B.Tech. (Fashion Technology)

Revised 2018 Regulations, Curriculum & Syllabi

Stay Ahead

BANNARI AMMAN INSTITUTE OF TECHNOLOGY

An Autonomous Institution Affiliated to Anna University - Chennai • Approved by AICTE • Accredited by NAAC with "A+" Grade

SATHYAMANGALAM - 638401 ERODE DISTRICT TAMILNADU INDIA

Ph : 04295-226000/221289 Fax : 04295-226666 E-mail : stayahead@bitsathy.ac.in Web : www.bitsathy.ac.in

CONTENTS

VISION OF THE DEPARTMENT

To provide dynamic and impactful education in the field of Fashion Design and Technology, facilitate the transfer of knowledge and skills, achieve academic excellence in meeting the emerging needs of the nation's fashion industry and the world.

MISSION OF THE DEPARTMENT

- To pursue impactful research, impart value based education and skill based education to meet the challenging needs of the Fashion industry as well as society.
- To foster students for higher education in fashion designing, merchandising, and research related activities.
- To nurture and develop entrepreneurial skills among students for project management and entrepreneurial ventures by providing infrastructure, human resources, and enterprise knowledge.

PROGRAMME EDUCATIONAL OBJECTIVIES (PEOs)

I. Graduates will be having successful careers in industry, academics, and research in the fields of apparel technology and fashion design with a fundamental knowledge and skill in the basics of science, technology, arts, mathematics, computers, and apparel manufacturing processes

II. Graduates will be globally competent in fashion industry project management and entrepreneurship through effective communication, design, and technology skills and also be able to appraise social and environmental issues.

III. Graduates will demonstrate a spirit of ethics, leadership and engage in professional practice throughout their careers.

PROGRAMME OUTCOMES (POs)

1. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

1. Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products, and accessories.
2. Articulate design aesthetics, communicate product values, collaborate across disciplines as a member and leader; and envision solutions in fashion systems: design, technology, production, and management.

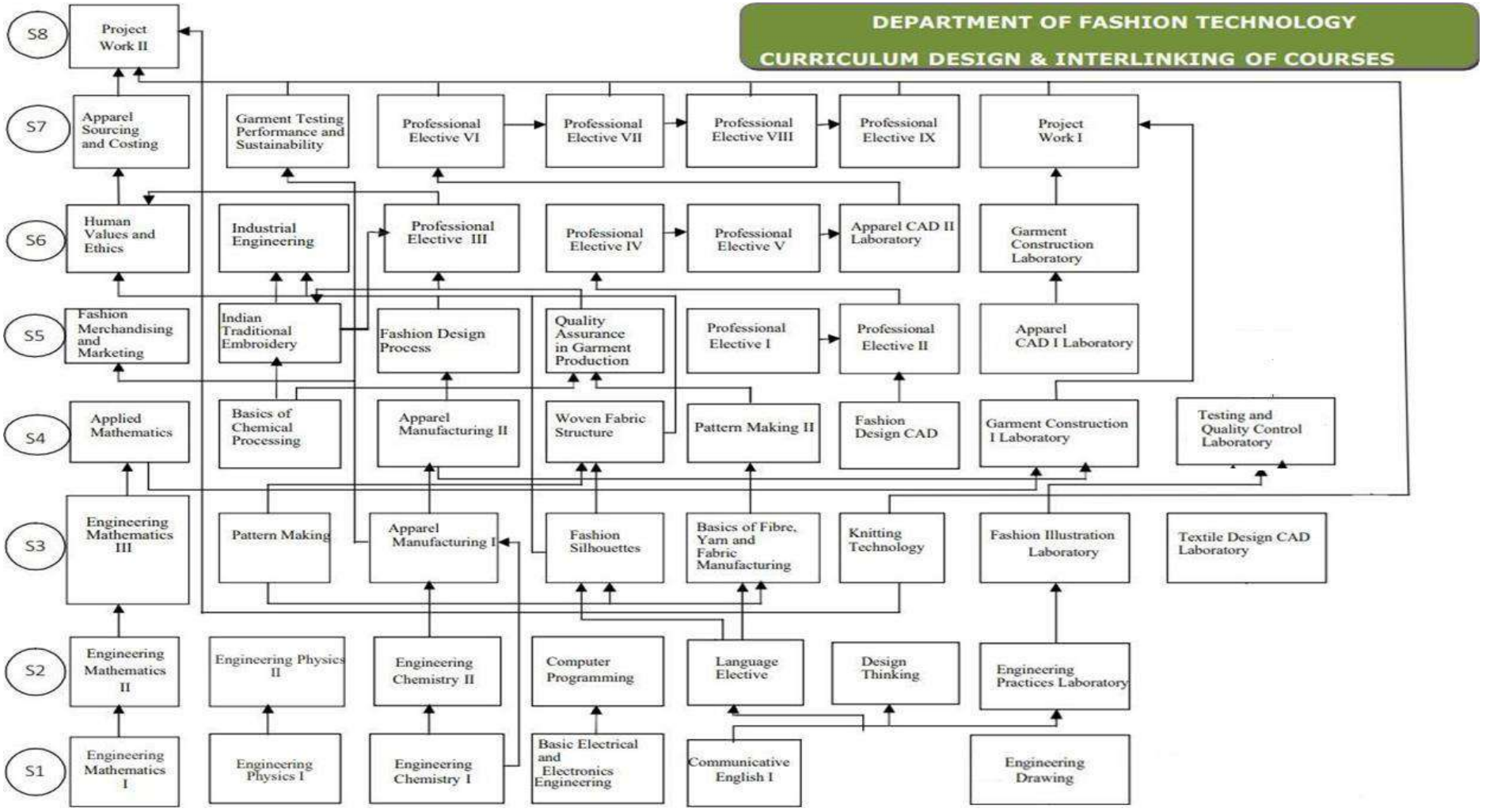
MAPPING OF PEOs AND POs

PEO(s)	**Programme Outcomes(s)**											
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)
I	X	X	X	X	X		X				X	X
II			X			X	X	X	X	X		X
III			X	X		X	X	X	X	X	X	X

DEPARTMENT OF FASHION TECHNOLOGY

CURRICULUM DESIGN & INTERLINKING OF COURSES

CONNECTIVITY CHART



GENERAL ELECTIVES (I TO IX) ARE THE COURSES OFFERED BY THE DEPARTMENT

(Candidates admitted during Academic Year 2021-2022)

DEPARTMENT OF FASHION TECHNOLOGY
Minimum Credits to be Earned: 163

I SEMESTER

Code No.	Course	L	T	P	C	Hours/ Week	Maximum Marks			Category
							CIA	SEE	Total	
18FT101	ENGINEERING MATHEMATICS I	3	1	0	4	4	40	60	100	BS
18FT102	ENGINEERING PHYSICS I	2	0	2	3	4	50	50	100	BS
18FT103	ENGINEERING CHEMISTRY I	2	0	2	3	4	50	50	100	BS
18FT104	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	2	0	2	3	4	50	50	100	ES
18HS101	COMMUNICATIVE ENGLISH I	1	0	2	2	3	100	0	100	HS
18FT106	ENGINEERING DRAWING	1	0	4	3	5	100	0	100	ES
Total		**11**	**1**	**12**	**18**	**24**	**-**	**-**	**-**	**-**

II SEMESTER

Code No.	Course	L	T	P	C	Hours/ Week	Maximum Marks			Category
							CIA	SEE	Total	
18FT201	ENGINEERING MATHEMATICS II	3	1	0	4	4	40	60	100	BS
18FT202	ENGINEERING PHYSICS II	2	0	2	3	4	50	50	100	BS
18FT203	ENGINEERING CHEMISTRY II	2	0	2	3	4	50	50	100	BS
18FT204	COMPUTER PROGRAMMING	2	0	2	3	4	50	50	100	ES
	LANGUAGE ELECTIVE	1	0	2	2	3	100	0	100	HS
18FT206	DESIGN THINKING	2	0	2	3	4	50	50	100	ES
18FT207	ENGINEERING PRACTICES LABORATORY	0	0	4	2	4	100	0	100	ES
Total		**12**	**1**	**14**	**20**	**27**	**-**	**-**	**-**	**-**

III SEMESTER										
Code No.	**Course**	**L**	**T**	**P**	**C**	**Hours/ Week**	**Maximum Marks**			**Category**
							CIA	**SEE**	**Total**	
18FT301	ENGINEERING MATHEMATICS III	3	1	0	4	4	40	60	100	BS
18FT302	PATTERN MAKING	2	0	2	3	4	50	50	100	PC
18FT303	APPAREL MANUFACTURING I	2	0	2	3	4	50	50	100	PC
18FT304	FASHION SILHOUETTES	2	0	2	3	4	50	50	100	PC
18FT305	BASICS OF FIBER, YARN AND FABRIC MANUFACTURING	3	0	0	3	3	40	60	100	PC
18FT306	KNITTING TECHNOLOGY	3	0	0	3	3	40	60	100	PC
18FT307	FASHION ILLUSTRATION LABORATORY	0	0	4	2	4	100	0	100	PC
18FT308	TEXTILE DESIGN CAD LABORATORY	0	0	4	2	4	100	0	100	PC
18GE301	SOFT SKILLS-VERBAL ABILITY	0	0	2	0	2	100	0	100	EEC
Total		**15**	**1**	**16**	**23**	**32**	**-**	**-**	**-**	**-**
IV SEMESTER										
Code No.	**Course**	**L**	**T**	**P**	**C**	**Hours/ Week**	**Maximum Marks**			**Category**
							CIA	**SEE**	**Total**	
18FT401	APPLIED MATHEMATICS	2	1	0	3	3	40	60	100	BS
18FT402	BASICS OF CHEMICAL PROCESSING	3	0	2	4	5	50	50	100	PC
18FT403	APPAREL MANUFACTURING II	2	0	2	3	4	50	50	100	PC
18FT404	WOVEN FABRIC STRUCTURE	2	0	2	3	4	50	50	100	PC
18FT405	PATTERN MAKING II	3	0	2	4	5	50	50	100	PC
18FT406	FASHION DESIGN CAD	2	0	2	3	4	50	50	100	PC
18FT407	GARMENT CONSTRUCTION I LABORATORY	0	0	4	2	4	100	0	100	PC
18FT408	TESTING AND QUALITY CONTROL LABORATORY	0	0	4	2	4	100	0	100	PC
18HS001	ENVIRONMENTAL SCIENCE	2	0	0	0	2	100	0	100	HSS
18GE401	SOFT SKILLS – BUSINESS ENGLISH	0	0	2	0	2	100	0	100	EEC
Total		**16**	**1**	**20**	**24**	**37**	**-**	**-**	**-**	**-**

V SEMESTER										
Code No.	**Course**	**L**	**T**	**P**	**C**	**Hours/ Week**	**Maximum Marks**			**Category**
							CIA	**SEE**	**Total**	
21FT501	FASHION MERCHANDISING AND MARKETING	3	0	0	3	3	40	60	100	PC
21FT502	INDIAN TRADITIONAL EMBROIDERY	3	0	2	4	5	50	50	100	PC
21FT503	FASHION DESIGN PROCESS	3	0	2	4	5	50	50	100	PC
21FT504	QUALITY ASSURANCE IN GARMENT PRODUCTION	3	0	0	3	3	40	60	100	PC
	PROFESSIONAL ELECTIVE I	3	0	0	3	3	40	60	100	PE
	PROFESSIONAL ELECTIVE II	3	0	0	3	3	40	60	100	PE
21FT507	APPAREL CAD I LABORATORY	0	0	4	2	4	100	0	100	PC
21FT508	GARMENT CONSTRUCTION II LABORATORY	0	0	4	2	4	100	0	100	PC
18GE501	SOFT SKILLS – APTITUDE I	0	0	2	0	2	100	0	100	EEC
Total		**18**	**0**	**14**	**24**	**32**	-	-	-	-
VI SEMESTER										
Code No.	**Course**	**L**	**T**	**P**	**C**	**Hours/ Week**	**Maximum Marks**			**Category**
							CIA	**SEE**	**Total**	
21HS002	HUMAN VALUES AND ETHICS	2	0	0	2	2	40	60	100	HSS
21FT602	INDUSTRIAL ENGINEERING	3	0	2	4	5	50	50	100	PC
21FT603	FASHION PORTFOLIO	2	0	2	3	4	50	50	100	PC
	PROFESSIONAL ELECTIVE III	3	0	0	3	3	40	60	100	PE
	PROFESSIONAL ELECTIVE IV	3	0	0	3	3	40	60	100	PE
	PROFESSIONAL ELECTIVE V	3	0	0	3	3	40	60	100	PE
21FT607	APPAREL CAD II LABORATORY	0	0	4	2	4	100	0	100	PC
21FT608	GARMENT CONSTRUCTION III LABORATORY	0	0	4	2	4	100	0	100	PC
18GE601	SOFT SKILLS – APTITUDE II	0	0	2	0	2	100	0	100	EEC
Total		**16**	**0**	**14**	**22**	**30**	-	-	-	-

VII SEMESTER										
Code No.	**Course**	**L**	**T**	**P**	**C**	**Hours/ Week**	**Maximum Marks**			**Category**
							CIA	**SEE**	**Total**	
21FT701	APPAREL SOURCING AND COSTING	3	0	0	3	3	40	60	100	PC
21FT702	GARMENT TESTING - PERFORMANCE AND SUSTAINABILITY	3	0	0	3	3	40	60	100	PC
	PROFESSIONAL ELECTIVE VI	3	0	0	3	3	40	60	100	PE
	PROFESSIONAL ELECTIVE VII	3	0	0	3	3	40	60	100	PE
	PROFESSIONAL ELECTIVE VIII	3	0	0	3	3	40	60	100	PE
	PROFESSIONAL ELECTIVE IX	3	0	0	3	3	40	60	100	PE
21FT707	PRODUCT DEVELOPMENT LABORATORY	0	0	4	2	4	60	40	100	PC
21FT708	PROJECT WORK I	0	0	6	3	6	60	40	100	EEC
Total		**18**	**0**	**10**	**23**	**28**	**-**	**-**	**-**	**-**
VIII SEMESTER										
Code No.	**Course**	**L**	**T**	**P**	**C**	**Hours/ Week**	**Maximum Marks**			**Category**
							CIA	**SEE**	**Total**	
21FT801	PROJECT WORK II	0	0	18	9	18	60	40	100	EEC
Total		**0**	**0**	**18**	**9**	**18**	**-**	**-**	**-**	**-**

ELECTIVES										
LANGUAGE ELECTIVES										
Code No.	**Course**	**L**	**T**	**P**	**C**	**Hours/ Week**	**Maximum Marks**			**Category**
							CIA	**SEE**	**Total**	
18HS201	COMMUNICATIVE ENGLISH II	1	0	2	2	3	100	0	100	HSS
18HSH01	HINDI	1	0	2	2	3	100	0	100	HSS
18HSG01	GERMAN	1	0	2	2	3	100	0	100	HSS
18HSJ01	JAPANESE	1	0	2	2	3	100	0	100	HSS
18HSC01	CHINESE	1	0	2	2	3	100	0	100	HSS
18HSF01	FRENCH	1	0	2	2	3	100	0	100	HSS

ELECTIVES										
PROFESSIONAL ELECTIVES										
Code No.	**Course**	**L**	**T**	**P**	**C**	**Hours / Week**	**Maximum Marks**			**Category**
							CIA	**SEE**	**Total**	
VERTICAL I - APPAREL MARKETING										
21FT001	TREND ANALYSIS AND FASHIONFORECASTING	3	0	0	3	3	40	60	100	PE
21FT002	VISUAL MERCHANDISING	3	0	0	3	3	40	60	100	PE
21FT003	ESSENTIALS OF APPAREL MARKETING	3	0	0	3	3	40	60	100	PE
21FT004	APPAREL RETAIL MANAGEMENT	3	0	0	3	3	40	60	100	PE
21FT005	FASHION BRAND MANAGEMENT	3	0	0	3	3	40	60	100	PE
21FT006	DIGITAL MARKETING AND E BUSINESS	3	0	0	3	3	40	60	100	PE
VERTICAL II - APPAREL PRODUCT DEVELOPMENT										
21FT007	KNIT WEAR DEVELOPMENT	3	0	0	3	3	40	60	100	PE
21FT008	CLOTHING COMFORT	3	0	0	3	3	40	60	100	PE
21FT009	FASHION ACCESSORIES	3	0	0	3	3	40	60	100	PE
21FT010	GARMENT FINISHING AND CARE	3	0	0	3	3	40	60	100	PE
21FT011	HOME FURNISHING	3	0	0	3	3	40	60	100	PE
21FT012	APPAREL PRODUCT DEVELOPMENT.	3	0	0	3	3	40	60	100	PE
VERTICAL III- GARMENT MANUFACTURING										
21FT013	AUTOMATIONS IN APPAREL MANUFACTURING	3	0	0	3	3	40	60	100	PE
21FT014	LEAN MANUFACTURING	3	0	0	3	3	40	60	100	PE
21FT015	SUPPLY CHAIN MANAGEMENT FOR APPAREL INDUSTRY	3	0	0	3	3	40	60	100	PE
21FT016	SOCIAL COMPLIANCES AND QUALITYASSURANCE IN APPAREL INDUSTRY	3	0	0	3	3	40	60	100	PE
21FT017	ADVANCED TECHNOLOGIES FOR APPARELINDUSTRY	3	0	0	3	3	40	60	100	PE

21FT018	COMPUTER APPLICATIONS IN APPAREL MANUFACTURING	3	0	0	3	3	40	60	100	PE
VERTICAL IV- APPAREL MANAGEMENT										
21FT019	OPERATIONS RESEARCH IN APPARELINDUSTRY	3	0	0	3	3	40	60	100	PE
21FT020	ENTERPRISE RESOURCE PLANNING INAPPAREL INDUSTRY	3	0	0	3	3	40	60	100	PE
21FT021	INTERNATIONAL BUSINESS IN APPARELINDUSTRY	3	0	0	3	3	40	60	100	PE
21FT022	ENTREPRENEURSHIP IN APPAREL MANUFACTURING	3	0	0	3	3	40	60	100	PE
21FT023	SUSTAINABLE APPAREL BUSINESS MANAGEMENT	3	0	0	3	3	40	60	100	PE
21FT024	APPAREL PRODUCTION MANAGEMENT	3	0	0	3	3	40	60	100	PE
VERTICAL V- SPECIALTY APPAREL										
21FT025	TECHNOLOGY OF NON-WOVENS	3	0	0	3	3	40	60	100	PE
21FT026	PROTECTIVE GARMENTS	3	0	0	3	3	40	60	100	PE
21FT027	INTIMATE APPARELS	3	0	0	3	3	40	60	100	PE
21FT028	SMART TEXTILES AND GARMENTS	3	0	0	3	3	40	60	100	PE
21FT029	SPORTS TEXTILES AND GARMENTS	3	0	0	3	3	40	60	100	PE
21FT030	MEDICAL TEXTILES AND GARMENTS	3	0	0	3	3	40	60	100	PE
VERTICAL VI - FASHION DESIGN										
21FT031	HISTORY OF CLOTHING AND FASHION	3	0	0	3	3	40	60	100	PE
21FT032	FASHION STYLING AND MODELLING	3	0	0	3	3	40	60	100	PE
21FT033	FASHION PHOTOGRAPHY AND CHOREO	3	0	0	3	3	40	60	100	PE
21FT034	FASHION COMMUNICATION	3	0	0	3	3	40	60	100	PE
21FT035	FASHION VISAGE	3	0	0	3	3	40	60	100	PE
21FT036	CHRONICLE OF FASHION	3	0	0	3	3	40	60	100	PE
21FT037	TEXTILE HERITAGE	3	0	0	3	3	40	60	100	PE
VERTICAL VII - IT APPLICATION FOR FASHION BUSINESS										
21FT038	DATA MANAGEMENT TECHNIQUES	3	0	0	3	3	40	60	100	PE
21FT039	PRINCIPLES OF WEB DESIGN	3	0	0	3	3	40	60	100	PE
21FT040	E COMMERCE IN FASHION	3	0	0	3	3	40	60	100	PE
21FT041	ERP FOR FASHION BUSINESS	3	0	0	3	3	40	60	100	PE
21FT042	INTRODUCTION TO AI APPLICATION	3	0	0	3	3	40	60	100	PE
21FT043	IOT IN FASHION	3	0	0	3	3	40	60	100	PE
21FT044	TECHNICAL DESIGN FOR GARMENT MANUFACTURING	3	0	0	3	3	40	60	100	PE

HONOUR VERTICAL COURSES										
21FTH01	ADVANCED TECHNOLOGIES FOR APPARELINDUSTRY	3	0	0	3	3	40	60	100	PE

21FTH02	SUPPLY CHAIN MANAGEMENT FOR APPARELINDUSTRY	3	0	0	3	3	40	60	100	PE
21FTH03	LEAN MANUFACTURING	3	0	0	3	3	40	60	100	PE
21FTH04	SOCIAL COMPLIANCES AND QUALITYASSURANCE IN APPAREL INDUSTRY	3	0	0	3	3	40	60	100	PE
21FTH05	COMPUTER APPLICATIONS IN APPARELMANUFACTURING	3	0	0	3	3	40	60	100	PE
21FTH06	TECHNICAL DESIGN FOR GARMENT MANUFACTURING	3	0	0	3	3	40	60	100	PE
21FTH07	E COMMERCE IN FASHION	3	0	0	3	3	40	60	100	PE

MINOR VERTICAL COURSES										
21FTM01	ADVANCED TECHNOLOGIES FOR APPARELINDUSTRY	3	0	0	3	3	40	60	100	PE
21FTM02	SUPPLY CHAIN MANAGEMENT FOR APPARELINDUSTRY	3	0	0	3	3	40	60	100	PE
21FTM03	LEAN MANUFACTURING	3	0	0	3	3	40	60	100	PE
21FTM04	SOCIAL COMPLIANCES AND QUALITYASSURANCE IN APPAREL INDUSTRY	3	0	0	3	3	40	60	100	PE
21FTM05	COMPUTER APPLICATIONS IN APPARELMANUFACTURING	3	0	0	3	3	40	60	100	PE
21FTM06	TECHNICAL DESIGN FOR GARMENTMANUFACTURING	3	0	0	3	3	40	60	100	PE
21FTM07	AUTOMATIONS IN APPAREL MANUFACTURING	3	0	0	3	3	40	60	100	PE

B. Tech- FT | Minimum Credits to be earned: 163 | Revised Regulations 2018

OPEN ELECTIVES										
Code No.	**Course**	**L**	**T**	**P**	**C**	**Hours/ Week**	**Maximum Marks**			**Category**
							CIA	**SEE**	**Total**	
21OCE01	ENERGY CONSERVATION AND MANAGEMENT	3	0	0	3	3	40	60	100	OE
21OCS01	OBJECT ORIENTED PROGRAMMING	3	0	0	3	3	40	60	100	OE
21OCS02	JAVA FUNDAMENTALS	3	0	0	3	3	40	60	100	OE
21OCS03	KNOWLEDGE DISCOVERY IN DATABASES	3	0	0	3	3	40	60	100	OE
21OCS04	E LEARNING TECHNIQUES	3	0	0	3	3	40	60	100	OE
21OCS05	SOCIAL TEXT AND MEDIA ANALYTICS	3	0	0	3	3	40	60	100	OE
21OEI01	PROGRAMMABLE LOGIC CONTROLLER	3	0	0	3	3	40	60	100	OE
21OEI02	SENSOR TECHNOLOGY	3	0	0	3	3	40	60	100	OE
21OEI03	FUNDAMENTALS OF VIRTUAL INSTRUMENTATION	3	0	0	3	3	40	60	100	OE
21OEI04	OPTOELECTRONICS AND LASER INSTRUMENTATION	3	0	0	3	3	40	60	100	OE
21OME01	DIGITAL MANUFACTURING	3	0	0	3	3	40	60	100	OE
21OME02	INDUSTRIAL PROCESS ENGINEERING	3	0	0	3	3	40	60	100	OE
21OME03	MAINTENANCE ENGINEERING	3	0	0	3	3	40	60	100	OE
21OME04	SAFETY ENGINEERING	3	0	0	3	3	40	60	100	OE
21OFD01	TRADITIONAL FOODS	3	0	0	3	3	40	60	100	OE
21OFD02	FOOD LAWS AND REGULATIONS	3	0	0	3	3	40	60	100	OE
21OFD03	POST-HARVEST TECHNOLOGY OF FRUITS AND VEGETABLES	3	0	0	3	3	40	60	100	OE

21OFD04	CEREAL, PULSES, AND OIL SEEDTECHNOLOGY	3	0	0	3	3	40	60	100	OE
21OPH01	NANOMATERIALS SCIENCE	3	0	0	3	3	40	60	100	OE
21OPH02	SEMICONDUCTOR PHYSICS ANDDEVICES	3	0	0	3	3	40	60	100	OE
21OPH03	APPLIED LASER SCIENCE	3	0	0	3	3	40	60	100	OE
21OPH04	BIO PHOTONICS	3	0	0	3	3	40	60	100	OE
21OPH05	PHYSICS OF SOFT MATTER	3	0	0	3	3	40	60	100	OE
21OCH01	CORROSION SCIENCE AND ENGINEERING	3	0	0	3	3	40	60	100	OE
21OCH02	POLYMER SCIENCE	3	0	0	3	3	40	60	100	OE
21OCH03	ENERGY STORING DEVICES	3	0	0	3	3	40	60	100	OE
21OGE01	PRINCIPLES OF MANAGEMENT	3	0	0	3	3	40	60	100	OE
21OGE02	ENTREPRENEURSHIP DEVELOPMENT I	3	0	0	3	3	40	60	100	OE
21OGE03	ENTREPRENEURSHIP DEVELOPMENT II	3	0	0	3	3	40	60	100	OE
21OGE04	NATION BUILDING: LEADERSHIP ANDSOCIAL RESPONSIBILITY	3	0	0	3	3	40	60	100	OE

18FT101 ENGINEERING MATHEMATICS I 3 1 0 4

Course Objectives

- Understand the concepts of vectors and Eigenvectors for different matrices to describe the stability of the linear systems in engineering fields.
- Exemplify the concepts of differentiation and integration to identify the area of 2D and 3D surfaces in engineering problems.
- Explain the concepts of analytic functions in complex domain to predict the nature of different engineering systems.

Programme Outcomes (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

Course Outcomes (COs)

1. Represent the different forms of coordinate system in complex plane and characteristics of linear systems by Eigenvalues and Eigenvectors.
2. Analyse various types of functions and their differentiation techniques involved in engineering fields.
3. Implement different methods of integration used in engineering problems.
4. Execute the suitable integration technique to calculate the area and volume of different surfaces.
5. Apply the concept of analytic function to estimate the integral in complex plane.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	1	3												
2	2	3												
3	2	3												
4	3	3												
5	1	3												

UNIT I **9 Hours**

COMPLEX NUMBERS, VECTORS AND MATRICES

Complex plane, polar coordinates and polar form of complex numbers, powers and roots, fundamental theorem of algebra. Vector algebra in 2-D and 3-D space, dot product and cross product. Matrices : Eigen values and Eigen vectors, Properties of eigen values and eigen vectors.

UNIT II **9 Hours**

CALCULUS

Limits and Continuity of Functions: Limits of functions, types of limits, evaluation of limits, continuity of functions, properties of continuous functions. Derivatives: Derivatives, differentiability, rules and properties, differentiation of transcendental functions, higher order derivatives, implicit differentiation, and differentiation of hyperbolic functions. Integration: Anti-derivatives, RiemannSum, indefinite and definite integration, Mean Value Theorem for definite integral, Fundamental Theorem ofCalculus.

UNIT III **9 Hours**

INTEGRATION METHODS

Basic integration formulae for algebraic and transcendental functions. Integration by special devices: integration by parts, rationalizing substitution or trigonometric substitution, partial fractions, reduction formulas, improper integrals, convergence tests.

UNIT IV **9 Hours**

APPLICATIONS OF DERIVATIVES AND INTEGRATIONS

Extreme values, points of inflection and curve sketching, Rolles Theorem, Mean Value Theorem, optimization, indeterminate forms, L Hopitals Rule. Area between curves, volume of a general solid by slicing and cylindrical shell methods, volume of a solid of revolution, length of plane curves, area of a surface of revolution.

UNIT V **9 Hours**

COMPLEX ANALYSIS

Analytic Functions- Properties of Analytic function - Determination of Analytic Function using Milne Thompson method. Cauchy's Integral Formula - Classification of Singularities - Cauchy's Residue Theorem.

Total: 45+15=60 Hours

Reference(s)

1. Finney RL, Weir MD and Giordano FR, Thomas Calculus, 10th edition, Addison-Wesley, 2001
2. Smith RT and Minton RB, Calculus, 2nd Edition, McGraw Hill, 2002.
3. Kreysgiz E, Advanced Engineering Mathematics, 8th edition, John Wiley & Sons, 1999.
4. Anton H, Calculus with Analytic Geometry, 5th edition, John Wiley & Sons, 1995.
5. Ayres F Jr and Mendelson E, Schaum s Outline of Theory and Problems of Calculus, 4^{th}edition, McGraw Hill, 1999.
6. S.C. Gupta, Fundamentals of Statistics, 7th Edition, Himalaya Publishing House Pvt. Ltd. 2018.

18FT102 ENGINEERING PHYSICS I 2 0 2 3

Course Objectives

- Illustrate the Newtons laws of motion and wave motion with applications
- Understand the basic properties of electricity, magnetism and optics
- Differentiate the special theory of relativity and quantum physics from classical physics

Programme Outcomes (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO9: Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

Course Outcomes (COs)

1. Illustrate the Newtons three laws of motion and apply the same to solve the real world problems involving elevator, at wood machine and acceleration of objects
2. Exemplify the physical characteristics of simple harmonic motion, wave motion and find the solutions for wave equations
3. Infer the fundamental laws, properties of electricity and magnetism and apply the same to electric and magnetic elements
4. Apply the principles of physical and geometrical optics in the mirrors, lenses, microscopes and diffraction gratings
5. Outline the importance of special theory of relativity, quantum physics and analyse the wave and particle nature of matter

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	1							2					
2	2								2					
3	2	2												
4	2	2							2					
5	2	1							2					

UNIT I **6 Hours**

MECHANICS

Newtons laws of motion: Concept of force and its nature - Newtons first law and inertial frames-definition of mass- Newtons second law-gravitational force and weight - Newtons third law. Applications of Newtons laws: particle in equilibrium, particle under net force - weighing a mass in an elevator, the atwood machine and acceleration of two objects connected by a cord

UNIT II **6 Hours**

OSCILLATIONS AND WAVES

Fundamentals of simple harmonic motion -energy of simple harmonic oscillator - spring mass system - time period of simple pendulum, compound pendulum and torsional pendulum -Damped oscillations. Travelling wave motion - sinusoidal waves on strings - speed of a wave - reflection and transmission - rate of energy transfer in wave motion

UNIT III **6 Hours**

ELECTRICITY AND MAGNETISM

Point charges - electric fields - Gauss law and its applications - electric potential - capacitance - energy stored in a capacitor. Concept and source of magnetic fields - Amperes theorem - determination of magnetic field due to different current distributions - Faradays law - self-induction and mutual induction - energy stored in an inductor

UNIT IV **6 Hours**

LIGHT AND OPTICS

Nature of light - laws of reflection and refraction -refractive index and Snells law - dispersion of light - total internal reflection - image formation: concave mirrors - convex mirrors - thin lenses - compound microscope - human eye. Conditions of interference -Youngs double slit experiment- intensity distribution of interference - phase change due to reflection - diffraction-narrow slit diffraction - single slit and two slit - intensity distribution - diffraction grating - applications

UNIT V **6 Hours**

MODERN PHYSICS

Special theory of relativity - simultaneity and time dilation - twin paradox - length contraction - relativistic mass variation - space time graph. Black body radiation and Planck hypothesis - allowed energy levels - thermal radiation from different objects - photo electric and Compton effect. Matter waves - de-Broglie hypothesis - wave nature of particles - Davission-Germer experiment

EXPERIMENT 1 **5 Hours**

Determination of resultant of system of concurrent coplanar forces-Parallelogram law of forces.

EXPERIMENT 2 **5 Hours**

Determination of moment of inertia-Torsional pendulum

EXPERIMENT 3 **5 Hours**

Determination of wavelength of mercury spectral lines-spectrometer

EXPERIMENT 4 **4 Hours**

Determination of refractive index of solid and liquid-travelling microscope

EXPERIMENT 5 **3 Hours**

Determination of wavelength of laser-diffraction grating

EXPERIMENT 6 **4 Hours**

Determination of frequency of a tuning fork-Melde's apparatus

EXPERIMENT 7 **4 Hours**

Thickness of a thin wire using interference of light-Air wedge method

Total: 60 Hours

Reference(s)

1. R A Serway and J W Jewitt, Physics for Scientists and Engineers, Thomson Brooks/Cole, 2011.
2. Halliday and Resnick, Fundamentals of Physics, John Wiley and Sons, Inc, 2011.
3. H C Verma, Concepts of Physics (Vol I & II), Bharathi Bhawan Publishers & Distributors, New Delhi, 2017.
4. H D Young and R A Freedman, Sears and Zemanskys University Physics with Modern Physics, Pearson education, 2016.
5. R K Gaur and S L Gupta, Engineering Physics, Dhanpat Rai Publications, 2012.

18FT103 ENGINEERING CHEMISTRY I 2 0 2 3

Course Objectives

- Explain the composition and properties of clothing care items
- Differentiate between ionic, covalent, coordinate bonding and classify the bonding between dye and fabric as ionic or covalent
- Review types, sources, chemical composition/properties and applications of different fibres used in fashion industry
- Select suitable accessories to create new designs by analyzing its properties

Programme Outcomes (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

Course Outcomes (COs)

1. Summarize the influence of hard water, chemical action of soap and role of stiffening agents on fabrics
2. Illustrate the influence of different chemical bonds on the dye fiber interaction
3. Classify fibres based on source/applications and identify the type of fibre through chemical test
4. Exemplify natural, synthetic and semi synthetic fibres based on its chemical composition, properties and applications
5. Outline the chemical properties and uses of metals and gems as fashion accessories

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	2												
2	2	1												
3	2	2												
4	2	2												
5	3	2												

UNIT I **7 Hours**

CLOTHING CARE

Water- hard and soft water - determination of water hardness (EDTA method) - methods of softening water: Ion exchange process. Stain Removal: Laundry soaps - composition of soap - chemical action. Difference between soap and detergents. Various solvents for stain removing blood, tea, rust, oil/grease. Stiffening Agents: Purpose of stiffening - classification - uses of stiffeners - natural and commercial starches

UNIT II **5 Hours**

CHEMICAL BONDING

Ionic, covalent and co-ordinate bonds (overview only) - hydrogen bonding and its consequences- Vander Waals forces (dipole-dipole and dipole-induced dipole). Interaction between fibres/polymers and dyes (basic concept only) - dye substrate affinity (dyes for cellulose fibres and silk)

UNIT III **5 Hours**

INTRODUCTION TO FIBRES

Types of fibres (staple and filament fibres) - classification of fibres (based on source, and applications) - polymeric nature of fibres- difference between natural and synthetic fiber - fiber identification - burn test - difference between fiber and fabrics

UNIT IV **6 Hours**

FIBRES IN FASHION INDUSTRY

Natural fibres: Classification - identification - chemical composition/properties and applications: Cellulosic fibres (cotton and hemp) - protein fibres (wool and silk) - semisynthetic fibers (rayon). Synthetic fibers (polyester and nylon)

UNIT V **7 Hours**

FASHION ACCESSORIES

Definition/ chemical properties and uses- Terracotta and quilling. Metals in fashion accessories: Atomic structure, properties and applications of base/coat metals - iron, nickel, copper, gold and silver. Electroplating of copper. Gemstones - classification - inorganic and organic gemstones: Composition and properties of ruby, emerald, topaz, pearl, amber and coral

FURTHER READING

Applications of fibres in day-to-day life-Fibre composites - smart clothes using composite fibres Impact of corrosion in textile and fashion industry

EXPERIMENT 1 **2 Hours**

Lab safety rules and guidelines for students

EXPERIMENT 2 **2 Hours**

Preparation of N/10 and M/10 oxalic acid and sodium carbonate solutions

EXPERIMENT 3 **4 Hours**

Determination of hardness in the water sample by EDTA method

EXPERIMENT 4 **2 Hours**

Identify suitable solvent to remove the stain due to organic or inorganic compounds.

EXPERIMENT 5 **4 Hours**

Preparation of starch indicator and application in iodometric titration for determination of Hypochlorite in a Commercial Bleach Product.

EXPERIMENT 6 **4 Hours**

Collect and document three natural as well as synthetic fibers and list its properties and uses

EXPERIMENT 7 **4 Hours**

Design suitable fashion accessories using economically viable recyclable materials (Paper/clay)

EXPERIMENT 8 **4 Hours**

Demonstration of electroplating of copper on stainless steel object

EXPERIMENT 9 **4 Hours**

Estimation of amount of copper in brass by EDTA method

Total: 60 Hours

Reference(s)

1. J.D. Lee, Concise inorganic chemistry, Blackman Science Ltd, France, Wiley-India, 5th edition (Reprint), 2016.
2. V.R. Gowariker, N.V. Viswanathan and Jayader Sreedhar, Polymer Science, New Age International (P) Limited, 2nd edition, 2015.
3. P. C. Jain and M. Jain, Engineering Chemistry, Dhanpat Rai Publications., New Delhi, 2016.
4. B. R. Puri, L. R. Sharma and Madan S. Pathania, Principles of Physical Chemistry, Shoban Lal Nagin Chand & Co., 2010.
5. Mihir Deb, Sanjib Chandra Sarkar, Minerals and Allied Natural Resources and their Sustainable Development, Springer, 2017.

18FT104 BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING

2 0 2 3

Course Objectives

- To understand the basic concepts of electrical circuits and machines.
- To examine the speed control methods of DC motor and electrical safety devices.
- To illustrate the measurement techniques of illumination and noise levels.

Programme Outcomes (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

Course Outcomes (COs)

1. Explain the electrical properties and means of measuring them.
2. Examine the construction and operation principles of electrical machines.
3. Illustrate the fundamental concepts of electronics.
4. Demonstrate knowledge of the measurement techniques applied for measuring Illumination levels and noise levels.
5. Analyze the safety measures incorporated in electrical machines and devices.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2												
2	3	2												
3	3	2												
4	2	2												
5	3	2												

UNIT I **5 Hours**

PROPERTIES OF MATERIALS AND MEASUREMENT

Electrical properties such as Conductivity, Resistivity, Capacitance of Nano Materials and Fibres ,Measurement of Voltage, Current, Power and Power factor using Digital meter - LCRQ meter.

UNIT II **8 Hours**

ELECTRICAL MACHINES AND DRIVES

Construction and Operation of Permanent magnet DC motors, Single phase Induction Motor, Servo Motor - Drive system for Sewing Machines.

UNIT III **5 Hours**

FUNDAMENTALS OF ELECTRONICS

Characteristics of PN Junction diode, Timers - Display system, Interfacing DC motor with electronic control system.

UNIT IV **6 Hours**

LIGHTS AND SOUNDS

Lux, Luminance, Luminance Intensity, measurement using Lux meter - Types of Lamps: Mercury Vapour Lamp, LED, CFL - Fundamentals of Sound: Noise level, Decibels, Noise meter.

UNIT V **6 Hours**

EARTHING SAFETY AND ACCESSORIES

Earthing: Necessity- Types of Earthing, Measurement of Earth Resistance - Types of fuses, MCB, ELCB Necessity of Insulation - Types of Switches, Sockets and Plugs for sewing and automated cutting machines.

EXPERIMENT 1 **6 Hours**

Measurement of conductivity, resistivity of fibres and conducting polymers.

EXPERIMENT 2 **6 Hours**

Develop a prototype driving mechanism for sewing machines.

EXPERIMENT 3 **6 Hours**

Develop a electronic speed control system for DC motor.

EXPERIMENT 4 **6 Hours**

Develop a Lighting system with uniform luminous intensity for a given location.

EXPERIMENT 5 **6 Hours**

Fuse replacement and earthing of equipment.

Total: 60 Hours

Reference(s)

1. A.L.Anwari, Basic of Electrical Engineering, Dhanpat Rai,2016.
2. Open Shaw Taylor, Utilization of Electrical Energy, University Press,2017.
3. Alan.S.Moris, Reza Langari, Measurement and Instrumentation, Elsevier,2011.
4. R. S. Sedha, A Textbook of Applied Electronics, S.Chand & Company Ltd, 2013.
5. D.S.Mathur, Elements of properties of materials, S.Chand Company, 2010.

18HS101 COMMUNICATIVE ENGLISH I 1 0 2 2

Course Objectives

- Read and understand the main points on familiar matters regularly encountered in work, school,or leisure
- Listen and respond in most common situations where English is spoken
- Write simple connected texts on topics which are familiar or of personal interest
- Describe experiences and events, hopes and ambitions and briefly give reasons and explanations for opinions and plans

Programme Outcomes (POs)

PO9: Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.**Course Outcomes (COs)**

1. Use appropriate grammar and vocabulary that is expected at the BEC Preliminary exam level
2. Understand the general meaning of non-routine letters within own work area, and short reports of a predictable nature
3. Write formal, routine letters of factual nature, and make notes on routine matters, such as taking/placing orders
4. Follow simple presentations/demonstrations
5. Deal with predictable requests from a visitor, state routine requirements, and offer advice within own job area on simple matters

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1														
2									2					
3														
4										1				
5										2				

UNIT I **9 Hours**

GRAMMAR

Tenses Future continuous, Past continuous, Past perfect, Past simple, Past tense responses, Present perfect continuous, Present perfect/past simple Reported speech Adverbs intensifiers Comparatives and superlatives Conditionals 2nd and 3rd Connecting words expressing cause and effect, contrast Phrasal verbs Prepositions of place Simple passive - Wh-questions in the past Question tags Will and going to, for prediction.

UNIT II **9 Hours**

READING

Understanding short real-world notices, messages Detailed comprehension of factual material; skimming and scanning skills - Interpreting visual information Reading for detailed factual information Reading for gist and specific information - Grammatical accuracy and understanding of text structure - Reading and information transfer.

UNIT III **9 Hours**

WRITING

Internal communication including note, message, memo or email - arranging / rearranging appointments, asking for permission, giving instructions - Business correspondence including letter, fax, email apologising and offering compensation, making or altering reservations, dealing with requests, giving information about a product.

UNIT IV **9 Hours**

LISTENING

Listening for specific information Listening for numbers and letters Note completion Listening for gist listening to monologues (presentations, lectures, announcements and briefings) listening to interacting speakers (telephone conversations, face-to-face conversations, interviews and discussions).

UNIT V **9 Hours**

SPEAKING

Exchanging personal and factual information expressing and finding out about attitudes and opinions organise a larger unit of discourse Turn-taking, negotiating, collaborating, exchanging information, expressing and justifying opinions, agreeing and/or disagreeing, suggesting, speculating, comparing and contrasting, and decision-making. 1.Goodbye party for Miss Pushpa T S - Nissim Ezekiel 2.Our Casuarina Tree - Toru Dutt 3.Palanquin Bearers - Sarojini Naidu 4.The Tyger - William Blake 5.Ode on a Grecian Urn - John Keats

Total: 45 Hours

Reference(s)

1. Alexander Garrett, Cambridge BEC Preliminary Students Book with Answers, Cambridge University Press, 2016.
2. Lan Wood, Anne Williams and Anna Cowper. Pass Cambridge BEC Preliminary, Second Edition, New Delhi, 2014.
3. Norman Whitby. Cambridge Business Benchmark. Pre-Intermediate to Intermediate, Students Book. South Asian Edition, 2018.

18FT106 ENGINEERING DRAWING **1 0 4 3**

Course Objectives

- To learn conventions and use of geometry in producing Engineering curves.
- To draw 3D objects and structures using projection concepts.
- To produce multiple views of the given objects and structures.
- To represent 3D objects using analytical drawing techniques.
- To depict humans in their environment by adopting appropriate scales.

Programme Outcomes (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories.

Course Outcomes (COs)

1. Illustrate different types of curves applying geometrical concepts.
2. Illustrate in representative style, basic 3D forms and visual patterns.
3. Construct 3D objects and structures applying projection concepts.
4. Develop geometrical objects and complex forms using analytical drawing techniques.
5. Illustrate humans and their environment applying appropriate scales.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2												
2	2	2			2									
3	2	2			2								1	
4	3	2			2								1	
5	3	2			2								1	

UNIT I **3 Hours**

ENGINEERING CURVES

Construction of hyperbola - eccentricity method. Construction of ellipse by concentric circle method, Construction of parabola by parallelogram method. Construction of Roulettes - Cycloids, Involutes.

UNIT II **3 Hour**

REPRESENTATION OF BASIC 3D FORMS AND VISUAL PATTERN

Foreshortening, Overlapping, Shades and Shadows.Visual pattern and texture - Dialation and rotation, rotation and radiation, reflection, patterns as repetition. Basic design explorations - Exploration of design elements.

UNIT III **3 Hours**

PCITORIAL SYSTEMS

Orthographic projections. Axonometric projections - isometric and diametric. Perspective projections - 1 point perspective, 2 point perspective.

UNIT IV **3 Hours**

ANALYTICAL DRAWING

Analytical drawing - Geometrical objects, Additive forms, Subtractive forms, Complex forms.

UNIT V **3 Hours**

SCALES IN REPRESENTING ART

Bird's Eye view, Ant's Eye view, Human scales in situation sketching. Architecture and human scale, Human figure and Anatomy.

EXPERIMENT 1 **6 Hours**

Construction of hyperbola by eccentricity method and ellipse by concentric circle method

EXPERIMENT 2 **6 Hours**

Construction of roulettes: cycloid and involutes

EXPERIMENT 3 **6 Hours**

Render a 3D object by foreshortening technique. Highlight the shadows.

EXPERIMENT 4 **6 Hours**

Develop a visual pattern by dilation and rotation, radiation and rotation with reference to giveninspiration

EXPERIMENT 5 **6 Hours**

Develop an orthographic projection of the given object

EXPERIMENT 6 **6 Hours**

Develop an isometric drawing and diametric drawing of the given reference object

EXPERIMENT 7 **6 Hours**

Develop a single point perspective drawing and two point perspective of the given scenario

EXPERIMENT 8 **6 Hours**

Develop an analytical drawing of the given geometric object. Show additive forms, subtractive forms and complex forms

EXPERIMENT 9 **6 Hours**

Depict the given picture in bird's eye view and ant's eye view.

EXPERIMENT 10 **6 Hours**

Depict the given scenario in situation sketching style.

Total: 75 Hours

Reference(s)

1. Allan Mcrobie, The seduction of curves: The lines of beauty that connects Mathematics, Art and the nude, Princeton University press, 2017.
2. Matt Rota, Pencil Art workshop: Techniques, ideas and inspirations for drawing and designing with pencil, Rockport publishers, 2017.
3. Deborah Velesquez, Drawing in Black and White: Creative excercises, Art techniques and Explorations in positive and negative design, Quarry books, 2016.
4. Francis D.K. Ching with Steven P Juroszek, Design drawing, John Wiley and sons, 2nd edition 2013.
5. K.V.Natarajan, A Text Book of Engineering Graphics, Dhanalakshmi Publishers, 2013.

18FT201 ENGINEERING MATHEMATICS II 3 1 0 4

Course Objectives

- Understand the concepts of partial derivatives and multiple integrals to define the area, volume and extreme values of various surfaces in engineering fields.
- Classify the sequences and series in linear systems is convergent or divergent.
- Formulate the real time engineering problem into mathematical model using ordinary differential equation and solve it by appropriate method.

Programme Outcomes (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

Course Outcomes (COs)

1. Illustrate the various parameters in partial differentiation and characterize the maxima and minima functions for signals and systems.
2. Apply multiple integral concepts to calculate the area and volume by appropriate vector integral theorems.
3. Analyse the convergence and divergence of sequences and series by various tests.
4. Construct first order differential equations from real time phenomena and solve it by suitable method.
5. Execute the appropriate method to solve the second order differential equations.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3												
2	2	3												
3	2	3												
4	1	3												
5	1	3												

UNIT I **9 Hours**

PARTIAL DIFFERENTIATION

Functions of several variables, plotting of 2-variable functions, introduction to cylindrical and spherical coordinates, chain rule, total differential, gradient, directional derivatives, normal lines and tangent planes, extreme of functions of two variables, applications.

UNIT II **9 Hours**

MULTIPLE INTEGRALS

Double integrals, regions of integrations, triple integrals, applications (Cartesian coordinates only- Green's theorem and Gauss Divergence theorem).

UNIT III **9 Hours**

SEQUENCES AND SERIES

Sequences and series, convergence and divergence of series, absolute convergence, conditional convergence, test for convergence and divergence. Power series for functions, interval of convergence, Taylor and Maclaurin series, Taylors Theorem with remainder.

UNIT IV **9 Hours**

FIRST ORDER DIFFERENTIAL EQUATIONS

Separable differential equations, homogeneous differential equations, exact differential equations, integrating factor, Bernoullis equation, applications.

UNIT V **9 Hours**

SECOND ORDER DIFFERENTIAL EQUATIONS

Second order homogeneous and non-homogeneous equations with constant coefficients, variation of parameters, method of undetermined coefficients, series solutions of differential equations, applications.

FOR FURTHER READING

Fast Fourier Transform in Paper making and Printing.

Total: 60 Hours

Reference(s)

1. Finney RL, Weir MD and Giordano FR, Thomas Calculus, 10th edition, Addison-Wesley, 2001
2. Smith RT and Minton RB, Calculus, 2nd Edition, McGraw Hill, 2002.Kreysgiz E, Advanced Engineering Mathematics, 8th edition, John Wiley & Sons, 1999.
3. Ray Wylie and C Louis Barrett, Advanced Engineering Mathematics, Sixth Edition, Tata McGraw-Hill Publishing Company Ltd, 2003.
4. Peter V. O Neil , Advanced Engineering Mathematics, Seventh Edition , Cengage Learning India Private Limited, 2012.
5. Glyn James, Advanced Engineering Mathematics, Third Edition, Wiley India, 2014.

18FT202 ENGINEERING PHYSICS II 2 0 2 3

Course Objectives

- Understand the elastic and surface properties of materials for their relevant applications to various streams of engineering and technology.
- Realize the importance of static and dynamic friction in textile materials.
- Apply the concepts involved in thermodynamics for solving the real world problems.

Programme Outcomes (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO9: Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

Course Outcomes (COs)

1. Understand the elastic properties of materials in terms of the three modulii of elasticity and surface properties of liquids
2. exemplify the wave properties, generation of ultrasonics and their applications in the field of nondestructive testing methods
3. illustrate the crystal structure, crystal planes and unit cell characteristics of cubic crystal systems
4. assess the differences between static and dynamic friction and effect of wear and abrasions in textile machinery parts
5. apply the knowledge of thermodynamics in calculating the heat requirement for fabric process and analyze kinetics of dyeing

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	1							2					
2	2	1							2					
3	2	1							2					
4	2	1							2					
5	2	1							2					

UNIT I **6 Hours**

ELASTICITY AND SURFACE PROPERTIES

Elasticity: elastic and plastic behavior of materials - stress - strain diagram - Hookes law types of elastic modulii: Youngs modulus - bulk modulus - rigidity modulus - Poissons ratio - factors affecting elasticity. Surface properties: cohesive force - adhesive force - factors affecting surface tension - interfacial tension - emulsions - detergency - foaming - wettability - coefficient of viscosity - Stokes law - Poiseuilles law - coefficient of viscosity of various liquids.

UNIT II **6 Hours**

ULTRASONICS

Properties of ultrasonic waves - generation: magnetostriction and piezoelectric methods - detection of ultrasonic waves - velocity of ultrasonic waves using acoustic grating. Nondestructive testing: pulse echo method - merits and demerits - applications: drilling - cutting - SONAR - Applications of ultrasonic in Textile and apparels

UNIT III **6 Hours**

SOLID STATE PHYSICS

Crystalline and noncrystalline materials - lattice points - space lattice - crystal structure -unit cells - Bravais lattice and crystal systems - Miller indices - procedure for finding Miller indices-relation between interplanar distance and interatomic distance - unit cell characteristics of SC, BCC, FCC and HCP structures

UNIT IV **6 Hours**

FRICTION

Friction: basic laws - static and dynamic friction - adhesion - sheering theory - surface roughness - deformation - ploughing - normal adhesion - effects of speed on friction - wear and abrasion - frictional behaviour of elastomers - rolling friction.

UNIT V **6 Hours**

THERMODYNAMICS

Heat - equilibrium and quasistatic process - path functions - comparison between heat and work - internal energy - laws of thermodynamics - isothermal and adiabatic process - work done - reversible and irreversible process - entropy diffusion- model for diffusion - diffusion coefficient - rate of dyeing, equilibrium, exhaustion, migration, adsorption and absorption of dyes - kinetics of dyeing with disperse dyes.

EXPERIMENT 1 — 4 Hours

Find the elevation of the given wooden beam at the midpoint by loading at the ends and hence calculate the Youngs modulus of the material.

EXPERIMENT 2 — 4 Hours

Find the depression at the midpoint of the given wooden beam for 50g, 100 g, 150 g, 200 g and 250 g subjected to non-uniform bending and determine the Youngs modulus of the material of the beam.

EXPERIMENT 3 — 4 Hours

Determine the moment of inertia of the disc and calculate the rigidity modulus of a given wire using torsion pendulum (symmetrical masses method).

EXPERIMENT 4 — 4 Hours

Determine the coefficient of viscosity of a given liquid by Poiseuille's method.

EXPERIMENT 5 **4 Hours**

Determine the
(i) wavelength of ultrasonics in a liquid medium,
(ii) velocity of ultrasonic waves in the given liquid
(iii) compressibility of the given liquid using ultrasonic interferometer.

EXPERIMENT 6 **5 Hours**

Determine the coefficient of thermal conductivity of a bad conductor by Lee's disc method

EXPERIMENT **5 Hours**

Form the interference fringes from the air wedge setup and calculate the thickness of the given material (yarn).

Total: 60 Hours

Reference(s)

1. A. Serway and John W. Jewett, JR. Physics for Scientists and Engineers with Modern Physics, Ninth Edition Raymond, 2016.
2. Bhattacharya, D.K. & Poonam, T. Engineering Physics. Oxford University Press, 2015.
3. Gaur, R.K. & Gupta, S.L. Engineering Physics. Dhanpat Rai Publishers, 2012
4. Pandey, B.K. & Chaturvedi, S. Engineering Physics- Cengage Learning India, 2012
5. B.S. Gupta, Friction in textile materials, Wood Cut Publishing Pvt Ltd. 2008

18FT203 ENGINEERING CHEMISTRY II 2 0 2 3

Course Objectives

- Explain the significance of electromagnetic spectrum on color theory based on complementary colors of light, chromophore, auxochrome, intensity shifts and illustrate photo processes based on Jablonski diagram
- Classify dyes based on source, its extraction methods and measures towards sustainable development
- Summarize the ingredients in paint for different applications in fashion industry

Programme Outcomes (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO7: Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

Course Outcomes (COs)

1. Summarize different regions in an electromagnetic spectrum and exemplify chromophores based on intensity shifts
2. Explain the influence of electromagnetic radiation in photochemical process of dyes
3. Classify natural and synthetic dyes based on its source, three extraction methods of natural dyes and research outcomes for sustainable dyeing process
4. Exemplify constituents and functions in paint, varnish and lacquers
5. Select suitable colouring chemicals based on the composition and properties for different applications in fashion industry

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	2												
2	2	1												
3	2	2					1							
4	3	2												
5	3	2					1							

UNIT I **6 Hours**

COLOUR THEORY FOR DESIGNERS

Colour terminology: Electromagnetic spectrum - absorption of radiation - electronic, vibrational and rotational transitions. Regions of electromagnetic spectrum - complementary colours. Chromophores, auxochromes, hyperchromic shift, hypochromic shift, hypsochromic shift and bathochromic shift - conjugated chromophores.

UNIT II **7 Hours**

PHOTOCHEMISTRY OF DYES

Photochromic dyes. Thermochromic dyes (Leuco dyes). Laws of photochemistry - Lambert-Beer Law and its limitations. Photoprocesses - Jablonski diagram (Internal Conversion, Inter-system crossing, Fluorescence, Phosphorescence) Chemiluminesence and Photo-sensitization. Principle,instrumentation (Block diagram)and applications: Colorimetric analysis (estimation of prussian blue dye).

UNIT III **6 Hours**

CLASSIFICATION OF DYES

Natural and synthetic dyes - examples. Evolution of natural dyes - sources - extraction methods - applications -sustainability - from unsustainable to sustainable development.

UNIT IV **5 Hours**

PAINTS

Characteristics of a good paint. Constituents and functions: Pigment, drying oil, thinners, driers, fillers, plasticizers, antiskinning agents. Varnish: Types constituents and functions. Lacquers: Constituents, examples and functions.

UNIT V **6 Hours**

COLORS OF FASHION

Historical painting materials. Paints for fabrics: Acrylic composition - mechanism of drying. Fire retardant paint -composition and properties. Face and body paint: Types-(natural and synthetic) - composition. Hair colour: Types-composition - effect of pH.

SELF STUDY

Finger print region (IR)
Fire proof paint
Nanotechnology in fashion industry

EXPERIMENT 1 **4 Hours**

Interpretation of extended chromophore present in organic compound by UV-Visible spectrum

EXPERIMENT 2 **4 Hours**

Estimation of the concentration of Prussian blue dye by Colorimetric analysis

EXPERIMENT 3 **4 Hours**

Extraction of natural dye from plants using different methods Soxhlet extraction/IR Extraction /microwave extraction/Ultrasonic extraction

EXPERIMENT 4 **4 Hours**

Application of extracted natural dye on different fabrics of cotton and silk.

EXPERIMENT 5 **4 Hours**

Removal of dye effluents in water by activated charcoal

EXPERIMENT 6 **4 Hours**

Application of varnish on naturally derived product

EXPERIMENT 7 **2 Hours**

Estimation of strength of HCl by pH metric titration method

EXPERIMENT 8 **4 Hours**

Preparation of face and body paint for fashion applications

Total: 60 Hours

Reference(s)

1. J.D. Lee, Concise inorganic chemistry, Blackman Science Ltd, France, Wiley-India, 5th edition(Reprint), 2016
2. V.R. Gowariker, N.V. Viswanathan and Jayader Sreedhar, Polymer Science, New Age International (P) Limited, 2nd edition, 2015
3. P. C. Jain and M. Jain, Engineering Chemistry, Dhanpat Rai Publications., New Delhi, 2016
4. P. Gregory, Classification of Dyes by Chemical Structure, Springer, Boston, MA, 1990.
5. D. R. Waring et al. (eds.), The Chemistry and Application of Dyes Plenum Press, New York 1990

18FT204 COMPUTER PROGRAMMING 2 0 2 3

Course Objectives

- To learn the basics of Excel.
- To study the basics of C primitives, operators and expressions.
- To understand the different primitive and user defined data types.

Programme Outcomes (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/ Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4: Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

Course Outcomes (COs)

1. Design applications using Excel and work with formulas and functions in Excel
2. Develop programs using operators and input-output functions
3. Apply decision making and looping statements in writing C programs
4. Apply the concepts of arrays and strings in developing C programs
5. Design applications using structures and functions in C

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	3	3		3									
2	2	2	1		3									
3	2	3	2		3									
4	2	2	2		3									
5	2	2	2		3									

UNIT I **3 Hours**

WORKING WITH EXCEL

Introduction-Working with Excel workbook-Working with Worksheet-Formulas and functions-Inserting charts-Sorting.

UNIT II **3 Hours**

INTRODUCTION TO C PROGRAMMING

Overview of C-Structure of C program-Keywords-Constants- Variables-Data types-Type conversion Operators and Expressions: Arithmetic-Relational-Logical-Assignment- Increment and Decrement-Conditional-Bitwise operators.

UNIT III **3 Hours**

CONTROL STATEMENTS

Decision Making and Branching: simple if statement-if else statement-nesting of if else Statement-Switch Statement. Decision Making and Looping: while statement-do while statement-for statement - Jump Statements: goto-break-continue-return statement

UNIT IV **3 Hours**

ARRAYS AND STRINGS

Arrays: Introduction, one dimensional array, declaration - Initialization of one dimensional array, two-dimensional arrays, multi-dimensional arrays. Strings: String handling functions.

UNIT V **3 Hours**

STRUCTURES AND FUNCTIONS

Structures: Introduction-defining a structure- declaring structure variables-accessing structure members-structure initialization- Enumerated data type -User Defined Functions: Elements of user defined functions -Definition of functions-return values and their types- function calls-function declaration-categories of function -call by value and call by reference-recursion.

UNIT VI **4 Hours**

SELF STUDY

Creating and manipulating document using word - Mail merge - Creating spread sheet with charts and formula using excel - developing power point presentation with Animations - C graphics using built in functions

EXPERIMENT 1 **6 Hours**

Working with Excel sheet

EXPERIMENT 2 **6 Hours**

Implement a C program using data types and operators.

EXPERIMENT 3 **4 Hours**

Implement C program using if else and switch statements.

EXPERIMENT 4 **6 Hours**

Implement C program using looping statements.

EXPERIMENT 5 **6 Hours**

Implement C program using arrays.

EXPERIMENT 6 **6 Hours**

Implement C program using string handling functions.

EXPERIMENT 7 **6 Hours**

Implement C programs using structures.

EXPERIMENT 8 **4 Hours**

Implement C programs using functions.

Total: 64 Hours

Reference(s)

1. Pradeep K. Sinha, Priti Sinha, Computer Fundamentals, BPB publications, 2008
2. Ashok. N. Kamthane, Computer Programming, Second Edition, Pearson Education, 2012
3. E.Balagurusamy, Programming in ANSI C, Tata McGraw-Hill, 2012
4. Herbert Schildt, C -The complete Reference, Tata McGraw-Hill, 2013
5. Byron Gottfried, Programming with C, Schaum's Outlines, Tata Mcgraw-Hill, 2013

18FT206 DESIGN THINKING 2 0 2 3

Course Objectives

- To enable students comprehend the fundamentals of design thinking process
- To impart knowledge of photography foundations for design
- To enable students conceptualize design developments and understand visual ethics

Programme Outcomes (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/ Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO5: Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories.

PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Identify and interpret the fundamental concepts of design thinking.
2. Demonstrate knowledge of attributes of the color and their schemes applied in design.
3. Produce layouts for brochure design and calendar events applying grid theory.
4. Classify typography types by their style and appraise applications in various printed designs.
5. Demonstrate knowledge about the creative thinking process applied in design practice.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	1											
2	3	2											2	2
3	3	2			2								3	3
4	3	2											2	2
5	3	2											2	

UNIT I **6 Hours**

DESIGN FUNDAMENTALS

Design fundamental - Characteristics of a good design - Elements of design Line, Colour, Texture, Shape or form, Size. principles of design - Balance, Harmony, Emphasis, Proportion, Rhythm. creativity, importance of creativity, developing creativity.

UNIT II **6 Hours**

COLOR THEORY FOR DESIGN

Colour theory - introduction - basics of colour theory - attributes of colour - hue, value, saturation , tint - shade - colour wheel - colour harmony - colour schemes - achromatic, monochromatic, polychromatic, warm colours, cool colours, analogous colours, complementary colours, split complements, incongruous, triads and tetrads - colour blending - additive model, subtractive model - colour contrast - colour psychology.

UNIT III **6 Hours**

GRIDS AND LAYOUT

Grids and layouts - role of grids - structure - grid system and templates- layouts - layout guidelines - important parts of a page layout - factors influencing a layout -organizing layouts - capturing readers attention - visual composition - Collage.

UNIT IV **6 Hours**

TYPOGRAPHY

Typography - typeface anatomy, measurements - typeface classifications - type families - spacing and alignment selecting appropriate fonts - tips and techniques - Graphics -importance of graphics - types of graphics - vector graphics, raster graphics - vector file formats, raster graphic file formats, format conversion - crop and scale.

UNIT V **6 Hours**

CREATIVE THINKING PROCESS

Design process - approach - stages of design process - demonstrations and guidelines - Logo Design. Approach to design development - SCAMPER

EXPERIMENT 1 — 4 Hours

Create a Textile Print Patterns for Womens/Mens/Kids wear with appropriate layouts.

EXPERIMENT 2 — 6 Hours

Prepare the following Charts

o Prang colour chart
o Value Chart
o Intensity Chart

EXPERIMENT 3 — 6 Hours

Illustrate print designs for the Elements of Design

o Line
o Colour
o Texture
o shape or form
o Size

EXPERIMENT 4 **6 Hours**

Illustrate Principles of Design
o Balance in print
o Harmony in print
o Emphasis in print
o Proportion in print
o Rhythm in print

EXPERIMENT 5 **8 Hours**

Illustrate the colour harmony in dress design
o Monochromatic colour harmony
o Analogous colour harmony
o Complementary colour harmony
o Double complementary colour harmony
o Split complementary colour harmony
o Triad colour harmony

Total: 60 Hours

Reference(s)

1. Jeff Davis, Foundations of Design, Tempe Digital, 2016.
2. Vic Costello, Multinedia foundations: Core concepts for digital design, CRC press, 2016.
3. Judith wilde and Richard wilde, The process: A new foundation in Art and Design, Lawrence king, 2015.
4. Gavin Ambrose, Paul harris, Basics Design 08 - Design thinking, AVA publishing, 2009.
5. Alan pipes, Foundations for art and design, Lawrence king, 3rd edition, 2008.

18FT207 ENGINEERING PRACTICES LABORATORY **0 0 4 2**

Course Objectives

- To demonstrate conceptualizing skills in developing decorative design ideas.
- To demonstrate fundamental concepts of braiding, crocheting and embroidery.
- To demonstrate skills for making coasters, greeting cards, table mats, wall hangings and hand bags

Programme Outcomes (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO5: Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories.

Course Outcomes (COs)

1. Fabricate simple decorative articles used in everyday life.
2. Choose and apply painting materials and medium for producing painting artworks
3. Apply fundamental craft techniques of crocheting, braiding and embroidery for making decorative articles

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3				2								2	
2	3				2								2	
3	3				2								2	

EXPERIMENT 1 **6 Hours**

Development of Greeting card design using Indian script font.

EXPERIMENT 2 **6 Hours**

Development of Warli motifs and prepare painting.

EXPERIMENT 3 **6 Hours**

Development of saree embroidery pattern using any one of the Indian traditional embroidery techniques.

EXPERIMENT 4 **6 Hours**

Development of madhubani theme wall decor items.

EXPERIMENT 5 **6 Hours**

Development of kalamkari style decor tea coasters and table mats

EXPERIMENT 6 **6 Hours**

Development of hand bag artwork using chikankari stitches

EXPERIMENT 7 **6 Hours**

Apply braiding technique and prepare handbag.

EXPERIMENT 8 **6 Hours**

Apply smocking technique and prepare the base for Indian injiri dress

EXPERIMENT 9 **6 Hours**

Development of crochet applique appropriate for hand bags

EXPERIMENT 10 **6 Hours**

Development of silk thread embroidery pattern for Womens apparel tops

Total: 60 Hours

Reference(s)

1. Natalie chanin, The Geometry of Hand-Sewing: A Romance in Stitches and Embroidery from Alabama Chanin and The School of Making (Alabama Studio), Abrams, 2017
2. Carol marine, Daily painting: Paint small and often to become a more creative, productive and successful artist, Watson-Guptill publications, 2014.
3. Alison Ellen, Hand knitting: new directions, 2nd edition, D&N publishing, 2011.

18FT301 ENGINEERING MATHEMATICS III 3 1 0 4

Course Objectives

- Understand the concepts of Fourier series, Fourier and Laplace transforms which will enable them to model and analyze the physical phenomena
- Implement the Fourier analysis, an elegant method in the study of heat flow, fluid mechanics and electromagnetic fields
- Apply the numerical techniques to offer an approximate solution for the differential equations in a real world situation

Programme Outcomes (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

Course Outcomes (COs)

1. Apply the Fourier analysis for the periodicity and non-periodicity of combination of sine and cosine functions
2. Classify partial differential equation and able to solve various equations
3. Formulate a function in frequency domain whenever the function is defined in time domain by Laplace transform
4. Interpret the solution of system of linear equations by various numerical techniques
5. Execute the numerical solution of initial and boundary value problems of differential equations by different methods

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	1	2												
2	1	2												
3	1	2												
4	1	2												
5	1	2												

UNIT I **9 Hours**

FOURIER ANALYSIS

Fourier series for periodic functions - Orthogonal functions - The Euler coefficients - Fourier transforms -Properties of Fourier transform - Applications of Fourier series and transform analysis

UNIT II **9 Hours**

PARTIAL DIFFERENTIAL EQUATION

Introduction to partial differential equations - One-dimensional wave equation - Method of separation of variables - D Alembert s solution of the wave equation. Heat equation. Laplace equation

UNIT III **9 Hours**

LAPLACE TRANSFORM

Properties and theorems of Laplace transform - Shifting theorems - Convolution - Applications to ordinary differential equations - Applications to linear system analysis

UNIT IV **9 Hours**

NUMERICAL SOLUTION OF SYSTEM OF LINEAR EQUATIONS

Solution of algebraic and transcendental equations: Fixed point iteration method - Newton- Raphson method - Solution of system of linear equations: Gauss elimination method - Inverse of a matrix: Gauss-Jordan method- Eigen values of a matrix by Power method

UNIT V **9 Hours**

NUMERICAL SOLUTION OF DIFFERENTIAL EQUATIONS

Solution of first order ordinary differential equations: Eulers method - Fourth order Runge- Kutta method - Milnes predictor and corrector method - Solution of partial differential equations: Parabolic equations by Crank Nicholson method- Hyperbolic equations by explicit finite difference method

Total: 60 Hours

Reference(s)

1. Kreyszig Erwin, Advanced Engineering Mathematics, 7th Edition, John Wiley, 1993
2. Johnson Richard A. and Bhaltacharyya Gouri K., Statistics, Principles and Methods, 3rd Edition, John Wiley, 1996
3. O Neil Peter V., Advanced Engineering Mathematics, 4th Edition, PWS-Kent, 1995
4. James Glyn, Advanced Modern Engineering Mathematics, Addison-Wesley, 1993
5. Grewal B. S, Numerical Methods in Engineering and Science with Programms in C & C++, Ninth Edition, Khanna Publications, 2010
6. Sankara Rao. K, Numerical Methods for Scientists and Engineers, Third Edition, PHILearning Private Limited, New Delhi, 2009

18FT302 PATTERN MAKING 2 0 2 3

Course Objectives

- Acquire knowledge on human body measurements and creating pattern from the measurements.
- Develop commercial pattern with design aspect by manipulating the basic pattern.
- Fabricate patterns of different sizes by grading the basic pattern.

Programme Outcomes (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/ Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories.
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Explain the basic proportions ofhuman body and determine the anthropometric measurement points.
2. Explain the pattern makingtechniques and terminologies applied in them
3. Apply draping and flat pattern technique to draft patterns of basic bodice, sleeve, skirt and trousers.
4. Apply the principles of patternmaking to manipulate the basic pattern according to the styles.
5. Generate stylelines, altered and graded patterns.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	2										2	1
2	3	2											2	1
3	3	2											2	1
4	3	2	3										2	1
5	3	2	3										2	1

UNIT I **6 Hours**

ANTHROPOMETRY AND SIZE SYSTEMS

Anthropometry- Basic Measurements, Human Anatomy, Rule of Proportion-the human body: Height Weight distribution. Size Systems, Standards, Size charts.

UNIT II **6 Hours**

PATTERN MAKING

Pattern - Definition and Types- Individual and Commercial patterns. Pattern making - definition and types of pattern making- drafting, draping, flat pattern techniques. Pattern making - Tools and functions. Pattern Details, Trueing, blending, pattern grain line, balance line terms, notches, seam allowance, jog seam, dart points, pleats, flares, gather and true bias.

UNIT III **6 Hours**

PATTERN MAKING AND DRAPING - BASIC SET

Drafting - Basic blocks for Men, Women and Kid - Bodice, Sleeve, Skirt and Trousers. Draping - Tools used, Basic blocks for Men, Women and Kid - Bodice, Sleeve, Skirt and Trousers.

UNIT IV **6 Hours**

PRINCIPLES OF PATTERN MAKING

Dart manipulation- Single dart series: slash-spread technique and pivotal transfer technique. Two dart series- slash spread and pivotal transfer technique. Graduated and radiating darts. Parallel, asymmetric and intersecting darts. Types of added fullness and Contouring Principle.

UNIT V **6 Hours**

STYLE LINES, PATTERN ALTERATION AND GRADING

Style lines: Classic princess style line and variations, Armhole princess style line and variations, Panel Style line and variations. Pattern Alteration: Defects in pattern - Causes and remedies, checking for fit, Pattern alteration for fit. Grading: Grading process, grade rules, and types of grading system.

EXPERIMENT 1 **3 Hours**

Interpretation of the different types of body measurements like circumferential, vertical and horizontal measurements by taking body measurements from the human body and mannequin.

EXPERIMENT 2 **4 Hours**

Development of patterns by drafting and draping - Basic bodice and sleeve

EXPERIMENT 3 **6 Hours**

Development of patterns by drafting and draping - skirt and trousers.

EXPERIMENT 4 **4 Hours**

Single dart series: Slash spread technique and Pivotal transfer technique

EXPERIMENT 5 **4 Hours**

Double dart series: Slash spread technique and Pivotal transfer technique

EXPERIMENT 6 **2 Hours**

Drafting of style lines: Classic princess style line and variations.

EXPERIMENT 7 **2 Hours**

Drafting of style lines: Armhole princess style line and variations

EXPERIMENT 8 **2 Hours**

Drafting of style lines: Panel Style line and variations

EXPERIMENT 9 **3 Hours**

Grading of patterns - Manual method.

Total: 60 Hours

Reference(s)

1. Helen Joseph Armstrong,Pattern Making for Fashion Design, Pearson Education (Singapore)Pvt. Ltd.,2005
2. Winifred Aldrich,Metric Pattern Cutting, Blackwell Science Ltd., 1994
3. Amaden-Crawford Connie,The Art of Fashion Draping (3rd edition), Om Books International Publications, 2005
4. Hollen Norma R; Kundel Carlyn,Pattern making by the flat pattern method, 1998
5. Deepti Gupta, Norsaadah Zakaria, Anthropometry, apparel sizing and design, 1st Edition, Woodhead Publishing Ltd, 2014

18FT303 APPAREL MANUFACTURING I 2 0 2 3

Course Objectives

- To impart knowledge on various types of sewing machine settings and operating functions.
- To impart knowledge on the spreading and marker planning concepts along with cutting process parameters.
- To impart knowledge on advanced sewing machines

Programme Outcomes (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/ Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO5: Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO9: Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and writeeffective reports and design documentation, make effective presentations, and give and receive clear instructions.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories.
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Explain the basic spreading concepts and resolve the different spreading techniques with reference to fabric design types.
2. Analyze the marker planning parameters and resolve the cutting machine specifications with reference to different cutting parameters.
3. Analyze the sewing machine working components and explain the functions of them.
4. Analyze the operating mechanism of SNLS and the components coordinating the operation cycle.
5. Analyze the operating functions of flat lock machines and over lock machines.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	1	1	2		1				1	1			2	1
2	2	1	3		1				1	1			2	1
3	1	2	3		1				1	1			2	1
4	1	2	3		1				1	1			2	1
5	2	2	3		1				1	1			2	1

UNIT I **5 Hours**

SPREADING CONCEPTS AND TECHNIQUES

Type of fabric packages received at garment industry, Manual spreading, Computerized spreaders, Spread relaxation, Types of spreads, NOW, NEW, NUD, Symmetrical and Asymmetrical patterns, effect on marker making.

UNIT II **7 Hours**

MARKER PLANNING AND CUTTING MACHINES

Marker plan preparation, marker efficiency, factors affecting marker efficiency, marker duplicating methods, computer aided marker making. Introduction to cutting machines, types and functions of cutting machines, straight knife, round knife, band knife cutting machines, notches, drills, die cutting machines;computerized cutting machines, common defects in cutting and their remedies.

UNIT III **6 Hours**

PARTS OF SEWING MACHINE

Basic parts of a sewing machine - needle, bobbin case/bobbin hook, loppers, loop spreader, threading fingers, throat plate, tongue chaining plates, take up devices, tensioner, feed dog, presser foot, folders and attachments. Types of needles, parts of needles and their function, needle size, sewing thread, properties of sewing threads, ticket number, fabric sewability,

UNIT IV **6 Hours**

OPERATING FUNCTIONS OF SNLS

Classification of sewing machines - basic SNLS machine, parts and their functions, adjustments, stand height, pedal, needle bar, presser foot, feed dog, differential feed ratio, reverse feed, stitch length selection, feed timing, needle and bobbin thread tension, stitch cycle timing diagram, Maintenance of SNLS machine, Common defects and remedies.

UNIT V **6 Hours**

OPERATING FUNCTIONS OF FLATLOCK MACHINES AND OVERLOCK MACHINES

Over-lock and Flat-lock Sewing Machines: Loopers - eye and blind, spreader, Trimmers, Take-up devices: types, Stitch cycle timing diagram, Machine adjustments, Feeding mechanism-types and functions- drop, differential, belt, variable top and bottom feed, puller, needle feed and unison feed. Machine speed and rate of feed, stitch size regulation. Types, guides- arm, cylindrical and flat guides, folders and binders, types of presser foot & its functions.

EXPERIMENT 1 **3 Hours**

For the given fabric designs, plan the spreading technique to be adopted for executing the cut plan.

EXPERIMENT 2 **3 Hours**

Calculate the total spreading time per lay comprising of 80 plies for marker length 4m.

EXPERIMENT 3 **3 Hours**

Prepare a marker plan for the give cut order quantity and size breakup.

EXPERIMENT 4 **3 Hours**

Calculate the cutting time for lay of 7m length covering a total cutting perimeter of 560metres and 80 plies, if the CAM cutting head operates at a average speed of 2.5 meters per min. The cutting head stops for 1min every 30 minutes in between.

EXPERIMENT 5 **3 Hours**

Prepare illustrated examples of sewing needle positions in SNLS, Over lock machine, Flat lock machine Button sewing machine and Button hole making machine.

EXPERIMENT 6 **3 Hours**

Prepare a collection of sewing needles and sewing thread ticket no. Match the sewing thread count tosewing needle size for any four types.

EXPERIMENT 7 **3 Hours**

Illustrate SNLS machine stitch cycle timing diagram for all stages of one complete stitch.

EXPERIMENT 8 **3 Hours**

Illustrate the feed dog motion cycle for one cycle of stitch formation

EXPERIMENT 9 **3 Hours**

Illustrate the over lock machine looper threading

EXPERIMENT 10 **3 Hours**

Illustrate the Flat lock machine looper threading layout

Total: 60 Hours

Reference(s)

1. R.Rathinamoorthy & R.Surjit, Apparel Machinery and Equipment, Woodhead PublishingIndia in Textiles, New Delhi, 2015
2. Marie Clayton, Ultimate Sewing Bible A Complete Reference with Step-by-Step Techniques, Collins & Brown, London, 2008.
3. Carr and Latham"s, Technology of Clothing Manufacture, 4th Edition, Om Books International, New DelhiMay 2008
4. Clair B. Shaeffer -The Complete Book of Sewing Shortcuts- Sterling Publishing Company, 1981.
5. Marry Mathew, Practical Clothing Construction Part I and II Basic Sewing Process, Cosmic Press, Chennai, 1999.
6. Claire Shaeffer,-Sewing for Apparel Industry Prentice Hall, 2000.

18FT304 FASHION SILHOUETTES 2 0 2 3

Course Objectives

- To enable Students understand and comprehend the fundamentals of visual art.
- To impart the knowledge of properties of lines, shapes, colors and compositions applied in silhouettes
- To enable the students develop fashion silhouettes in different styles.

Programme Outcomes (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO6: The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO12: Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories.
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Interpret the aesthetics of art and determine their characteristic features.
2. Exemplify the principles of fashion silhouettes such as biomorphic forms, layered styles, wrapping styles, embellished garments, Asymmetrical silhouettes and structured garments
3. Exemplify the principles of fashion silhouettes such as draping styles, body conscious dresses, Feminine patterns, movement, pattern and texture..
4. Explain the classification system of fashion silhouettes and appraise their salient features.
5. Explain the different types of ethnic silhouettes and critique them.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2						2				2	3	2
2	3	2				2		2				2	3	2
3	3	1						2				1	3	2
4	3	1				2		2				1	2	2
5	3	1						2				2	2	2

UNIT I **6 Hours**

FUNDAMENTALS OF VISUAL ART

Different types of Art styles-Romantism, Neo classicism, Art deco, Modern art, Abstract expressionism, Surrealism, Pop art & Post modern Art. Aesthetics of art -subject view, composition view, content view and context view. Gestalt principles of perception.

UNIT II **6 Hours**

PRINCIPLES IN FASHION SILHOUETTES

Principles of fashion designing: embellishments, asymmetrical forms, biomorphic forms, structured garments, layering and wrapping styles.

UNIT III **6 Hours**

FASHION PRINCIPLES

Draping styles - flagging drape lines, fluid drape lines. Body conscious dresses, feminine patterns, movement and pattern, texture and motifs. Compression silhouettes -Compacting the body, following the exact shapes of the body.

UNIT IV **6 Hours**

CLASSIFICATION OF SILHOUETTES

Structural silhouettes - form that stands away from body and lines are created by shaping and seams. Fluid silhouettes -fabrics that flow over the body and follow the human form. Ornamentation - Creating details will enhance the form. Expansion silhouettes -exaggerating shapes formed away from the body.

UNIT V **6 Hours**

ETHNIC SILHOUETTES

Indian ethnic silhouettes Men: Sherwani, Kurta-pyjama, Kurta-Dhoti, Angraks, Nehru collar. Women: Anarkali, Salwar kameez, Shararas, Ghararas, Lehenga Choli, Sarees. South east Asian women silhouettes : Ao Dai, Kimono, Cheongsam, Hanbok, Sarongs, Pareo, Gho, Tunic, Deel, Chut thai.

EXPERIMENT 1 **4 Hours**

Collars and Necklines - Develop a mao neck top and halterneck dress. Compare the differences in neckline features.

EXPERIMENT 2 **4 Hours**

Shoulders and sleeves - Draw a grace jones style exaggerated shoulder pads silhouette and a sleeve with ruffles.

EXPERIMENT 3 **4 Hours**

Waistlines - Draw a low waist line silhouette and a high waist line silhouette. Resolve the illusion created by the position of waist band in determining the proportion of torso and legs.

EXPERIMENT 4 **4 Hours**

Closures - Draw a eighties style leather jacket emphasizing the zipper and cargo pocket with Snap buttons

EXPERIMENT 5 **4 Hours**

Pleats and flounces -Draw Delphos: a tea gown of minutely pleated silk inspired by the ancient Greek chiton. Resolve the difference between pleat and flounce

EXPERIMENT 6 **4 Hours**

Gathering and draping -Draw a surplice wrap draped silhouette and harem pant.

EXPERIMENT 7 **2 Hours**

Decorative applique-Draw a manish arora's silhouette laced with beads, fringes, tassels and other metals.

EXPERIMENT 8 **4 Hours**

Accessories -Develop a 3D sketch of hand bag and shoe. highlight its values and tones.

Total: 60 Hours

Reference(s)

1. Andrew Graham dixon and Ian Chilvers, ART: The definitive visual guide, DK publishers, 2018.
2. Laura Volintesta, language of fashion design: 26 principles every fashion designer should know, Rockport publishers, 2014.
3. Alicia Kennedy, Emily stoehrer, Jay calderin, Fashion design referenced, Rockport publishers, 2013.
4. Macarena San martin, Fashion Details: 1000 ideas from neckline to waist line, pockets to pleats, Rockport publishers, 2011
5. Celia Stall- Meadows, Fashion now: A global perspective, Prentice hall, 2010.
6. Https://www.instyle.com

18FT305 BASICS OF FIBRE, YARN AND FABRIC MANUFACTURING

3 0 0 3

Course Objectives

- To learn and acquaint with the basics of yarn formation and fabric formation to supplement the subsequent learning of garment making and fashion portfolio development
- To learn the physical, mechanical and comfort properties of fibers.
- To learn and acquaint with the basics of yarn formation and fabric formation.

Programme Outcomes (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Classify the physical and chemical properties of textile fibers, production techniques (Both natural &manmade fibers) and its applications.
2. Classify the different types of mechanical and comfort properties of fibers and its measuring techniques.
3. Analyze the principles of preparatory process in spinning and comprehend their production and quality parameters.
4. Analyze the principles of modern spinning systems and comprehend their production and quality parameters.
5. Explain the principles of fabric formation in looms and classify the types of fabrics produced in them.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	2												1
2	3	1												
3	2	3												1
4	2	3												
5	2	2												1

UNIT I **9 Hours**

NATURAL AND MANMADE FIBERS

Introduction to fibres: Definition of Staple fibre and Filament, Yarn, and Thread. Classification - Natural fibres, Man-made fibres. Properties - essential properties, desirable properties. Production, cultivation and chemical properties of Natural Fibers: Cotton, Silk and wool. Production sequence, physical & chemical properties of Viscose Rayon, Polyester, Nylon. Applications of natural & man - made fibers.

UNIT II **9 Hours**

MECHANICAL AND COMFORT PROPERTIES

Degree of order, degree of orientation of molecular chains. Definitions: breaking strength, breaking extension, yield point, initial modulus, work of rupture and work factor. Stress-strain curves for various textile fibres and their significance. Definitions: humidity - Absolute humidity - Relative humidity - Moisture content, moisture regain. Factors influencing moisture regain - Conditioning of fibres. Static electricity, causes, problems and its elimination techniques

UNIT III **9 Hours**

YARN MANUFACTURING

Fiber and yarn numbering system (count). Introduction about ginning, blow room, carding, combing, drawing, simplex and ring spinning system, processes, principle of operation and applications. Post spinning system, types and its applications

UNIT IV **9 Hours**

MODERN SPINNING SYSTEMS

Modern spinning systems: Definition and Classification - rotor spinning, friction spinning, air jet spinning, and bobtex spinning: processes, principle of operation, spinnability, output yarn quality characteristics, application areas and production capability -Comparison of modern spinning systems and their yarn quality parameters.

UNIT V **9 Hours**

FABRIC MANUFACTURING

Fabric Manufacturing: Definition - Classification of fabric forming methods: weaving, knitting, nonwovens: classification, processes, and principle of operation. Loom: Definition and Classification - Basic shuttle loom, shuttleless loom and other popular modern looms - Classification, principle of operation Rapier, Projectile, Air jet and Water jet.

Total: 45 Hours

Reference(s)

1. J.W.S. Hearle&W.E.Morton Physical Properties of Textile Fibers, Woodhead publishing, 4th Edition, ISBN 9781845694425, 2008
2. M. K. Talukdar, P. K. Sriramulu, and D. B. Ajgaonkar, Weaving: Machines, Mechanisms, Management, Mahajan Publishers Pvt. Ltd. 1998.
3. W. S. Murphy, Handbook of Weaving, Abhishek Publications, 2001.
4. Albrecht Wilhelm,Fuchs Hilmar, and Kittelmann Walter, Nonwoven Fabrics: Raw Materials, Manufacture, Applications, Characteristics, Testing Processes, 2002.
5. R. K. Dharmadhikary, T. F. Gilmore, H. A. Davis and S. K. Batra, Thermal Bonding of Nonwoven Fabrics, Textile Progress, Vol. 26, No.2, Textile Institute, 1995.

18FT306 KNITTING TECHNOLOGY 3 0 0 3

Course Objectives

- To understand the basics of warp and weft knit structures and its derivatives.
- To comprehend the design for various knitted fabric structures
- To understand the knitting machine parameters for producing various knitted structures

Programme Outcomes (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/ Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Analyze the warp knitted and weft knitted fabrics by interpreting their structure
2. Distinguish between the various knitted fabrics
3. Determine the production of weft knitted fabrics by varying the fabric forming parameters.
4. Explain and outline the working principles of warp knitting machines and the pattern of fabric formation
5. Determine the production of warp knitted fabrics by varying the fabric forming parameters

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	3												1
2	2	2	1											1
3	2	3												1
4	2	2												1
5	2	3	1											1

UNIT I **9 Hours**

FUNDAMENTALS OF KNITTING

Introduction to knitting, Comparison of weaving and knitting, classification of warp and weft knitting machines, comparison of warp and weft knitted fabrics, elements of knitted loop structure. Symbolic, Graph paper and Diagrammatic representation of stitches. Knitting needles - Types, Knitting action, advantages and disadvantages

UNIT II **9 Hours**

WEFT KNITTING MACHINE

Elements of knitting machine - Cylinder, Sinker, Cam, Needle, Creel, Feeders - positive feeder, storage positive feeder, elastane feeder, take down mechanism. Patterning mechanism. Electronic devices for needle selection. Working principle of plain, rib, interlock and purl knitting machines. Formation of knit, tuck and float stitches. Effect of loop length

UNIT III **9 Hours**

WEFT KNITTED STRUCTURES

Production of weft knitted fabric structures -Single jersey, Rib, Purl, Interlock. Derivatives of single and double jersey structures: plaited fabrics, 2X2 rib structure, half cardigan, full cardigan, Ponte-di- Roma, Ottoman rib, Texi- pique, Pin-tuck, Milano rib, French pique, Swiss pique. Applications of weft knit fabric, Common defects in weft knit fabric

UNIT IV **9 Hours**

WARP KNITTING MACHINE

Elements of Tricot and Raschel warp knitting machines - warp beam, guide bar, needle, needle bar, sinker, presser bar, links, and trick plate. Knitting cycle and working principles of Tricot and Raschel knitting machine. Pattern controlling mechanism - pattern wheels, pattern chains links, Electronic Jacquard

UNIT V **9 Hours**

WARP KNITTED STRUCTURES

Representation of warp knit structures. Point Paper, Chain-Link Notation, single fabrics, Chain stitch, Tricot lap, Full tricot, Lock Knit, Reverse Lock Knit, satin, Loop raided fabrics, Queen's cord, Sharkskin, Blind lap. Applications of warp knit fabric

Total: 45 Hours

Reference(s)

1. D. B. Ajgaonkar, Knitting Technology, Universal Publication Corporation, Mumbai, 1998
2. Anbumani N, Knitting Fundamentals, Machines, Structures and Developments, New Age International Private Limited, New Delhi, 2007
3. Samuel Raz, Flat Knitting: The New Generation, MeisenbachGmbH, Bamberg, Meisenbach, 1991
4. D Spencer, Knitting Technology, 3rd Edition, A Comprehensive Handbook and Practical Guide, Apr 2001,Woodhead Publishing, ISBN :9781855733336
5. K.F. Au, Advances in Knitting Technology,Woodhead Publishing, England 2011

18FT307 FASHION ILLUSTRATION LABORATORY 0 0 4 2

Course Objectives

- To make the students understand the basic concepts of fashion art and learning the aspects of fashion rendering.
- To improve their skills in creating new designs and dresses.
- To develop their skills in fashion arts and creating innovative sketches
- Developing design improvisation of basics fashion rendering.

Programme Outcomes (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO5: Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO9: Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and writeeffective reports and design documentation, make effective presentations, and give and receive clear instructions.
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Illustrate the different body sections of human anatomy and plan different postures
2. Plan the fabric and colour application for developed fashion figures
3. Generate sketches in exclusive methods suitable for distinct presentations

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	2			1				2	2				2
2	1	2			3				2	2				2
3	2	2			1				2	2				3

EXPERIMENT 1 **6 Hours**

Illustration of stick figures, block figures and fleshing on block figures

EXPERIMENT 2 **6 Hours**

Figure analysis - Sketching of fashion figures in 8 and a half , 10 and 12 head proportions

EXPERIMENT 3 **6 Hours**

Face analysis Sketching of facial shapes

EXPERIMENT 4 **6 Hours**

Illustration of varied postures front, back, side and three fourth profiles

EXPERIMENT 5 **6 Hours**

Colour rendering techniques mixed media application

EXPERIMENT 6 **6 Hours**

Fabric rendering techniques wovens and knits

EXPERIMENT 7 **6 Hours**

Fabric rendering techniques drape lines, pleats, gathers, surface ornamentation

EXPERIMENT 8 **6 Hours**

Illustration of croquis female

EXPERIMENT 9 **6 Hours**

Illustration of croquis male

EXPERIMENT 10 **6 Hours**

Illustration of croquis children

Total: 60 Hours

18FT308 TEXTILE DESIGN CAD LABORATORY 0 0 4 2

Course Objectives

- To train the students on developing basic fabric weaves and simulate their appearance
- To impart the knowledge of developing print designs appropriate for a concept
- To equip them in developing concept boards, logo designs and brochure designs.

Programme Outcomes (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO5: Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO9: Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and writeeffective reports and design documentation, make effective presentations, and give and receive clear instructions.
PSO1: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Design fabric weaves and renders them based on fashion trends.
2. Design different types of print designs for a concept.
3. Plan and prepare concept boards, logo designs and brochure designs for fashion communication.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	2			3				2	2			3	
2	2	2			3				2	2			3	
3	2	2			3				2	2			3	

EXPERIMENT 1 **6 Hours**

Development of Plain and twill weave patterns with two colorways.

EXPERIMENT 2 **6 Hours**

Development of dobby blanket design with a colorway.

EXPERIMENT 3 **6 Hours**

Development of an elaborate jacquard design with an extra warp and weft design for a stole.

EXPERIMENT 4 **6 Hours**

Development of half drop all over print pattern of geometric motifs.

EXPERIMENT 5 **6 Hours**

Development of directional print of floral motifs.

EXPERIMENT 6 **6 Hours**

Development of t-shirt chest print design for a digital printing.

EXPERIMENT 7 **6 Hours**

Development of a typographical print design for a tote bag.

EXPERIMENT 8 **6 Hours**

Design a conceptual board based on a theme using a collage of images.

EXPERIMENT 9 **6 Hours**

Modify an existing logo of a brand.

EXPERIMENT 10 **6 Hours**

Develop a brochure design for a company featuring it's product details and logo.

Total: 60 Hours

Reference(s)

1. Fashion and Textile Design with Photoshop and Illustrator, Professional Creative Practice, Robert Hume, publication 2016, Fairchild books.
2. CAD for Fashion Design and Merchandising, Stacy Stewart Smith, publication 2014, Fairchild Books.
3. Learn Adobe Illustrator CC for Graphic Design and Illustration, Dena Wilson and Peter Lourekas with Rob Schwartz, Publication 2016.

18GE301 SOFT SKILLS - VERBAL ABILITY 0 0 2 0

Course Objectives

- To help students gain adequate proficiency in vocabulary
- To help students become proficient in basic writing skills related to workplace communication
- To read and understand unabridged text

Programme Outcomes (POs)

PO1: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO5: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

Course Outcomes (COs)

1. Take up verbal ability part of the placement tests with confidence
2. Write with confidence in professional and workplace communication
3. Distinguish fact from opinion by reading passages from a text

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	1													
2	1				1									
3	1													

UNIT I **15 Hours**

INTRODUCTION

Synonyms - Antonyms - Word Groups - Verbal Analogies - Etymology - Critical Reasoning - Cloze Test - One Word Substitution - Idioms and Phrases - Text & Paragraph Completion.

UNIT II **15 Hours**

BASICS OF VERBAL APTITUDE

Sentence Formation - Paragraph Formation - Change of Voice - Change of Speech - Reading Comprehension - Sentence Equivalence - Jumbled Sentences - Spotting Errors -Homophones Homonyms - Commonly Mispronounced/Misspelt Words.

Total: 30 Hours

Reference(s)

1. Murphy, Raymond. English Grammar in Use A Self-Study Reference and Practice Book for Intermediate Learners of English. IV Edition. United Kingdom: Cambridge University Press. 2012.
2. Lewis, Norman. Word Power Made Easy. New York: Pocket Books. 1991.
3. Baron"s The Official Guide for New GMAT Review, New Jersey: John Wiley & Sons, Inc. 2015.

18FT401 APPLIED MATHS 2 1 0 3

Course Objectives

- Understand the basic concepts of probability and the distributions with characteristics and also two dimensional random variables
- Apply different statistical inference techniques in testing of hypothesis in a real time fashion industry.
- Analyse the design in identifying the suitable product by comparing the characteristics of the material in industries.

Programme Outcomes (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

Course Outcomes (COs)

1. Demonstrate the basic probability axioms and concepts, Probability distributions of therandom variables in designing process.
2. Identify the relationship and properties of two dimensional random variables using Correlation techniques in textile manufacturing.
3. Implement basic statistical inference techniques, including confidence intervals and hypothesis testing to science/engineering problems.
4. Design an experiment for an appropriate situation using ANOVA technique.
5. Compare statistical data in quality control by various control chart techniques.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2												
2	3	2												
3	3	2												
4	3	2												
5	3	2												

UNIT I **9 Hours**

PROBABILITY THEORY

Axioms of probability - Conditional probability - Bayes theorem - Random variable: Probability mass function - Probability density function: Moment Generating function-Binomial, Poisson and Normal distributions.

UNIT II **9 Hours**

TWO DIMENSIONAL RANDOM VARIABLES

Joint distributions - Marginal and Conditional distributions -Covariance - Correlation and Regression analysis in Textile Manufacturing.

UNIT III **9 Hours**

TESTING OF HYPOTHESIS

Sampling distributions - Estimation of parameters -Statistical hypothesis - Large sample test based on Normal distribution for single mean and difference of means -Small sample tests: t-test for mean-F- test - Chi-square test for Goodness of fit and Independence of attributes.

UNIT IV **9 Hours**

DESIGN OF EXPERIMENTS

One way and Two way classifications -Completely randomized design- Randomized block design - Latin square design.

UNIT V **9 Hours**

STATISTICAL QUALITY CONTROL

Control charts for measurements (X and R charts) -Control charts for attributes (p, c and np charts)- Tolerance limits- Acceptance sampling.

Total: 60 Hours

Reference(s)

1. Milton J. S. and Arnold Jesse C., Introduction to Probability and Statistics: Principles and Applications for Engineering and The Computing Sciences, McGraw Hill Inc, 3rd Edition, 1995.
2. S.C. Gupta, Fundamentals of Statistics, 7th Edition, Himalaya Publishing House Pvt. Ltd. 2018.
3. Johnson Richard A. and Bhaltacharyya Gouri K., Statistics, Principles and Methods, 3rd Edition, John Wiley, 1996.
4. Milton J. S. and Arnold Jesse C., Introduction to Probability and Statistics: Principles and Applications for Engineering and The Computing Sciences, McGraw Hill Inc, 3rd Edition, 1995.
5. Kreyszig Erwin, Advanced Engineering Mathematics, 7th Edition, John Wiley, 1993.

18FT402 BASICS OF CHEMICAL PROCESSING 3 0 2 4

Course Objectives

- Apply fundamental knowledge on chemical processing of textiles.
- Learn and apply the method of application of pre-treatments / dyes / prints /finishing/ process.
- Demonstrate knowledge of the machinery used for pre-treatment / dyeing/printing/finishing/ process

Programme Outcomes (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/ Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4: Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5: Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO9: Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and writeeffective reports and design documentation, make effective presentations, and give and receive clear instructions.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories.
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Explain the preparatory process and produce desized, scoured, bleached and mercerized fabric
2. Analyze the various dyeing machines and produce dyed fabrics with different dyes
3. Differentiate styles of printing, methods of printing and create printed fabrics
4. Evaluate suitable mechanical and chemical finishing techniques for fabric
5. Analyze the color matching using spectrophotometer for measuring the quality of dyedmaterial

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	3	2						2	2			2	1
2	2	3	2		1				2	2			2	1
3	2	3	2						2	2			2	1
4	2	2	2	2	1								2	1
5	2	2	2	2	1								2	1

UNIT I **9 Hours**

PREPARATORY PROCESSES

Introduction - Process sequence of wet processing for woven and knits. Singeing: plate singeing, roller singeing and gas singeing. Desizing hydrolytic, oxidative and enzymatic. Scouring alkaline and enzymatic. Bleaching - hypochlorite, peroxide and sodium chlorite bleaching. Optical whitening. Mercerizing: Hot and Cold mercerization, tension, tensionless and tubular mercerization.

UNIT II **9 Hours**

DYEING

Dyeing equipment - jigger, winch, soft flow, jet dyeing, J-box, padding mangles, package dyeing and garment dyeing machine. Classification of dyes. Dyeing of cotton using natural, direct, reactive, vat and sulphur dyes. Dyeing of polyester using carrier, HTHP and thermo sol. Dyeing of cellulosic blends(one bath and two bath process). Kinetics and thermodynamics of textile dye absorption.

UNIT III **9 Hours**

PRINTING

Ingredients of print paste and their role in printing. Viscosity of print paste, Rheology properties and flow of print paste, Styles of printing - direct, discharge, resist, tie and dye and batik. Methods of printing - block, stencil, roller, rotary, flat bed, transfer and chest printing. Special prints -flock, foam, foil, glitter, khadi, leather, pearl and rubber. After treatments of printed goods. Troubleshooting in textile printing

UNIT IV **9 Hours**

FINISHING

Mechanical finishing -raising, shearing, sueding, anti shrink finish, compacting, decatizing, calendaring, embossing. Chemical finishing - softening, crease resist, biopolishing, flame retardant, water repellent, water proof, soil release, antimicrobial, UV protection finish. Denim washing - stone washing, acid washing, enzymatic washing and sand blasting.

UNIT V **9 Hours**

COMPUTER COLOR MATCHING CONCEPTS

Color; Electromagnetic spectrum - visible range, measurement of color strength - color matching - theory and applications. Spectrophotometer and color matching systems. Quality control using computerised color matching systems, color difference - pass / fail system and computerised shade sorting.

EXPERIMENT 1 — 3 Hours

Hydrolytic desizing and scouring of grey cotton fabric and assessment of the desized and scoured fabric

EXPERIMENT 2 — 3 Hours

Comparison of whiteness index and tenacity of peroxide and sodium hypochlorite bleached samples

EXPERIMENT 3 **3 Hours**
Assessment of rubbing and perspiration fastness of cotton fabrics

EXPERIMENT 4 **3 Hours**
Comparison of different ISO wash fastness tests on fabrics dyed with direct dyes

EXPERIMENT 5 **3 Hours**
Dyeing of cotton using direct / vat / reactive dyes

EXPERIMENT 6 **3 Hours**
Dyeing of polyester, nylon, polyester/ cotton and polyester / viscose

EXPERIMENT 7 **3 Hours**
Dyeing of silk yarn / fabric with acid dyes

EXPERIMENT 8 **3 Hours**
Printing of cotton fabric using direct or discharge styles.

EXPERIMENT 9 **3 Hours**
Printing of cotton fabric using resist style.

EXPERIMENT 10 **3 Hours**
Bio polishing finish on denim fabric. Crease resistant finishing of cotton fabrics and measurement of dry and wet CRA

Total: 75 Hours

Reference(s)

1. D. Gopalakrishnan, Basics of Chemical Processing, Daya Publishing House, New Delhi, 2016
2. E. R. Trotman, Dyeing and Chemical Technology of Textile Fibres, Charles Griffin and Co.Ltd., London. 1990.
3. A. Shenai, Technology of Bleaching and Mercerzing - Vol. III, Sevak Publications,Mumbai 1991
4. A. Shenai, Technology of Dyeing - Vol. VI, Sevak Publications, Mumbai, 2000
5. A. Shenai, Technology of Printing - Vol. IV, Sevak Publications, Mumbai 1996
6. http://nptel.ac.in/courses/116102016/

18FT403 APPAREL MANUFACTURING II 2 0 2 3

Course Objectives

- To impart knowledge on constructing the different types components like collars, sleeve, pocket, plackets used in garments.
- To impart the knowledge about different types of fabrics and it relation to garment cutting and sewing process.
- To Impart knowledge about different categories of garments and fasteners used in apparel industry.

Programme Outcomes (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/ Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO5: Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO9: Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and writeeffective reports and design documentation, make effective presentations, and give and receive clear instructions.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories.
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Analyze the techniques involved in constructing the collar in different garments.
2. Analyze the techniques involved in constructing the sleeves of different garments andassembly of woven shirts and trousers.
3. Predict the seams suitable for knitted garments and resolve the factors affecting their seam performance.
4. Analyze the garment sewing defects and the possible remedies for improving seam quality.
5. Outline the preventive maintenance requirements of industrial sewing machines.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	1	2		1				1	1			2	1
2	1	2	3		2				2	1			2	1
3	2	1	3		-				1	1			2	1
4	2	1	3		-				1	1			2	1
5	3	1	3		-				1	1			2	1

UNIT I **6 Hours**

SEAMS IN COLLAR NAD YOKE CONSTRUCTION

Formal shirt collar construction steps, seams and stitches used, Difference in stitching collar with folder and without folder. Yoke construction steps, Seams and stitches used. Folders used in yoke construction. Issues in collar construction.

UNIT II **6 Hours**

SEAMS IN SLEEVE AND BODY CONSTRUCTION

Seams used in sleeve construction and construction steps of the same with folders and without folders. Factors to be considered while sewing sleeves. Seams used in garment assembly of shirts and trousers. Factors affecting sewing performance of woven shirts and trousers.

UNIT III **6 Hours**

SEAMS FOR KNITTED GARMENTS

Superimposed seams, bound seams, flat seams, decorative seams and lap seams in knitted garments. Stitch classes used in knitting, Seam strength test and factors affecting seam strength in knitted garments. Seam slippage and factors affecting seam slippage in knits.

UNIT IV **6 Hours**

SEAM DEFECTS AND REMEDIES

Factors affecting sewability. Sewing defects in garments. Seam types and stitch density for children's apparel and Adult apparels. Acceptable seam puckering standards.

UNIT V **6 Hours**

TROUBLE SHOOTING SEWING MACHINE

Sewing machine remedies -avoiding breaking of needles, looped stitches, skipped stitches, upper thread breaking, lower thread breaking, puckered seams. Preventive maintenance for industrial sewing machine - General cleaning requirements, Lubrication, Periodical service.

EXPERIMENT 1 **5 Hours**

Prepare samples for Collars-peter pan, turtle neck, Chinese, shawl, shirt

EXPERIMENT 2 **5 Hours**

Develop samples for Sleeves - set in sleeve (Plain, Puff, Kimono

EXPERIMENT 3 **4 Hours**

Construct samples of Pockets-patch pocket, bound pocket and front hip pocket

EXPERIMENT 4 **4 Hours**

Design samples for Pockets-Patch pockets, Patch pockets with flap, Seam pockets

EXPERIMENT 5 **4 Hours**

Design samples of plackets Continuous bound placket,2-piece placket, tailors placket, fly opening

EXPERIMENT 6 **4 Hours**

Applying fullness in various parts of the children's wear.

EXPERIMENT 7 **4 Hours**

Application of seams in appropriate places based on garment types

Total: 60 Hours

Reference(s)

1. B. Claire and Shaeffer, Sewing for Apparel Industry, Pearson's Prentice Hall, New Jersey, 2000.
2. B. Claire Shaeffer& Glee Barre, High Fashion Sewing Secrets from the World's Best Designers: A Step- By-Step Guide to Sewing Stylish Seams, Buttonholes, Pockets, Collars, Hems, And More, Rodale Books Publisher, New York, 2001.
3. Marry Mathew, Practical Clothing Construction Part I, Basic Sewing Process, Cosmic Press, Chennai,1999.
4. Cooklin Gerry, Garment Technology for Fashion Designers, Blackwell Science Publisher, USA, 1997.
5. Leila Aitken, Step by Step Dress Making Course, Sterling Publishing Co. Inc. NewYork,1994.
6. www.fashiondex.com/Bubonia_Sample_1.pdf

18FT404 WOVEN FABRIC STRUCTURE 2 0 2 3

Course Objectives

- To understand the various types of woven fabric structures
- To comprehend the design, draft and peg plan for various woven fabric structures
- To determine the suitability of loom requirements to produce fabrics with different structures

Programme Outcomes (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/ Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4: Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO6: The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories.
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Explain the elements of woven fabric structure and analyze their construction parameters
2. Classify the special rib and cord woven structures and analyze their construction parameters.
3. Identify the suitable looms to produce the various types of woven fabric structures
4. Analyze the formation techniques of pile fabric structures
5. Analyze the formation techniques of pile fabric structures and double cloth

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2			2									1	
2	2					2							1	2
3	2			2									2	
4	2	2	2										2	
5	2												2	

UNIT I **6 Hours**

ELEMENTS OF WOVEN DESIGN AND ELEMENTARY WEAVES

Construction of elementary weaves- plain: warp rib, weft rib, mat, hopsack. Twills: modification of twills, Herring bone twill, broken twill, elongated twill, rearranged twills, diamond weaves. Satin - sateen and their derivatives.

UNIT II **6 Hours**

SPECIAL RIB AND CORD STRUCTURES

Ordinary and Brighton honey comb, Crepe weaves, Huck-a-back. Cork-Screw weaves, Bedford cords: plain faced, twill faced, Wadded, crepe-on. Welts & piques: wadded piques, Loose and fast back welts and piques. Mock-leno

UNIT III **6 Hours**

COLOUR AND WEAVE EFFECTS

Color theory: light and pigment theory, modification of color, color combination, application of colors, color and weave effects. Spot figuring: arrangement of figuring for dobby and jacquard, Extra warpand extra weft figuring.

UNIT IV **6 Hours**

BACKED FABRIC PILE AND DOUBLE CLOTHS

Backed fabrics: Warp and weft back, reversible and non-reversible. Warp pile, fast wire pile, terry weaves, terry stripe and terry check. Weft pile: plain back, twill back velveteen, Lashed pile, corduroy, Weft plush.

UNIT V **6 Hours**

STITCHED DOUBLE CLOTHS

Double cloth: Classification, self stitched, face to back, back to face, Combination face to back and back to face stitched double cloth. Wadded double cloth: weft and warp Wadded double cloth. Center warp & Weft Stitched double cloth

FOR FURTHER READING

Effect of different weaves on fabric properties, Braiding, Extra warp and extra weft figuring with multi colour, Effect of Length, density and fatness on pile, 3D Fabrics, other types of double cloth.

EXPERIMENT 1 **3 Hours**

Analysis of Plain, Twill weave and Satin weaves

EXPERIMENT 2 **3 Hours**

Analysis of Huck-a-back and Honey Comb weaves

EXPERIMENT 3 **3 Hours**

Design, Draft and Peg plan of Mock Leno, Bedford cords

EXPERIMENT 4 **3 Hours**

Analysis of Extra Warp and Extra Weft Figuring

EXPERIMENT 5 **3 Hours**
Design, Draft and Peg plan of Double cloth, Pile Fabric

EXPERIMENT 6 **3 Hours**
Evaluation of Color and Weave Effects

EXPERIMENT 7 **3 Hours**
Design the set of parameters of a woven fabric for the given specific end-use

EXPERIMENT 8 **3 Hours**
Analyze the knitted fabric and state the end-uses

EXPERIMENT 9 **3 Hours**
Sourcing and analysis of the given woven fabrics

EXPERIMENT 10 **3 Hours**
Sourcing and analysis of the given woven fabrics.

Total: 60 Hours

Reference(s)

1. Grosicki Z. J., Watson Textile Design and Colour, Vol.1, Woodhead Publications, Cambridge England, 2004
2. Z. Grosicki, Watson"s Textile Design and Colour, Universal Publishing Corporation, Mumbai, 1998
3. E G Gilligan,Woollen and Worsted Woven Fabric Design,,Woodhead publication,UK,2004
4. Seyam A. M., Structural Design of Woven Fabrics, Theory and Practice, TextileInstitute, Manchester, 2002
5. W. S. Murphy, Textile weaving & Design, Abhishek Publications, 2000
6. nptel.ac.in/courses/116102005/26

18FT405 PATTERN MAKING II **3 0 2 4**

Course Objectives

- Acquire knowledge on developing pattern style variants for body components.
- Develop patterns for commercial categories.
- Develop patterns for functional wear.

Programme Outcomes (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/ Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO5: Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO9: Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and writeeffective reports and design documentation, make effective presentations, and give and receive clear instructions.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories.
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Resolve the methods for draftingsleeve variants and collar variants
2. Explain the procedure for draftingpatterns for top wear garments and predict the fine changes that needs to be incorporated in realproduction patterns.
3. Explain the procedure for draftingpatterns for bottom wear and one piece garments and predict the fine changes thatneed to be incorporated in real production patterns.
4. Exemplify the factors affecting knit wear patterns and intimate apparels and resolve the methods of making them.
5. Determine the pattern making adjustments and changes required for manufacturing functional wear.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	3		2				2	2			2	2
2	3	2	3						2	2			2	2
3	3	2	3		-				2	2			2	2
4	3	2	3						2	2			2	2
5	3	2	3		2				2	2			2	2

UNIT I **9 Hours**

DRAFTING OF BODY COMPONENTS

Drafting of body components using slash and spread or pivotal transfer methods: Procedure Sleeve: Set in sleeve- puff, bell, bishop, circular, leg-o-mutton, Juliet, petal, marmaluke, butterfly, cold shouldered sleeve. Raglan sleeves. Sleeve combined with bodice - kimono, dolman, Magyar/batwing. Collars: Flat collar, Shirt collar, Peter pan collar, Sailor collar, Shawl collar.

UNIT II **9 Hours**

PATTERN MAKING -TOP WEAR

Top wear: Drafting & draping -Procedure for Formal shirt, Polo shirt, Single and Double breasted blazer, Kameez, Blouse, Ladies jacket.

UNIT III **9 Hours**

PATTERN MAKING - ONE PIECE WEAR

One piece wear: Drafting & draping -Procedure for Jump suit, Romper and Dresses. Bottom wear: Drafting & draping-Procedure for Denim trousers, Cargo shorts, Salwar, pants, knickers.

UNIT IV **9 Hours**

PATTERN MAKING -KNITS

Knit wear: Factors to be considered to draft knit wear.Intimate Apparel: Drafting & draping - Procedure for Vests, Brazier, Camisoles, Briefs, Boxers - briefs and shorts, Panty.

UNIT V **9 Hours**

PATTERN MAKING - FUNCTIONAL WEAR

Functional wear: Drafting & draping -Procedure for Sports/Active wear - Swim suit, Track suit. Chemical protective clothing - Lab coat. Medical functional clothing - Surgical gown, aprons. Cold weather protective clothing -Down jackets. Clothing for special needs.

EXPERIMENT 1 **6 Hours**

Drafting of patterns for different styles of sleeves and collars

EXPERIMENT 2 **7 Hours**

Drafting of patterns for Top wear:

1. Formal shirt and
2. Single breasted blazer

EXPERIMENT 3 **5 Hours**

Drafting of patterns for Bottom wear:
1. Denim trousers and
2. Knickers

EXPERIMENT 4 **6 Hours**

Drafting of patterns for Bottom wear:
1. Vests and Briefs
2. Brazier

EXPERIMENT 5 **6 Hours**

Drafting of patterns for Functional wear:
1. Sports/Active wear - Swim suit.

Total: 75 Hours

Reference(s)

1. Helen Joseph Armstrong- Pattern Making for Fashion Design- Pearson Education (Singapore)Pvt. Ltd.,2005
2. Winifred Aldrich,-Metric Pattern Cutting- Blackwell Science Ltd., 1994
3. Amaden-Crawford Connie,-The Art of Fashion Draping (3rd edition)- Om Books International Publications, 2005
4. Hollen Norma R; Kundel Carlyn, - Pattern making by the flat pattern method, 1998.
5. Gillian Holman, - Pattern Cutting Made Easy, Blackwell Scientific Publications, 1997.
6. Natalie Bray- More Dress Pattern Designing- Blackwell Scientific Publications, 1986.

18FT406 FASHION DESIGN CAD **2 0 2 3**

Course Objectives

- To train the students on developing flat sketches of different apparels
- To impart the knowledge of developing Tech packs of industrial standards.
- To equip them to present their designs in rendered illustrations developed by using software.

Programme Outcomes (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO5: Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO9: Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and writeeffective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories.

PO12: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Explain functions and tools of adobe illustrator
2. Develop silhouettes for different categories in digital platform
3. Develop story boards for different apparel categories of industrial standards.
4. Develop and render trim boards for different types.
5. Develop technical flat sketches of different apparel categories as per the industrial standards.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	1	2			2				2	2			3	2
2	1	2			2				2	2			3	2
3	1	2			2				2	2			3	2
4	1	2			2				2	2			3	2
5	1	2			2				2	2			3	2

UNIT I **6 Hours**

FUNDAMENTAL TOOLS IN ILLUSTRATOR

Image formats. Tools. Create a new file. Create new layers. Prepare a file for export to jpeg format. Preparation of technical drawing. Pattern creation. Offset pattern repeats. Prepare pattern brushes. Masking.Creating new brush strokes.

UNIT II **6 Hours**

SILHOUETTES IN DIGITAL PLATFORM

Silhouettes in digital platform

UNIT III **6 Hours**

STORY BOARDS

Croquis development, Adding effects to an illustration, working with text, Downloading fonts and clip art. Edit a photograph. hand drawing. Color filling the garments. Changing the color of scanned fabric. Gradient editor.

UNIT IV **6 Hours**

PREPARATION OF TRIM BOARDS

Zipper development. Changing zipper color and size. brand label development. Size label development. embroidery pattern development. Develop button designs in different sizes.

UNIT V **6 Hours**

TECHNICAL FLAT SKETCHES

Formal shirts, trousers, jackets, Trench coats, Jump suits, Polo shirts, Swimsuits, Blazers.

EXPERIMENT 1 **3 Hours**

Develop a flat sketch of Men's full hand formal shirt with monochromatic soft floral prints.

EXPERIMENT 2 **3 Hours**

Develop a flat sketch of women’s pleated skirt.

EXPERIMENT 3 **3 Hours**

Develop a flat sketch of Sequined Women's peasant blouse.

EXPERIMENT 4 **3 Hours**

Develop a flat sketch of Men's cargo pants.

EXPERIMENT 5 **3 Hours**

Develop a tech pack for a Boys T-shirt with a chest print.

EXPERIMENT 6 **3 Hours**

Develop a Tech pack for women's embroidered Kurti.

EXPERIMENT 7 **3 Hours**

Develop a Tech pack for All Over Printed Men's Joggers.

EXPERIMENT 8 **3 Hours**

Develop a Full Fashion Illustration of Women's denim trousers on a croquie that is in trend and render it.

EXPERIMENT 9 **3 Hours**

Develop a Full Fashion Illustration of kid's casual wear on a croquie and render it.

EXPERIMENT 10 **3 Hours**

Develop a Full Fashion Illustration of a Men's croquie in formal wear and render it.

Total: 60 Hours

Reference(s)

1. Robert Hume. Fashion and Textile Design with Photoshop and Illustrator, Professional CreativePractice. Fairchild books, 2016.
2. Stacy Stewart Smith. CAD for Fashion Design and Merchandising, Fairchild Books, 2014.
3. Dena Wilson and Peter Lourekas with Rob Schwartz Learn Adobe Illustrator CC for GraphicDesign and Illustration. 2016
4. Marianne Centner and Frances Verekar. Fashion designer's handbook for Adobe Illustrator.2nd edition. A. John Wiley and Sons. 2011.
5. Kathleen Colussy and Steve Greenberg. Rendering fashion, fabric and prints. Pearson education. 2005.
6. Marianne Centner and Frances Verekar. Fashion designer's handbook for Adobe Illustrator.2nd edition. A. John Wiley and Sons. 2011.

18FT407 GARMENT CONSTRUCTION I 0 0 4 2

Course Objectives

- To demonstrate conceptualizing skills in developing seam specifications.
- To demonstrate fundamental concepts of preparing sample seams.
- To demonstrate skills for making body components of garments.

Programme Outcomes (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO5: Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO9: Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories.

Course Outcomes (COs)

1. Organize the seam specificationparameters for preparing samples.
2. Construct samples making useof garmenting techniques.
3. Predict the technical problemsfaced in seam sample preparation

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3				2				2	2			2	
2	3				2				2	2			2	
3	3				2				2	2			2	

EXPERIMENT 1 **6 Hours**

Preparing samples for basic Hand stitches, Seams and Seam finishes with seam diagram and specification (cross section)

EXPERIMENT 2 **6 Hours**

Preparing samples for basic garmenting techniques: Fullness -Darts, Tucks, Pleats and Gathers

EXPERIMENT 3 **6 Hours**

Preparation of samples for Sleeves: Set in sleeve and cold shoulder sleeve.

EXPERIMENT 4 **6 Hours**

Preparation of samples for Collars: Shirt collar and Nehru collar.

EXPERIMENT 5 **6 Hours**

Preparation of samples for
Neckline finishes: Bias facing, Bias binding, fitted facing and French binding.

EXPERIMENT 6 **6 Hours**

Application of suitable neckline finishes and collars in men's wear with seam specification and seam diagram.

EXPERIMENT 7 **6 Hours**

Preparation of samples for Shawl collar with facing

EXPERIMENT 8 **6 Hours**

Preparation of yoke for men's wear formal shirt with seam diagram and specification.

EXPERIMENT 9 **6 Hours**

Construction of (Formal shirt) front placket and full sleeve placket.

EXPERIMENT 10 **6 Hours**

Construction of Blazer notch collar with specification

Total: 60 Hours

Reference(s)

1. Natalie chanin, The Geometry of Hand-Sewing: A Romance in Stitches and Embroidery from Alabama Chanin and The School of Making (Alabama Studio), Abrams, 2017.
2. Carol marine, Daily painting: Paint small and often to become a more creative, productive and successful artist, Watson-Guptill publications, 2014.
3. Alison Ellen, Hand knitting: new directions, 2nd edition, D&N publishing, 2011.
4. https://www.makersrow.com.

18FT408 TESTING AND QUALITY CONTROL LABORATORY

0 0 4 2

Course Objectives

- To understand working principles/ procedures of various textile testing instruments
- To test the fibre, yarn, fabric and accessories

Programme Outcomes (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/ Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4: Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5: Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories.
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Identify the textile fibers by using fiber identification tests.
2. Assess the essential & desirable properties of fibers, yarn & fabric.
3. Analyze the properties of both woven & knitted fabrics.
4. Analyze the performance related properties of apparels and accessories.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	3	2	3	2			2					1	1
2	2	3	2	2	1			2					2	1
3	3	3	2	2	1			2					1	
4	3	3	2	2				2						

EXPERIMENT 1 **6 Hours**

Fibre identification tests by microscopic, burning and chemical tests

EXPERIMENT 2 **6 Hours**

Analysis of Cotton fibre length (Baer Sorter)

EXPERIMENT 3 **6 Hours**

Measurement of Fibre fineness (air-flow)

EXPERIMENT 4 **6 Hours**

Measurement of single yarn twist

EXPERIMENT 5 **6 Hours**

Measurement of yarn strength: Lea strength

EXPERIMENT 6 **6 Hours**

Testing of fabric thickness, stiffness and crease recovery

EXPERIMENT 7 **6 Hours**

Testing of fabric tensile strength, tearing strength and bursting strength

EXPERIMENT 8 **6 Hours**

Measurement of Shrinkage in Knitted Fabric

EXPERIMENT 9 **6 Hours**

Analysis of fabric abrasion resistance and fabric pilling of various GSM

EXPERIMENT 10 **6 Hours**

Measurement of seam strength and button strength

Total: 60 Hours

18HS001 ENVIRONMENTAL SCIENCE 2 0 0 0

Course Objectives

- Understand the interdisciplinary and holistic nature of the environment
- Identify the significance of natural resources and environment on the quality of life and stimulate the quest for sustainable development
- Assess the socio-economic, political and ethical issues in environmental science

Programme Outcomes (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO7: Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

Course Outcomes (COs)

1. Explain the importance of interdisciplinary nature of environment studies, uses and exploitation of natural resources
2. Analyze the different types of ecosystems and biodiversity, its values and also role of professionals in protecting the environment from degradation
3. Identify the existing environmental challenges related to pollution and its management
4. Select suitable strategies for sustainable management of components of environmental science
5. Correlate the impacts of population and human activities on environment

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	1	2												
2	1	1												
3	2	2					1							
4	1													
5	2													

UNIT I **6 Hours**

NATURAL RESOURCES

Forest resources: Use - over exploitation - deforestation - case studies. Water resources: Use - over utilization of surface and ground water - conflicts over water. Mineral resources: Use - exploitation - environmental effects of extracting and using mineral resources - case studies. Food resources: Effects of modern agriculture - fertilizer-pesticide problems (eutrophication, blue baby syndrome, biomagnification). Energy resources: renewable (solar, wind, and hydro).

UNIT II **6 Hours**

ECOSYSTEMS AND BIODIVERSITY

Concept of an ecosystem: Structure and function of an ecosystem - producers - consumers - decomposers - food chains - food webs and ecological pyramids - Types of ecosystem: Introduction - characteristic features: desert ecosystem. Biodiversity - value of biodiversity - threats to biodiversity - endangered and endemic species - Conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.

UNIT III **6 Hours**

ENVIRONMENTAL POLLUTION

Pollution: Definition - causes - effects - control measures of air pollution - water pollution : (Sewage water treatment by activated sludge and trickling filter process) - noise pollution- thermal pollution. Disaster management: causes - effects - control measures of floods Ã¢?? earthquake

UNIT IV **7 Hours**

SOCIAL ISSUES AND ENVIRONMENT

Sustainable development : Definition - Unsustainable to sustainable development - solid waste management - causes - effects - 5R Principles (landfills, incineration, composting). Water conservation - rain water harvesting - watershed management. Climate change - global warming - acid rain - ozone layer depletion. E-waste.

UNIT V **5 Hours**

HUMAN POPULATION AND ENVIRONMENT

Human population: Population growth - characteristics - variation among nations - population explosion - value education - HIV / AIDS. Role of information technology in environment and human health - occupational safety and health administration (OSHA)

FOR FURTHER READING

Human rights: Biomedical waste -Identification of adulterants in food materials

Total: 30 Hours

Reference(s)

1. Anubha Kaushik, C.P. Kaushik, Environmental Science and Engineering , 4th Multi Colour Edtion, New Age International Publishers, New Delhi, 2014
2. Raven, P.H., Hassenzahl, D.M. & Berg, L.R. 2012. Environment. 8th edition. John Wiley & Sons
3. T. G. Jr. Miller, S. Spoolman, New Environmental Science, 14th Edition, Wadsworth Publishing Co, New Delhi, 2014
4. Pepper, I.L., Gerba, C.P. & Brusseau, M.L. 2011. Environmental and Pollution Science. Academic Press
5. A. K. De, Environmental Chemistry, 7th Edition , New age international publishers, New Delhi, 2014

18GE401 SOFT SKILLS-REASONING 0 0 2 0

Course Objectives

- To acquire command of both the receptive skills (Listening, Reading) and the productive skills (Writing and Speaking) of English language
- To understand and make effective use of English language in business contexts

Programme Outcomes (POs)

PO1: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO5: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

Course Outcomes (COs)

1. Listen, Read, Speak, and Write Business English at the level of independent users
2. Appear for the Business English Certificate (BEC) Vantage level examination conducted by the Cambridge Assessment English

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	1													
2	1				1									

UNIT I **15 Hours**

LISTENING AND READING

Listening for writing short answers - filling gaps in sentences - identifying topic, context and function - identify different functions of language in business situations - identify prompts -identify paraphrases of required information Scanning - reading for gist - understanding sentence structure - error identification - identify paraphrases cohesive words and phrases - understand the importance of analysing the distractors - identify grammatical and semantic relationships

UNIT II **15 Hours**

WRITING AND SPEAKING

Business emails - notes - memos to colleagues or friends - giving instructions - explaining a development - asking for comments - requesting information - agreeing to requests - explaining - apologising - reassuring - complaining - describing - summarising - recommending - persuading turn - taking - sustaining interaction - initiating - responding - giving personal information - talking about present circumstances, past experiences and future plans - expressing opinion - speculating - organising a larger unit of discourse - giving information - expressing and justifying opinions - speculating - comparing and contrasting - agreeing and disagreeing

UNIT III **15 Hours**

LISTENING AND READING

Listening for writing short answers - filling gaps in sentences - identifying topic, context and function - identify different functions of language in business situations - identify prompts -identify paraphrases of required information - Scanning - reading for gist - understanding sentence structure - error identification - identify paraphrases - cohesive words and phrases - understand the importance of analysing the distractors - identify grammatical and semantic relationships

UNIT IV **15 Hours**

WRITING AND SPEAKING

Business emails - notes - memos to colleagues or friends - giving instructions - explaining a development - asking for comments - requesting information - agreeing to requests - explaining - apologising - reassuring - complaining - describing - summarising - recommending - persuading turn - taking - sustaining interaction - initiating - responding - giving personal information - talking about present circumstances, past experiences and future plans - expressing opinion - speculating - organising a larger unit of discourse - giving information - expressing and justifying opinions - speculating - comparing and contrasting - agreeing and disagreeing

Total: 60 Hours

Reference(s)

1. Whitehead, Russell and Michael Black. Pass Cambridge BEC Vantage Self - study Practice Tests with Key, Heinle - a part of Cengage Learning, Delhi, 2003.

21FT501 FASHION MERCHANDISING AND MARKETING **3 0 0 3**

Course Objectives

- To understand the fashion merchandising and marketing process in apparel business
- To comprehend the various types of merchandising in apparel business
- To exemplify the marketing research and product launching in apparel industry.

Programme Outcomes (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO5: Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6: The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and writeeffective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11: Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader ina team, to manage projects and in multidisciplinary environments.
PO12: Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Compare and contrast the different merchandising terms, functions and interpret the merchandising requirements of different groups of buyers.
2. Analyze the process flow in merchandising and the responsibilities of merchandisers in order execution.
3. Formulate market research, data collection techniques for inferring statistical results in apparel market research.
4. Assess the market research techniques
5. Interpret the industrial buying and sourcing process of apparel.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	2										3		1
2	2	2						2		2				1
3	2	3			2							2		1
4	2	2									2		1	1
5	2					2						3		1

UNIT I **9 Hours**

INTRODUCTION TO MERCHANDISING

Merchandising terminology-supplier, sub contractor, direct order, merchant export, Evaluation of sub contractors, vendors in evaluation, CM and CMT. Need of merchandising- advantages and disadvantages. Different forms of merchandising, Functions and tools of Merchandising.

UNIT II **9 Hours**

PROCESS FLOW IN MERCHANDISING

Teck Pack-Importance and contents of Tech pack, merchandisers perspective of tech pack. Sampling-Importance of sampling, different forms of sampling. Approvals- Types of approvals. Pre Production meeting, Production scheduling-Preparation of BOM, Time and Action calendar, Fabric and trims consumption. Time management in merchandise.

UNIT III **9 Hours**

FASHION MARKETING

The concept of fashion marketing. Types and methods of market research. Fashion marketing -Purpose of market research, an overview of the marketing research process, data sources. Fashion marketing communications, Sales forecasting. Marketing mix- 4 Ps.

UNIT IV **9 Hours**

MARKET RESEARCH TECHNIQUES

Market segmentation- behavioral, demographic, geographic. Types of sampling- cluster, convenience, judgment, quota, simply random sampling, systematic sampling. Techniques -interviews, attitude, likert scale, projective scales, observation.

UNIT V **9 Hours**

FASHION BUYING PROCESS AND SOURCING

Buying process- Buyer behavior, aspects of buying process, buying decision process. Pricing strategy, selection of distribution channel. Sourcing- types and process of sourcing, factors affecting sourcing, types of suppliers. Costing- components of cost of garment.

Total: 45 Hours

Reference(s)

1. Dr. V.R. Sampath, Garment Marketing and Merchandising, Published by Kalaiselvi Pathippakam.
2. Elaine Stone, Fashion Merchandising -An Introduction, Fourth Edition.
3. Virginia Grose, Basics Fashion Management 01: Fashion Merchandising, AVA publiser, switerland, 2011
4. Philip Kotler, Principles of Marketing, Pearson Education India, 2008.
5. Fashion Merchandising: Principles and practice by James Clark, published by Palgrave Macmillan, 2014.www.vasantkothari.com

21FT502 INDIAN TRADITIONAL EMBROIDERY 3 0 2 4

Course Objectives

- To introduce the technique(s) of Indian traditional embroidery for value addition.
- To create awareness about the different embroidered textiles of India.
- To initiate identification of regional embroideries developed by various communities.
- To understand the origin of technique and design with reference to colors, motifs, stitches of different Indian traditional embroidery.

Programme Outcomes (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO5: Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO7: Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO12: Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories.
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Analyze the specific embroidery style of Northern India on the basis of region, technique, motifs, Materials, colors, stitches, style of embroidery and Applications.
2. Structure the specific embroidery style of Western India on the basis of region, technique, motifs, Materials, colors, stitches, style of embroidery and Applications.
3. Outline the specific embroidery style of Central India on the basis of region, technique, motifs, Materials, colors, stitches, style of embroidery and Applications
4. Organize the specific embroidery style of Southern India on the basis of region, technique, motifs, Materials, colors, stitches, style of embroidery and Applications.
5. Differentiate the specific embroidery style of Eastern India on the basis of region, technique, motifs, Materials, colors, stitches, style of embroidery and Applications.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2				2		3					2	3	2
2	2				2		3					2	3	2
3	2				2		3					2	3	2
4	2				2		3					2	3	2
5	2				2		3					2	3	2

UNIT I **9 Hours**

TRADITIONAL EMBROIDERY-NORTHERN INDIA

Kashida from Kashmir, Phulkari from Punjab, Chamba rumal from Himachal Pradesh -region, technique, motifs, Materials, colours, stitches, style of embroidery, Applications.

UNIT II **9 Hours**

TRADITIONAL EMBROIDERY-WESTERN INDIA

Embroidery from Gujarat, Parsi embroidery - region, technique, motifs, Materials, colours, stitches, style of embroidery, Applications.

UNIT III **9 Hours**

TRADITIONAL EMBROIDERY -CENTRAL INDIA

Chikkankari from Uttar Pradesh, Phool Patti ka Kaam from Uttar Pradesh, Zardozi from Uttar Pradesh- region, technique, motifs, fabric, Materials, stitches, style of embroidery, Applications.

UNIT IV **9 Hours**

TRADITIONAL EMBROIDERY -SOUTHERN INDIA

Kasuti from Karnataka, Lambadi embroidery from Andhra Pradesh - region, technique, motifs, fabric, colours, stitches Materials, colours, stitches, style of embroidery, Applications.

UNIT V **9 Hours**

TRADITIONAL EMBROIDERY-EASTERN INDIA

Kantha from West Bengal, Sujani from Bihar, Pipli applique from Orissa - region, technique, motifs, Materials, colours, stitches, style of embroidery, Applications.

EXPERIMENT 1 **3 Hours**

Prepare a report showing the origin of Indian traditional embroidery.

EXPERIMENT 2 **3 Hours**

Collect the swatches and images on each type of traditional embroidery and make a scrap book.

EXPERIMENT 3 **3 Hours**

Collect the swatches and images on each type of traditional embroidery and make a scrap book.

EXPERIMENT 4 **3 Hours**

Design and develop a sample for Ladies Kurti showing the motifs of any two Indian traditionalembroidery.

EXPERIMENT 5 **3 Hours**

Design and develop a sample for Boys pajamas showing the motifs of any two Indian traditional embroidery.

EXPERIMENT 6 **3 Hours**

Design and develop a sample for Kids Frock showing the motifs of any two Indian traditional embroidery.

EXPERIMENT 7 **3 Hours**

Prepare a sample of any one traditional embroidery on 4"x4" fabric with a design size of 2"x2". Indicate the fabric used, type, size of needle and type of thread and amount of all material consumed for the same.

EXPERIMENT 8 **3 Hours**

Design a lifestyle product using any one traditional embroidery.

EXPERIMENT 9 **3 Hours**

Collect traditional embroidery motifs and create designs from collected motifs using Software.

EXPERIMENT 10 **3 Hours**

Collect traditional embroidery motifs and transform into digital form.

Total: 75 Hours

Reference(s)

1. Shailaja D.Naik, S Traditional Embroideries of India. A.P.H. Publishing Corporation, N.Delhi,1996.
2. Mary E Waring,Handbook of Traditional Embroidery,2017
3. Mary Gostelow, Embroidery-Traditional designs, techniques, and patterns from all over the world,1989.
4. Jangir, S. Digital embroidery designing: A new opportunity for textile designer. International Journal of Home Science. 2(3),2016
5. Veenu,Symbolic motifs in Traditional Indian Textiles and Embroideries, International Journal of Research in Economics and Social Sciences. 6(3),2016.
6. https://sewguide.com/indian-embroidery-patterns

21FT503 FASHION DESIGN PROCESS 3 0 2 4

Course Objectives

- To enable Students identify end user design needs and expectations.
- To impart the knowledge of conceptualizing designs and present them.
- To enable students prototype the concepts.

Programme Outcomes (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/ Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO5: Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO12: Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories.
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Explain trend analysis techniques and resolve the design requirements
2. Apply design research methodologies and execute design developments
3. Create thematic mood board and develop silhouettes
4. Exemplify constituents of fabric and determine the fabric specification.
5. Develop patterns and construct design

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2			2			2				2	2	
2	3	2			2			2				2	2	3
3	2	2	3					2					2	3
4	3	2	2					2					2	3
5	2	2	3					2					2	3

UNIT I **9 Hours**

FASHION TRENDS AND FORECASTING

Fashion cycle, trend analysis techniques, types of forecasting, Color forecasting process - Key colors. Social and Cultural aspects. Consumer segmentation based on Psychographic profiles.

UNIT II **9 Hours**

FASHION DESIGN RESEARCH METHODOLOGY

Design process - approach - stages of design process - demonstrations and guidelines - Fashion Design. Approach to design development - SCAMPER

UNIT III **9 Hours**

CONCEPTUALIZATION AND SILHOUETTE DEVELOPMENT

Development of designs and silhouettes, Concept editing and finalization, mood board creation processes, color story creation processes. Types of fashion looks - classic, bohemian, casual, eclectic, minimalistic and sporty

UNIT IV **9 Hours**

FABRIC SPECIFICATION

Classification of fabric types: woven fabric categories and knitted fabric categories. Fabric specification development: color specification, weight specification, drape specification.

UNIT V **9 Hours**

PROTOTYPE DEVELOPMENT

Pattern development processes - draping & alterations, Flat sketches. Story board preparation. Fashion photoshoot. Lookbook contents.

EXPERIMENT 1 **6 Hours**

Create an inspiration journal, brainstorm, visualize and focus

EXPERIMENT 2 **6 Hours**

Develop thematic mood board and color board with palette

EXPERIMENT 3 **6 Hours**

Visualize and develop silhouettes (minimum 30 silhouettes of any chosen garment)

EXPERIMENT 4 **6 Hours**

Show color story of the chosen silhouette and draft patterns for the same

EXPERIMENT 5 **6 Hours**

Construct the chosen silhouette

Total: 75 Hours

Reference(s)

1. Karl Aspelund, The design process, Fairchild, 2015.
2. Amolie Claude and Valerie Praguin, The collection process: fashion design process 4, Esmod editions, 2012.
3. Mckelvey and J. Munslow, Fashion design: process, innovation and practice, John wiley and sons, 2nd edition, 2011.
4. Simon Seivewright, Basics Fashion Design 01: Research and Design, A & C Black, 2nd edition, 2012
5. John Hopkins, Fashion Design: The Complete Guide, A & C Black, 2012.
6. Nette Fischer and Kiran Gobin, Construction for fashion design, Bloomsbury, 2017.

21FT504 QUALITY ASSURANCE IN GARMENT PRODUCTION **3 0 0 3**

Course Objectives

- Students will have fundamental knowledge on quality and quality standards
- Students will know the methodology of quality assurance in the apparel industry
- Students will apply statistical tools in the apparel industry

Programme Outcomes (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/ Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO5: Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6: The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7: Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO12: Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories.
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Explain the fundamentals of quality concepts and choose quality tools and inspection for each garment manufacturing stage
2. Interpret the specifications of quality standards and resolve the testing requirements of differentorganization protocols
3. Classify the quality inspection system procedures for fabric and accessories and implement them for carry out sample inspections
4. Determine tolerance limits for garment manufacturing processes and design standard operating procedures
5. Compare the costs of quality and determine the product care and safety requirements for different garments

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	1	3			2	2						1		2
2	3	2				2	2	1						3
3	3	3			1	2							2	
4	3	3			1	2								3
5	3	3	3			1		1					2	3

UNIT I **9 Hours**

FUNDAMENTALS

Quality: Definition, Dimensions & its importance. Inspection: Inspection loop, Systems of inspection, Types of inspection, Quality Control, Quality Assurance, Quality Management, Operating characteristic curve: Producers risk, Consumers risk, AQL, LTPD, Q-7 tools and its application

UNIT II **9 Hours**

QUALITY STANDARDS, SYSTEMS AND INSPECTION AGENCIES

Quality Standards: AATCC, ASTM, BIS, ISO, CSE. ISO 9001, ISO 14001, OHSAS 18000:2000, GOTS, CPS (Children Protection Standards), Social Compliance. Inspection agencies: Governmentand private agencies, third party testing / inspection services, AEPC, Textiles Committee, Test and inspection report

UNIT III **9 Hours**

QUALITY ASSURANCE IN FABRICS AND ACCESSORIES

Establishing spec sheet for raw materials and accessories, Types of defects in fabrics, major and minor faults, Fabric grading & inspection systems: types, 4 point and 10 point, sampling procedure, prescribing inspection procedure for raw materials and accessories. Tolerance limits and qualitystandards for fabrics, other raw materials and accessories

UNIT IV **9 Hours**

QUALITY ASSURANCE IN APPAREL PRODUCTION

Standard Operating Procedure (SOP), Prescribing specifications for process and machines: Spreading, Pattern Making, Cutting, Bundling, Ticketing, Stitching, Pressing / Finishing. Care labeling of apparel: Standards and methods. Safety issues for different accessories in children garment, prescribing inspection procedures for process and finished garment. Tolerance limits and quality standards for cutting, sewing and finished garments

UNIT V **9 Hours**

QUALITY ASSURANCE IN PACKING AND ORGANIZATION

System and standards for packing, warehousing and shipping. Cost of quality: Cost of conformance, cost of non-conformance. Relationship between various costs, value of tracking quality costs, Reporting quality cost. Customer Complaints / Returns and their handling mechanism, Protection and Satisfaction. Quality maturity grid, Quality and profitability, Organization for Quality

Total: 45 Hours

Reference(s)

1. Janace E. Bubonia, Apparel Quality: A Guide to Evaluating Sewn Products, Bloomsbury Publishing, 2014
2. Quality Management Handbook for the Apparel Industry, Clothing trade, New Age International Publishers, 2012
3. Subrata Das, Quality Characterization of apparel, Woodhead Publishing.2010
4. Douglas C. Montgomery, Statistical Quality Control: A Modern Introduction, 6th edition, Wiley India Pvt. Limited, 2010
5. Sara J Kadolph, Quality Assurance for Textiles and Apparel, Fairchild Publications Inc., Chicago, 2007
6. www.astm.org

21FT507 APPAREL CAD I LABORATORY 0 0 4 2

Course Objectives

- To impart them knowledge in identifying the pattern making tools used in Lectra software and develop efficient patterns.
- To equip them in developing different garment patterns and grading the patterns in efficient manner.

Programme Outcomes (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/ Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO5: Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and writeeffective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO12: Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories.
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Identify the tools and applications of Lectra software (Pattern making and grading software)
2. Draft the "basic pattern set patterns in Lectra software.
3. Develop the patterns and grade them into different sizes.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	2	3		1							2	3	
2	1		3		2					1		2	3	1
3			3		3					1			3	2

EXPERIMENT 1 **6 Hours**

Identification of primary tools for navigation of Lectra modari's interface.

EXPERIMENT 2 **6 Hours**

Construct the pattern for Basic Bodice front(refer the standard measurement)

EXPERIMENT 3 **6 Hours**

Construct the pattern for Basic sleeve (refer the standard measurement)

EXPERIMENT 4 **6 Hours**

Draft the pattern for Basic skirt front and back (refer the standard measurement)

EXPERIMENT 5 **6 Hours**

Draft the pattern for Trouser front and Back (refer the standard measurement)

EXPERIMENT 6 **6 Hours**

Design a baba suit and draft the pattern, seam them and grade them into three different sizes.

EXPERIMENT 7 **6 Hours**

Draft a pattern for frock, develop a style variant of the drafted pattern, seam them and grade in three sizes.

EXPERIMENT 8 **6 Hours**

Draft a women's top, seam them and grade them into three different sizes.

EXPERIMENT 9 **6 Hours**

Draft the men's formal shirt pattern and grade them into different four sizes.

EXPERIMENT 10 **6 Hours**

Draft a men's trouser pattern, develop three different leg fits from it, seam the patterns and grade themin three inseam lengths

Total: 60 Hours

21FT508 GARMENT CONSTRUCTION II LABORATORY

0 0 4 2

Course Objectives

- To demonstrate skills in sewing different types of seams.
- To demonstrate skills in constructing commercial garment categories.
- To demonstrate skills in finishing garment samples.

Programme Outcomes (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO5: Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledgeof elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions intotheir design artworks, fashion products and accessories.
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Fabricate seam specifications of commercial garment categories.
2. Choose and apply sewing techniques in constructing the garment.
3. Apply fundamental concepts and prepare technical specifications.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	1				2					2			3	
2	1				2					2			2	1
3	1				2					2			3	2

EXPERIMENT 1 **6 Hours**

Construction of Polo shirt with suitable seam specification and seam diagrams

EXPERIMENT 2 **6 Hours**

Construction of long coat with suitable seam specification and seam diagrams.

EXPERIMENT 3 **6 Hours**

Construction of Kameez and its varieties with suitable seam specification and seam diagrams.

EXPERIMENT 4 **6 Hours**

Construction of Ladies blouse with suitable seam specification and seam diagrams.

EXPERIMENT 5 **6 Hours**

Preparation of Tech pack for Top wear for Men, women and kids wear

EXPERIMENT 6 **6 Hours**

Construction of casual trouser with suitable seam specification and seam diagrams.

EXPERIMENT 7 **6 Hours**

Construction of knickers with suitable seam specification and seam diagrams.

EXPERIMENT 8 **6 Hours**

Construction of salwar with suitable seam specification and seam diagrams.

EXPERIMENT 9 **6 Hours**

Construction of kameez with suitable seam specification and seam diagrams.

EXPERIMENT 10 **6 Hours**

Preparation of Tech pack for Bottom wear for Men

Total: 60 Hours

Reference(s)

1. B. Claire and Shaeffer, Sewing for Apparel Industry, Pearson's Prentice Hall, New Jersey, 2000.
2. B. Claire Shaeffer & Glee Barre, High Fashion Sewing Secrets from the World's Best Designers: A Step- By-Step Guide to Sewing Stylish Seams, Buttonholes, Pockets, Collars, Hems, And More, Rodale Books Publisher, New York, 2001.
3. Marry Mathew, Practical Clothing Construction Part I, Basic Sewing Process, Cosmic Press, Chennai, 1999.

18GE501 SOFT SKILLS - APTITUDE I 0 0 2 0

Course Objectives

- Expose the undergraduate students to such methods and practices that help, develop and nurture qualities such as character, effective communication, aptitude and holding ethical values.
- It will provide a lot of activities and examples for a student to learn and develop these life skills.

Programme Outcomes (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

Course Outcomes (COs)

1. Explain various concepts of number systems and their techniques in solving the percentage, average and age problems.
2. Analyse the profit and loss of real time situations and the relation between ratio, proportion and variation.
3. Apply different techniques to find the distance, speed and time of various moving objects.
4. Understand the concepts of coding, sequences and series, data interpretation and critical reasoning to solve real time logical reasoning problems.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2								3				
2	3	2								3				
3	3	2								3				
4	3	2								3				

NUMBER SYSTEMS **2 Hours**

Introduction - Definition - Classification on Numbers- Power cycles and remainders - Short cut process- Concept of Highest Common Factor-Concept of Least Common Multiple- Divisibility- Number of zeros in an expression.

PERCENTAGE **2 Hours**

Introduction - Definition and Utility of Percentage - Importance of base/denominator for percentage calculations-Concept of percentage values through additions-Fraction to percentage conversion table.

AVERAGES AND AGES **2 Hours**

Introduction-Average of different groups-Addition or removal of items and change in average-Replacement of some of the items.

RATIO, PROPORTIONS AND VARIATION **3 Hours**

Introduction- Ratio- Properties-Dividing a given number in the given ratio-Comparison of ratios-Proportions-Useful results on proportion- Continued proportion-Relation among the quantities more than two-Variation.

PROFIT AND LOSS **2 Hours**

Gain/Loss and percentage gain or percentage loss-Multiplying equivalents to find sale price-Relation among cost price, sale price, gain/loss and percentage gain or percentage loss-An article sold at two different selling price-Two different articles sold at same selling price-Percentage gain or percentage loss on selling price-Percentage gain or percentage loss on whole property.

TIME AND WORK **2 Hours**

Introduction-Basic concepts-Concepts on working with different efficiencies-Pipes and Cisterns-Work Equivalence (Man Days) -Alternative approach.

TIME, SPEED AND DISTANCE **2 Hours**

Definition-Basics of Time, Speed and Distance - Relative speed-Problems based on Trains-Problems based on Boats and Streams-Problems based on Races-Time taken with two difference modes of transport-Time and distance between two moving bodies.

CODING AND DECODING **3 Hours**

Introduction-Description of Coding method-Coding patterns - Concepts of Coding and Decoding-Problems involving Coding and Decoding methods.

SEQUENCE AND SERIES **2 Hours**

Introduction-Sequences of real numbers - Number and Alphabet series-Description of Number and Alphabet series-Analogy-Odd man out-Power series.

DATA SUFFICIENCY **3 Hours**

Introduction to Data Sufficiency - Overview of the wide variety of Data Sufficiency problems - Basic introduction on how to determine what information is sufficient to solve a given problem - Common pitfalls to avoid.

DIRECTION **3 Hours**

Introduction to Direction - sense test - Overview of the wide variety of Direction problems-Direction-Plotting diagrams.

CRITICAL REASONING **3 Hours**

Introduction-Basic concept of critical reasoning- Weaken the argument-Strengthen the argument-Flaw in the argument-Evaluate the conclusion.

Total: 30 Hours

Reference(s)

1. Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Fourth Edition, Mc Graw Hill Publications.
2. U. Mohan Rao, Quantitative Aptitude for Competitive Examinations, Scitech Publications Pvt Ltd, India.
3. Dinesh Khattar, The Pearson Guide to Quantitative Aptitude for Competitive Examinations, Third Edition, Pearson Education Pvt Ltd, India, 2016.
4. Dr. R S Aggarwal, A Modern Approach to Verbal and Non Verbal Reasoning, Revised Edition, S Chand Publications.
5. Arun Sharma, How to prepare for Logical Reasoning for CAT & other Management Exams, Fifth Edition, Mc Graw Hill Publications.
6. Jaikishan and Premkishan, How to Crack Test of Reasoning in all Competitive Examinations, Revised Edition, Arihant Publications.

21HS002 HUMAN VALUES AND ETHICS 2 0 0 2

Course Objectives

- Understand the concept of good values and comprehend the importance of value-based living.
- Recognize the culture of peace through education.
- Identify and apply the practices for value development and clarification.

Programme Outcomes (POs)

PO8: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

Course Outcomes (COs)

1. Understand the importance of human values and ethics in life.
2. Execute the importance of harmonious living in a diverse society.
3. Analyze the sensitivity to the crying needs of society such as ungodliness, corruption, poverty, and suffering, and play a vital role in eradicating them.
4. Plan intellectually mature, morally upright, ethically correct, and spiritually inspired decisions.
5. Execute a correct balance between professional excellence and social commitment.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1								3	2	2				
2								3	2	2				
3								3	2	2				
4								3	2	2				
5								3	2	2				

UNIT I **6 Hours**

COURSE INTRODUCTION - NEED, BASIC GUIDELINES AND ANALYSIS

1. Importance of Human Values & Ethics in 21st Century
2. Understanding the theory of basic human values and ethics
Openness to change
Self-enhancement
Conservation
Self-transcendence
3. Schwartz Value Survey: Self-Assessment

UNIT II **6 Hours**

EMBRACING THE COMMON ETIQUETTE

Altruism – Integrity -Freedom -Justice -Honesty -Truthfulness -Responsibility –Compassion

UNIT III **6 Hours**

CONTINUOUS HAPPINESS AND PROSPERITY

An overview on basic Human Aspirations - Understanding and living in harmony at various levels of life -Embracing self-love and wellness -Understanding harmony in the family and society

UNIT IV **6 Hours**

UNIVERSAL HUMAN VALUES AND PROFESSIONAL ETHICS

Reflection on growing global multifold problems: poverty, pollution, hunger, disease, unemployment, caste system, child labour, gender equality, politics and violence.
Understanding the challenges in cultural, personal, social, political, and economic environment

UNIT V **6 Hours**

UNDERSTANDING HARMONY IN THE NATURE AND EXISTENCE - WHOLE EXISTENCE AS CO-EXISTENCE

Understanding the harmony in the Nature - Holistic perception of harmony at all levels of existence - Practice Exercises and Case Studies will be taken up in Practice Sessions

Total: 30 Hours

Reference(s)

1. Martin, G. (2011). The Little Book of Ethics: A Human Values Approach. Australia: G.P. Martin.
2. Gupta, N. L. (2002). Human Values For The 21St Century. India: Anmol Publications Pvt. Limited.
3. Mishra, A. (2017). Happiness Is All We Want. India: Bloomsbury Publishing.
4. Universal Human Values. (2023). (n.p.): Booksclinic Publishing.
5. A Textbook on Professional Ethics And Human Values. (2007). India: New Age International (P) Limited

21FT602 INDUSTRIAL ENGINEERING 3 0 2 4

Course Objectives

- To understand the Industrial Engineering concepts and their uses.
- To utilize the various Industrial Engineering techniques in apparel manufacturing process.
- To understand the Material movement in the apparel manufacturing process.

Programme Outcomes (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/ Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO7: The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO12: Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Implement the industrial Engineering concepts and determine the factors affecting productivity.
2. Assess the productivity in the apparel industry and plan productivity management strategies.
3. Determine the material management functions and execute planning techniques in calculating the material requirements.
4. Analyze the concepts of time and motion study and execute work study procedures for calculating SAM values.
5. Interpret Value Management Techniques and design strategies for value management.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	1	2					1					1		2
2	1	2	1				1					2		2
3	1	2					2							2
4	2	3	2				2					3		2
5	1	3					2					2		2

UNIT I **9 Hours**

INTRODUCTION TO INDUSTRIAL ENGINEERING

Industrial Engineering - concepts, functions, applications and role of industrial engineer; Tailoring vs Garmenting, Fundamentals of industrial engineering - operations analysis and design, operationscontrol and management; productivity concept and importance, factors affecting productivity, kinds of productivity measures. Cycle time, basic time, SAM and SMV calculation.

UNIT II **9 Hours**

CONCEPTS OF PRODUCTIVITY

Productivity Definition-Importance-Productivity-Managements Role and Responsibility-The Key Elements Of Productivity-Productivity Measurement-Productivity Analysis-Productivity Improvement; Total Productivity Management - Introduction- Adoption of Total Productivity Management And Techniques For Total Productivity Expansion- Procedures For Adopting And Advancing The Use of Total Productivity Management. Benefits of increased productivity.

UNIT III **9 Hours**

PRODUCTION PLANNING AND INVENTORY CONTROL

Materials management - meaning, functions and objectives; Production, planning and control. Pre production activities of a supervisor. Inventory control: purpose, types, functions, EOQ, ABC, VED and FMEA analysis. Introduction to MRP, JIT, Kanban, SMED.

UNIT IV **9 Hours**

WORK STUDY

Definition and concepts of work study (time and motion study); objectives of method study and work measurement for the apparel industry; method study procedure; flow process charts for the various processes in the apparel industry; flow diagram, string diagram, multiple activity chart, SIMO chart and Travel chart. Time study procedures, standard data required for time study, Calculation of SAM.

UNIT V **9 Hours**

VALUE MANAGEMENT

Toyota Production System (TPS), Lean Manufacturing, World Class Manufacturing, Increasing the productivity of resources - Building design and storage space requirement for the apparel industry - Financial planning and control- Ergonomics in apparel industry - Sales forecasting and techniques.

EXPERIMENT 1 **3 Hours**

Calculate standard allowed minute for the particular style (Men's T shirt)

EXPERIMENT 2 **3 Hours**

Study the work measurement of level of garment industry for automatic welt pocket attaching machine (Activity sampling

EXPERIMENT 3 **3 Hours**

Analyze optimized techniques for manufacturing apparel products through Methods study (Outline process chart

EXPERIMENT 4 **3 Hours**

Analyze optimized line sequence for manufacturing apparel products through Methods study (Flow diagram

EXPERIMENT 5 **3 Hours**

Analyze optimized line sequence for manufacturing apparel products through Methods study (Various Charts) for collar turning and sleeve preparation process.

EXPERIMENT 6 **3 Hours**

Analyze the Factory simulation game of apparel production unit with all the necessary items.

EXPERIMENT 7 **3 Hours**

Create plant layout for given lot production

EXPERIMENT 8 **3 Hours**

Analyze the Operation break down for the particular style (Men's formal shirt)

EXPERIMENT 9 **3 Hours**

Analyze the performance of the operator for the particular style by using on standard efficiency technique.

EXPERIMENT 10 **3 Hours**

Prepare time and action plan for the particular style of garment.

Total: 75 Hours

Reference(s)

1. V.Ramesh babu, Industrial Engineering in Apparel Production, Woodhead publishing india, ISBN 9780857091079, November 2011
2. Kjell B. Zandin and Harold B. Maynard, Maynard's Industrial Engineering Handbook, McGraw-Hill Professional, 2001.
3. Jacob Solinger, Apparel Manufacturing Handbook, Bobbin Blenheim Media Corporation, Nashville, USA, 1988.
4. W. G. Ireson and E. L. Grant, Handbook of Industrial Engineering and Management, Prentice Hall of Robi, New Delhi, 1988.
5. Johnson Maurice, Introduction to Work Study, International Labour Organization, Geneva, 1995.
6. O. P. Khanna, Industrial Engineering & Management, Dhanpat Rai& Sons, Delhi, 1987.

21FT603 FASHION PORTFOLIO 2 0 2 3

Course Objectives

- To equip the students to curate and express inspiration and mood board ideas.
- To apply sketching skills and design exploration techniques.
- To impart knowledge of organizing different elements in a portfolio and bringing out the desired look.

Programme Outcomes (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate considerationfor the public health and safety, and the cultural, societal, and environmental considerations.
PO5: Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO9: Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and writeeffective reports and design documentation, make effective presentations, and give and receive clear instructions.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories.
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Execute trend analysis, identify key concepts: color, style, fabric and prepare trend reports for the chosen apparel category.
2. Exemplify the appropriate inspiration sources befitting the target customer.
3. Develop design exploration sketches, fashion illustrations and determine fabric specifications.
4. Determine intended design outcomes by manipulating fabrics.
5. Construct garments and bring out the look desired through photoshoot with a proper presentation.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	2	3		3				2	2			3	2
2	2	2	3		3				2	2			3	2
3	2	2	3		3				2	2			3	2
4	2	2	3		3				2	2			3	2
5	2	2	3		3				2	2			3	2

UNIT I **6 Hours**

TREND ANALYSIS

Trend analysis: Introduction to online trend forecasting platforms, Segmentation of consumes, performing online visual research, interpreting trends, generation of forecast report.

UNIT II **6 Hours**

FASHION DESIGN COMPONENTS

Inspiration board: elements to be present, visual arrangements. Mood board: Deriving mood board elements from the trend forecast report, Color board: color story, base color, ascent and descent colors and color proportions.

UNIT III **6 Hours**

DESIGN DEVELOPMENT

Design exploration techniques, fashion illustration: poses, rendering different fabrics, flat sketch: seam details, fabric and trim details, accessory board. Fabric selection parameters; flowy fabrics, sheer fabrics, suiting fabrics, shirting fabrics, heavy fabrics, denims, self designed fabrics. Fabric end use parameters.

UNIT IV **6 Hours**

FABRIC MANIPULATION

Fabric manipulation techniques: surface embellishments, different dyeing techniques: batik, tie and dye, vegetable dyeing, marbling. other ornamentation techniques.

UNIT V **6 Hours**

PROTOTYPE DEVELOPMENT

Garment construction: the selection of appropriate needles, seams, stitches. fit testing. fashion photoshoot: product and model photo hoot. Developing theme; Choosing poses, Hair and makeup, accessories, background selection. Arranging elements in the portfolio.

EXPERIMENT 1 — 3 Hours

Develop a trend analysis report for the chosen apparel category and target customer.

EXPERIMENT 2 — 3 Hours

Develop an inspiration board appropriate for the season, category and target customer's AIO.

EXPERIMENT 3 — 3 Hours

Develop a Mood board and color story elaborating the theme chosen.

EXPERIMENT 4 — 3 Hours

Develop 25 design explorations for garments from the elements taken from the mood board.

EXPERIMENT 5 — 3 Hours

Develop 10 fabric manipulated swatches (Draping, dyeing, surface embellishments, print artworks) for the mood board chosen and develop a Fabric manipulation board.

EXPERIMENT 6 — 3 Hours

Develop full length illustrations for the final designs and render them appropriately, also develop flat sketches. Develop trims and accessories board.

EXPERIMENT 7 **3 Hours**

Construct 3 garments finalized from the design explorations with measurements of your model.

EXPERIMENT 8 **3 Hours**

Construct 3 garments finalized from the design explorations with measurements of your model.

EXPERIMENT 9 **3 Hours**

Develop a photoshoot expressing the moods of the garments made with appropriate styling styling.

EXPERIMENT 10 **3 Hours**

Arrange all the boards and picture and present them in a proper portfolio format, Conclude the developed designs by correlating it with the mood and inspiration.

Total: 60 Hours

Reference(s)

1. Designing Your Fashion Portfolio From Concept to Presentation 1st edition, Joanne Barrett, Publication 2014.
2. Portfolio Presentation for Fashion Designers, Linda Tain 4th edition.Publication 2018
3. Anette Fischer and Kiran Gobin, Construction for fashion design, Bloomsbury, 2017.
4. Karl Aspelund, The design process, Fairchild, 2015.
5. www.29andseptemberstudio.com

21FT607 APPAREL CAD II LABORATORY 0 0 4 2

Course Objectives

- To impart them knowledge in identifying the pattern making tools used in Lectra software and develop efficient patterns.
- To equip them in developing different garment patterns and grading the patterns in efficient manner

Programme Outcomes (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO5: Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and writeeffective reports and design documentation, make effective presentations, and give and receive clear instructions.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories.
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Explain the functions of tools of Diamino marker making module of Lectra software
2. Prepare a marker plan for the pattern pieces included in the Variant with reference to given fabric
3. Develop 3D digital illustrations of design and on mannequins in Reach fashion studio

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	1			3					1			2	1
2	2	1			3					1			2	2
3	2	1			3					1			2	2

EXPERIMENT 1 **6 Hours**

Draft a men's trouser pattern, develop three different leg fits from it, seam the patterns and grade them in three inseam lengths. Develop a marker plan on a fabric width of 135cm.

EXPERIMENT 2 **6 Hours**

Draft a men's casual shirt pattern and develop a marker plan on a plaid fabric having 2X2 cm size pattern. The patterns should be matched at sleeve setting, pocket attachment, yoke and placket. Consider the fabric width as 140cm.

EXPERIMENT 3 **6 Hours**

Draft a full skirt. Assume an engineered stripe line passes through the princess seam line on the both sides of center front. The fabric width is 120cm with the engineered stripe located at 45cm from the selvedge.Develop an appropriate marker.

EXPERIMENT 4 **6 Hours**

Draft a Shawl collar jacket pattern in misses size 8 and prepare a marker plan in 120cm plain weave poplin fabric and 120cm herring bone twill fabric

EXPERIMENT 5 **6 Hours**

Draft a women's night suit and prepare marker plan in 140cm plaided fabric.

EXPERIMENT 6 **6 Hours**

Develop a 3D visual display of Women's business suit with coordinating accessories. Suggest asuitablefabric structure and show its simulation.

EXPERIMENT 7 **6 Hours**

Develop a 3D visual display of conceptual Figure skating suit for men and women both. Coordinate it with right accessories.

EXPERIMENT 8 **6 Hours**

Develop a 3D visual display of biker jackets and cargo shorts. Coordinate it with right accessories

EXPERIMENT 9 **6 Hours**

Develop a 3D visual display of any three Bohemian silhouettes with coordinating accessories.

EXPERIMENT 10 **6 Hours**

Develop a 3D visual display of women's gown for red carpet wear and Coordinate it with right accessories

Total: 60 Hours

21FT608 GARMENT CONSTRUCTION III LABORATORY

0 0 4 2

Course Objectives

- To demonstrate skills in sewing different types of seams.
- To demonstrate skills in constructing commercial garment categories
- To demonstrate skills in finishing garment samples

Programme Outcomes (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate considerationfor the public health and safety, and the cultural, societal, and environmental considerations.
PO5: Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories.
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Fabricate seam specifications of commercial garment categories.
2. Design silhouettes and construct the designer garment applying garmenting techniques.
3. Apply fundamental concepts and prepare technical specifications.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2		3						2			2	2	2
2	2	2	3						2			2	3	3
3	2		3						1			2	2	3

EXPERIMENT 1 **6 Hours**

Design and construction of women's airhostess jacket with shawl collar.

EXPERIMENT 2 **6 Hours**

Design and construction of women's airhostess skirt style.

EXPERIMENT 3 **6 Hours**

Prepare a technical specification for women's airhostess ensemble with suitable seam specification and seam diagrams.

EXPERIMENT 4 **6 Hours**

Design and construction of men's athletic wear: trunk and shorts.

EXPERIMENT 5 **6 Hours**

Prepare a technical specification for men's athletic wear: trunk and shorts with suitable seam specification and seam diagrams.

EXPERIMENT 6 **6 Hours**

Design and construction of women's sheath dress.

EXPERIMENT 7 **6 Hours**

Prepare a technical specification for women's sheath dress with suitable seam specification and seam diagrams.

EXPERIMENT 8 **6 Hours**

Design and construction of long anarkali top.

EXPERIMENT 9 **6 Hours**

Prepare a technical specification for long anarkali top with suitable seam specification and seam diagrams.

EXPERIMENT 10 **6 Hours**

Determine the difference between Preparation of Tech pack for Men's formal shirt and women's formal shirt.

Total: 60 Hours

Reference(s)

1. B. Claire and Shaeffer, Sewing for Apparel Industry, Pearson's Prentice Hall, New Jersey, 2000.
2. Claire Shaeffer& Glee Barre, High Fashion Sewing Secrets from the World's Best Designers: AStep-By-Step Guide to Sewing Stylish Seams, Buttonholes, Pockets, Collars, Hems, And More, Rodale Books Publisher, New York, 2001.
3. Marry Mathew, Practical Clothing Construction Part I, Basic Sewing Process, Cosmic Press, Chennai, 1999.

18GE601 SOFT SKILLS-APTITUDE II 0 0 2 0

Course Objectives

- Expose the undergraduate students to such methods and practices that help, develop and nurture qualities such as character, effective communication, aptitude and holding ethical values.
- It will provide a lot of activities and examples for a student to learn and develop these life skills.

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

Course Outcomes (COs)

1. Apply the concepts of probability, Sets, Permutation and Combinations in estimating data for real time problems.
2. Understand the concept of logarithms, progressions and Simple and Compound interest to solve various practical problems.
3. Analyse objects involving cubes and cuboids in determining the number of sides colored.
4. Interpret various data from graphs and tables to determine ratio, percentage and averages.
5. Apply the logical reasoning skills for identifying age, relations, visual relations and puzzles.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2								3				
2	3	2								3				
3	3	2								3				
4	3	2								3				
5	3	2								3				

PERMUTATION AND COMBINATION **2 Hours**

Definition-Fundamental rules-Theorems on Permutation-Theorems on Combination.

PROBABILITY **2 Hours**

Concept and Importance of Probability-Underlying factors for real Life estimation of probability-Basic facts about probability-Some important consideration while defining event.

SYLLOGISM AND VENN DIAGRAM **2 Hours**

Concepts on Syllogisms-Venn diagram-Interpretation-Venn diagram-solving.

SIMPLE INTEREST AND COMPOUND INTEREST **2 Hours**

Introduction-Definition - Effect of change of P, R, T on simple interest-Amount-Amount becomes N times the principle-Repayment of debt in equal installments-Rate and time are numerically equal-Compound Interest-Conversion period-Basic formula-Special cases-To find the principle / Time /Rate-Difference between Compound Interest and Simple Interest-Equal annual installment to pay the borrowed amount.

MIXTURES AND ALLIGATION **2 Hours**

Definition-Alligation rule-Mean value (cost price) of the mixture-Some typical situations where allegation can be used.

CUBE AND LOGARITHM **4 Hours**

Introduction-Basic Concepts of Cube and Cuboid-Problems involving cubes and cuboids of various dimensions-Problems involving coloured cubes and cuboids - Basic concepts of Logarithm-Laws of Logarithms including change of base-Common logarithm (base 10) - Properties of Logarithms to solve equations involving logarithmic expressions.

DATA INTERPRETATION **2 Hours**

Introduction-Ratio-Percentage-Average-Tables - Graphs and Charts.

PROGRESSION AND LOGICAL REASONING **2 Hours**

Arithmetic progression-Geometric progression-Harmonic progression-Theorems related with progressions.

PROBLEM ON AGES **2 Hours**

Introduction-Basic concept-Usage of Percentage and Averages -Applications.

ANALYTICAL REASONING **2 Hours**

Introduction-Basic concept-Nonverbal Analytical Reasoning -Arrangements.

BLOOD RELATION **2 Hours**

Introduction-Basic concept-Kind s of relation-Tree diagram -Relations.

VISUAL REASONING **2 Hours**

Introduction-Basic concepts-Odd man out-Next series-Mirror image and water image

SIMPLIFICATIONS **2 Hours**

Introduction-Basic concepts-Arithmetic operations-Equation solving methods-Puzzles.

Total: 30 Hours

Reference(s)

1. Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Fourth Edition, Mc Graw Hill Publications.
2. U. Mohan Rao, Quantitative Aptitude for Competitive Examinations, Scitech Publications Pvt Ltd, India.
3. Dinesh Khattar, The Pearson Guide to Quantitative Aptitude for Competitive Examinations, Third Edition, Pearson Education Pvt Ltd, India, 2016.

4. Dr. R S Aggarwal, A Modern Approach to Verbal and Non Verbal Reasoning, Revised Edition, S Chand Publications.
5. Arun Sharma, How to prepare for Logical Reasoning for CAT & other Management Exams, Fifth Edition, Mc Graw Hill Publications.
6. Jaikishan and Premkishan, How to Crack Test of Reasoning in all Competitive Examinations, Revised Edition, Arihant Publications.

21FT701 APPAREL SOURCING AND COSTING 3 0 0 3

Course Objectives

- To know the sourcing strategies concept
- To impart knowledge on various costing techniques
- To acquire the knowledge on preparing cost sheet

Programme Outcomes (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate considerationfor the public health and safety, and the cultural, societal, and environmental considerations.
PO4: Design/ Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO12:Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories.
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Analyze sourcing strategies concepts and determine the sourcing methods
2. Choose and apply the sourcing design formats in processing orders
3. Differentiate budgeting concepts and different elements of costing
4. Generate manufacturing and material cost estimates of Apparel styles
5. Analyze the demand and supply chain concepts and formulate pricing strategies

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	1	3	3	2								2		2
2	2	3	3									3	3	2
3	2	3	3									3		2
4	2	3	3	3								3	1	2
5	3	3	3	1								3	1	2

UNIT I **9 Hours**

SOURCING STRATEGIES

Principles of sourcing strategy -out sourcing. Sourcing goals and objectives. Source selection - contracts and incentives, supplier strategies. Sourcing data and reports.

UNIT II **9 Hours**

SOURCING DESIGN

Sourcing design elements. Risks and rewards of multiple sourcing. Capacity constraints and pricing in sourcing markets. LIC selection and incentives for innovation -Yard stick contracts. Case studies in sourcing.

9 Hours

UNIT III

BUDGETING AND PRINCIPLES OF COSTING

Budgeting - aims of Budgeting, types of budget. Costing - aims of costing, Elements of cost - Material cost, Labour cost and overheads, difference between budgeting and costing. Depreciation cost -reasons and methods of calculating depreciation.

UNIT IV **9 Hours**

COST FACTORS AND PRACTICES

Costing of garments: cost determinants - cost of yarn - fabric production - processing, lot size and design affecting cost, cutting, making and trim cost. Cost of bought out components - Thread, Button, Zipper, Interlining. Costing methods, Cost estimation bulk production. Cost calculation by interpreting Specification sheet Practical cost calculation for Ladies, Men’s and Children's wear - woven and knitted

UNIT V **9 Hours**

PRICING OF APPAREL PRODUCTS

Determining Pricing of apparel products: Price elasticity of demand and supply, sample costing-marginal revenue and marginal cost, cost plus pricing methods; Full cost pricing, conversion cost pricing differential cost pricing, variable cost pricing, direct cost pricing derivation of cost of apparel products-woven/knits; The budgeting process: Budgeting principles for the apparel industry, fixed vs. variable budget, master budget, laminations of budgets any justification effort

FOR FURTHER READING

The act of purchasing, the work that is performed in a procurement department, how to differentiate different supplier categories with strategic sourcing, and how to elevate a firm's performance with strategic sourcing. Best practices in sourcing and procure-to-pay systems which enable firms to automateand accelerate essential sourcing functions

Total: 45 Hours

Reference(s)

1. Sudhi Sheshadri -Sourcing Strategy- Principles, Policy and Design, Springer, 2005.
2. Charles T. Horngren, Introduction to Management Accounting, Prentice Hall, New Delhi,2001
3. M. I. Mahajan, Export Policy, Procedures and Documentation, Snow-white Publishers, Mumbai, 2007
4. R. Narayanaswamy, Financial Accounting - A Managerial Perspective, Prentice Hall India Pvt. Ltd., New Delhi,1997.
5. S. K. Bhattacharya & John Dearden, Accounting for Management Text and Cases, Vikas Publishing House, New Delhi, 2000.
6. https://www.onlineclothingstudy.com

21FT702 GARMENT TESTING - PERFORMANCE AND SUSTAINABILITY

3 0 0 3

Course Objectives

- To have fundamental knowledge on garment testing protocol and management of restricted substances.
- To acquire knowledge of the methodology of garment testing in the apparel industry.
- To apply testing of harmful substances as par international regulations to achieve sustainability in the apparel industry.

Programme Outcomes (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO5: Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6: The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7: Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9: Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and writeeffective reports and design documentation, make effective presentations, and give and receive clear instructions.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories.
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Explain the fundamentals of garment testing and test data management.
2. Interpret the specifications of quality standards and resolve the testing requirements of different protocols.
3. Classify the testing procedures of fabric and garment for determining care instruction of a garment.
4. Determine limits for restricted substances for achieving sustainability in garment quality.
5. Compare the regulatory requirements of harmful substances in different countries for different garments.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3			3	2	3	3	1	1				
2	3	3			3	2	3	3	2	1				
3	3	3			3	2	2	3	2	1			1	2
4	3	3			3	2	3	3	2	1				1
5	2	1			1	2	3	3	3	3				2

UNIT I **9 Hours**

ESSENTIAL ELEMENTS OF GARMENT TESTING

Garment testing and its importance, Routine testing, Random testing and Supplier initiated testing, Test data management and analysis, Role of regulatory and special tests, Management of restricted substances for RSL compliance.

UNIT II **9 Hours**

COMMON PROTOCOLS FOR GARMENT TESTING

Label verification, Identification, Washability, Performance, Colour fastness tests for woven, knitted, leather/suede and apparel related accessories such as belts, caps, ear muffs, gloves, hats, neckties, scarves and headbands, Special tests for technical outerwear, rainwear, intimate and sleepwear, sweaters, swimwear, down fill product and wrinkle resistance garment.

UNIT III **9 Hours**

GARMENT TESTING FOR DETERMINING GARMENT CARE

Washing tests: Machine wash at different temperature, Normal cycle, Permanent press and Delicate cycle, Hand wash, Bleaching tests: Chlorine bleach and Non-chlorine bleach, Drying tests: Drip dry, Flat dry, Line dry and Tumble dry, Ironing tests: Cool, Warm and Hot, Drycleaning: Petroleum, Fluorocarbon and Perchloroethylene, Professional drycleaning.

UNIT IV **9 Hours**

GARMENT TESTING FOR SUSTAINABILITY

Definition, Sustainable development and its goals, three dimensions of sustainability, Restricted Substances List (RSL), Testing of restricted substances such as carcinogenic and allergenic dyes, azo dyes, formaldehyde, chlorinated and other phenols, Chlorinated organic carriers, chromium VI, lead, cadmium, nickel, APEOs, Organotin compounds, phthalates, PVC, SCCPs, PAH, fluorocarbons, residual pesticides in garments, trims and embellishments, Overview of Manufacturing Restricted Substances List (MRSL) and its scope.

UNIT V **9 Hours**

GLOBAL REGULATORY TESTING REQUIREMENTS ON HARMFUL SUBSTANCES IN TEXTILE AND APPAREL

US regulations: CPSA, CPSIA, FHSA, FIFRA, TSCA, Cal Prop 65, WCSPA, EPA, EU regulations: REACH, BPR, GOTS, OEKO TEX Standard, China regulation, Korea Certification, Japanese regulation, Regulations of Vietnam, Regulations of Taiwan, Regulations of India.

Total: 45 Hours

Reference(s)

1. Subrata Das, Product Safety and Restricted Substances in Apparel -2nd edition, Woodhead Publishing, 2016,
2. Nimkartek Technical Services Private Limited, Guidebook of Chemical Management for Textile and Apparel Industry, 2015.
3. Janace E. Bubonia, Apparel Quality: A Guide to Evaluating Sewn Products, Bloomsbury Publishing, 2014.
4. Texan Laboratories Private Limited, Ecological Considerations, parameters, and testing, 2011.
5. Subrata Das, Quality Characterisation of apparel, Woodhead Publishing. 2010.
6. Sara J Kadolph, Quality Assurance for Textiles and Apparel, Fairchild Publicatons Inc., Chicago, 2007.

21FT707 PRODUCT DEVELOPMENT LABORATORY

0 0 4 2

Course Objectives

- To train the students in calculating material consumption for the fashion product.
- To impart the knowledge of executing sourcing activities for the materials identified in the fashion product
- To equip them develop technical specification sheet for the fashion product

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO4: Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO7: Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and writeeffective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO12:Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories.
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Create a problem brief based on the needs of the industry.
2. Carryout ideation and prototyping of possible solutions for the developed brief.
3. Develop products as a solution for the defined problems and present them visually.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	3		1			3			1		2		1
2	2	3		2			3			1		2		1
3	2	3		1			3			1		2	3	3

EXPERIMENT 1 **12 Hours**

Design and development of a mood board to translate abstract ideas into visual and tangible before designers begin working on prototypes for the fashion industry.

EXPERIMENT 2 **12 Hours**

Design and development of 25 possible ideas applying ideation techniques to select a design for dress materials for the fashion industry.

EXPERIMENT 3 **6 Hours**

Design and development of 6 prototypes from 25 ideas for the design selection of dress materials for the fashion industry.

EXPERIMENT 4 **6 Hours**

Design and development of a technical specification sheet for designing dress materials in the fashion industry.

EXPERIMENT 5 **6 Hours**

Development of a BOM (Bill of materials) to prepare a comprehensive list of materials to produce dress materials in the fashion industry.

EXPERIMENT 6 **12 Hours**

Design and development of the steps of design thinking to prepare the product design of dress material for the fashion industry.

EXPERIMENT 7 **6 Hours**

Design and development of a presentation board and a brochure for the apparel product.

Total: 60 Hours

21FT708 PROJECT WORK I **0 0 6 3**

Course Objectives

- To develop knowledge to formulate a real world problem and project's goals.
- To identify the various tasks of the project to determine standard procedures.
- To identify and learn new tools, algorithms and techniques.
- To understand the various procedures for validation of the product and analysis the cost effectiveness.
- To understand the guideline to Prepare report for oral demonstrations.

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess-societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply the set one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12:Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories.

PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Formulate a real world problem, identify the requirement and develop the design solutions
2. Express the technical ideas, strategies and methodologies.
3. Utilize the new tools, algorithms, techniques that contribute to obtain the solution of theproject.
4. Test and validate through conformance of the developed prototype and analysis the cost effectiveness.
5. Prepare report and present the oral demonstrations

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	2	3	2	2	2	2	2	2	1	1	2	3
2	3	3	2	3	2	2	2	2	2	2	1	1	2	3
3	3	3	2	3	2	2	2	2	2	2	1	1	2	3
4	3	3	2	3	2	2	2	2	2	2	1	1	2	3
5	3	3	2	3	2	2	2	2	2	2	1	1	2	3

21FT801 PROJECT WORK II **0 0 18 9**

Course Objectives

- To develop knowledge to formulate a real world problem and project's goals.
- To identify the various tasks of the project to determine standard procedures.
- To identify and learn new tools, algorithms and techniques.
- To understand the various procedures for validation of the product and analysis the cost effectiveness.
- To understand the guideline to Prepare report for oral demonstrations.

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess-societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply the set one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12:Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories.

PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Formulate a real world problem, identify the requirement and develop the design solutions
2. Express the technical ideas, strategies and methodologies.
3. Utilize the new tools, algorithms, techniques that contribute to obtain the solution of the project.
4. Test and validate through conformance of the developed prototype and analysis the cost effectiveness.
5. Prepare report and present the oral demonstrations

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	2	3	2	2	2	2	2	2	1	1	2	3
2	3	3	2	3	2	2	2	2	2	2	1	1	2	3
3	3	3	2	3	2	2	2	2	2	2	1	1	2	3
4	3	3	2	3	2	2	2	2	2	2	1	1	2	3
5	3	3	2	3	2	2	2	2	2	2	1	1	2	3

18HS201 COMMUNICATIVE ENGLISH II **1 0 2 2**

Course Objectives

- Read and understand ideas of complex text on both concrete and abstract topics
- Listen and understand technical discussions in his/her field of specialization
- Produce clear, detailed text on a wide range of subjects and explain a viewpoint on a topical issue giving the advantages and disadvantages of various options
- Interact with a degree of fluency and spontaneity that makes regular interaction without strain

Programme Outcomes (POs)

PO9: Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

Course Outcomes (COs)

1. Use appropriate grammar and vocabulary that is expected at the BEC Vantage exam level.
2. Understand the general meaning of non-routine letters, and of a report of predictable/ unpredictable topic
3. Write simple reports of factual nature and factual non-routine letters
4. Ask for factual information and understand the answer; and take/pass on workplace messages
5. Express opinions and present arguments to a limited extent; and give simple, prepared presentations on familiar topics

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1														
2									2					
3									3					
4										1				
5										2				

UNIT I **9 Hours**

GRAMMAR

Tenses - Future continuous, Future perfect, Future perfect continuous, Past perfect, Past perfect continuous - Adjectives and adverbs - Mixed conditionals - Modals - can't have, needn't have - Modals of deduction and speculation - Narrative tenses - Passives - Phrasal verbs, extended - Relative clauses - Reported speech - Will and going to, for prediction - Wish - Would expressing habits, in the past.

UNIT II **9 Hours**

READING

Scanning and reading for gist - Understanding text structure - Reading for gist and specific information - Vocabulary and structure - Understanding sentence structure and error identification

UNIT III **9 Hours**

WRITING

A message, memo or email, Giving instructions, explaining a development, asking for comments, requesting information, agreeing to requests - Business correspondence: explaining, apologising, reassuring, complaining, short report: describing, summarising - proposal: describing, summarising, recommending, persuading.

UNIT IV **9 Hours**

LISTENING

Listening for and noting specific information - Listening to identify topic, context, Function - Following the main points and retrieving specific information from the text.

UNIT V **9 Hours**

SPEAKING

Giving personal information: Talking about present circumstances, past experiences and future plans, expressing opinions, speculating - Organising a larger unit of discourse: Giving information and expressing and justifying opinions - Turn-taking: negotiating, collaborating, exchanging information, expressing and justifying opinions, agreeing/disagreeing, suggesting, speculating, comparing and contrasting, and decision- making. 1. A Horse and Two Goats - R K Narayan 2.My Lord the Baby - Rabindranath Tagore 3.Twist in the Tale - Jeffery Archer.4.The Third and Final Continent - Jhumpa Lahiri

5. The Gift of the Magi - O Henry

Total: 45 Hours

Reference(s)

1. Guy Brook-Hart, "BEC Vantage: Business Benchmark Upper-Intermediate- Student's Books" 1st Edition, Cambridge University Press, New Delhi, 2006.
2. Ian Wood, Paul Sanderson, Anne Williams with Marjorie Rosenberg, "Pass Cambridge BEC Vantage- Student's Book" 2nd Edition, Cengage Learning, New Delhi, 2014
3. Michael Handford, Martin Lisboa, Almut Koester, Angela Pitt, "Business Advantage - Student's Book Upper-Intermediate" Cambridge University Press, New Delhi, 2014.
4. Cambridge Examinations Publishing, "Cambridge BEC VANTAGE - Self-study Edition", Cambridge University Press, UK, 2005.

18HSH01 HINDI **1 0 2 2**

Course Objectives

- To help students acquire the basics of Hindi
- To teach them how to converse in Hindi on simple day-to-day situations
- To help students acquire the ability to understand a simple technical text in Hindi

Programme Outcomes (POs)

PO9.Individual and Teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10.Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

Course Outcomes (COs)

1. Construct simple sentences and use vocabulary required for day-to-day conversation.
2. Distinguish and understand the basic sounds of Hindi language.
3. Appear for Hindi examinations conducted by Dakshin Bharat Hindi Prachar Sabha.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1									3	3				
2									3	3				
3									3	3				

UNIT I **9 Hours**

Hindi Alphabet: Introduction - Vowels - Consonants - Plosives - Fricatives - Nasal sounds - Vowel Signs - Chandra Bindu & Visarg -Table of Alphabet -Vocabulary.

UNIT II **9 Hours**

Nouns: Genders (Masculine & Feminine Nouns long vowels and short vowels - -Masculine & Feminine - Reading Exercises.

UNIT III **9 Hours**

Pronouns and Tenses: Categories of Pronouns - Personal Pronouns - Second person (you & honorific) - Definite & Indefinite pronouns - Relative pronouns - Present tense - Past tense - Future tense - Assertive & Negative Sentences - Interrogative Sentences.

UNIT IV **9 Hours**

Classified Vocabulary: Parts of body - Relatives - Spices - Eatables - Fruit & Vegetables - Clothes - Directions - Seasons - Professions.

UNIT V **9 Hours**

Speaking: Model Sentences and Rhymes - Speaking practice for various occasions.

Total: 45 Hours

Reference(s)

1. Hindi Prachar Vahini-1 by Dakshin Bharat Hindi Prachar Sabha Chennai
2. B.R. Kishore, Self Hindi Teacher for Non-Hindi Speaking People,Vee Kumar Publications(P)Ltd., New Delhi,2009
3. Videos, Stories, Rhymes and Songs

18HSG01 GERMAN **1 0 2 2**

Course Objectives

- To help students appear for the A1 level Examination
- To teach them how to converse fluently in German in day-to-day scenarios

Programme Outcomes (POs)

PO9.Individual and Teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10.Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

Course Outcomes (COs)

1. Listen and identify individual sounds of German
2. Use basic sounds and words while speaking
3. Read and understand short passages on familiar topics
4. Use basic sentence structures while writing
5. Understand and use basic grammar and appropriate vocabulary in completing language tasks

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1									3	3				
2									3	3				
3									3	3				
4									3	3				
5									3	3				

UNIT I **9 Hours**

Introduction to German language: Alphabet - Numbers - Greetings - Days and Seasons- Working with Dictionary.

UNIT II **9 Hours**

Nouns - articles - Speaking about one self - Listening to CD supplied with the books, paying special attention to pronunciation

UNIT III **9 Hours**

Regular & Irregular verbs - Personal pronouns - family - Introduction to types of sentences

UNIT IV **9 Hours**

Question words-Types of Questions - Nominative case- Verb Conjugation - country - nationalities

UNIT V **9 Hours**

Verbs - to be & to have - conjugation - Hobbys - Framing basic Questions and answers

Total: 45 Hours

Reference(s)

1. Kursbuch and Arbeitsbuch, NETZWERK A1 DEUTSCH ALS FREMDSPRACHE, Goyal Publishers & Distributers Pvt. Ltd., New Delhi, 2015
2. Langenscheidt Eurodictionary - German - English / English - German, Goyal Publishers & Distributers Pvt. Ltd., New Delhi, 2009
3. Grundkurs, DEUTSCH Lehrbuch Hueber Munichen, 2007.

18HSJ01 JAPANESE 1 0 2 2

Course Objectives

- To train students for N5 Level Examination
- To teach them use basic Japanese sentences in day-to-day conversation
- To make students familiar with the Japanese cultural facets and social etiquettes

Programme Outcomes (POs)

PO9.Individual and Teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10.Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

Course Outcomes (COs)

1. Recognize and write Japanese alphabet
2. Speak using basic sounds of the Japanese language
3. Apply appropriate vocabulary needed for simple conversation in Japanese language
4. Apply appropriate grammar to write and speak in Japanese language
5. Comprehend the conversation and give correct meaning

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1									3	3				
2									3	3				
3									3	3				
4									3	3				
5									3	3				

UNIT I **9 Hours**

Introduction to Japanese - Japanese script- Pronunciation of Japanese(Hiragana)- (Katakana) Long vowels - Pronunciation of in,tsu,ga - Letters combined with ya,yu,yo - Daily Greetings and Expressions - Numerals. N1 wa N2 desu - N1 wa N2 ja arimasen - S ka N1 mo - N1 no N2 - san - Kore - Sore - Are - Kono N - Sono N - Ano N - Sou desu - Sou ja Arimasen - S1 ka - S2 ka - N1 noN2 - Sou desu ka - Koko - Soko - Asoko - Kochira - Sochira Achira - N1 wa N2 (place) desu - Doko - Dochira - N1 no N2 - Ko - So - A - Do (Demonstrative words) - O kuni Kanji10 - Technical Japanese Vocabulary (30 Numbers)

UNIT II **9 Hours**

Introduction to time - Ji - Fun - Pun - Introduction of verbs - V Masu - V Masen - V Mashita - V Masendeshita N (Time) Ni V - N1 Kara - N2 Made - N1 to N2 - S Ne - N (Place) e Ikimasu - Kimasu - Kaerimasu - Doko (e) Mo Ikimasen - Ikimasendeshita - N (Vechile) de Ikimasu - Kimasu - Kaerimasu - N (Person / Animal) to V - Itsu - S Yo N o (transitive) - N o Shimasu - Nani o Shimasuka - Nan and Nani - N (place) de V - V Masenka - V Mashou - o - Kanji 10 - Technical Japanese Vocabulary (30 Numbers) .

UNIT III **9 Hours**

N (tool/means) de V - Word/Sentence wa Go de Nani desu ka - N (person) Ni Agemasu, etc - N (person) Ni Moraimasu etc - Mou V Mashita - Introduction to Adjectives - N wa Na adj (Na) desu - N wa II adj (II) desu - Na adj Na n - II adj (II) N - Totemo - Amari - N wa Dou desuka - N1 wa DonnaN2 desuka - S1 Ga S2 - Dore N ga Arimasu - Wakarimasu - N Ga Sukidesu - Kiraidesu - Jozu desu - Heta desu - Donna N - Yoku - Daitai - Takusan - Sukoshi - Amari - Zenzen - S1 kara S2 - Doushite - Kanji 10 - Technical Japanese Vocabulary (30 Numbers)

UNIT IV **9 Hours**

N ga Arimasu - Imasu - N1 (place) Ni N2 ga Arimasu - Imasu - N1 (thing/person/place) no N2 (position) - N1 ya N2 - Word (s) desuka - Chirisosu wa Arimasuka - Saying numbers - Quantifier (period) Ni kai V - Quantifier Dake - N dake - Past tense of Noun sentences and Na adjective sentences - Past tense of ii adjective sentences - N1 wa N2 yori adjective desu - N1 to N2 to dochira gaadjective desu ka - N1/N2 no houga adjective desu - Kanji 10 - Technical Japanese Vocabulary (30 Numbers)

UNIT V **9 Hours**

N ga hoshi desu - V masu form tai desu - N (place) e V masu form - N Ni - ikimasu - kimasu - kaerimasu N ni V - N o V - dou ko ka - nani ka - go chuu mon - Verb conjugation - Verb groups - Verb te form - V te form kudasai - V te form imasu - V masu from mashouka - S1 ga S2 - N ga V - Vte form mo ii desu - V te form wa ikemasen - V te form imasu Shrimasen - Kanji 10 - Technical Japanese Vocabulary (30 Numbers)

Total: 45 Hours

Reference(s)

1. Japanese for Everyone: Elementary Main Textbook1-1, Goyal Publishers and Distributors Pvt.Ltd., Delhi, 2007.
2. Japanese for Everyone: Elementary Main Textbook 1-2, Goyal Publishers and Distributors Pvt. Ltd.,Delhi, 2007.

18HSF01 FRENCH **1 0 2 2**

Course Objectives

- To prepare the students for DELF A1 Examination
- To teach them to converse fluently in French in day-to-day scenarios

Programme Outcomes (POs)

PO9.Individual and Teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10.Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

CourseOutcomes (COs)

1. To help students acquire familiarity in the French alphabet & basic vocabulary
2. listen and identify individual sounds of French
3. Use basic sounds and words while speaking
4. Read and understand short passages on familiar topics
5. Understand and use basic grammar and appropriate vocabulary in completing language tasks

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1									3	3				
2									3	3				
3									3	3				
4									3	3				
5									3	3				

UNIT I **9 Hours**

ENTRER EN CONTACT

La langue francaise, alphabets, les numeros, les jours, les mois.| Grammaire Les verbes s appeler,etre, avoir, les articles definis, indefinis | Communication - Saluer, s informer sur quelquun, demander de se presenter | Lexique - Les alphabets, les nationalites, age, les pays, les couleurs, les jours de la semaine, les mois de l annee, les professions

UNIT II **9 Hours**

PARTAGER SON LIEU DE VIE

Les francais et leur habitat, des habitations insolites | Grammaire - Verbes - Conjugaison : Present (Avoir / etre / ER, IR, RE : Regulier et Irregulier) - Adjectifs les propositions de lieu | Communication
- Chercher un logement, d ecrire son voisin, s informer sur un logement | Lexique - L habitat, les pieces, l equipement, la description physique

UNIT III **9 Hours**

VIVRE AU QUOTIDIEN

Grammaire - Articles contractes, verbes vouloir, pouvoir, devoir, adjective interrogative, future proche | Communication- Exprimer ses gouts, parler de ses loisirs, justifier un choix, exprimer une envie | Lexique - le temps libre et les loisirs, les saisons, les activites quotidiennes, le temps (le matin, le soir, la nuit)

UNIT IV **9 Hours**

COMPRENDRE SON ENVIRONNEMENT - OUVRIR -CULTURE

Grammaire - Verbes - Finir, Sortir, les adjectifs demonstratifs, le passe compose, l imparfait | Communication - Propose quelqu un de faire quelque chose, raconteur une sortie au passe parler un film | Lexique - Les sorties, la famille, art, les vetements et les accessoires

UNIT V **9 Hours**

GOUTER A LA CAMPAGNE

Grammaire La forme negative, les verbes acheter, manger, payer, articles partitifs, le pronom en de quantite | Communication Accepter et refuse rune invitation, donner des instructions, commander au restaurant | Lexique Les services et les commerces, les aliments, les ustensiles, argent

Total: 45 Hours

Reference(s)

1. Saison A1, Methode de francais
2. Hachette FLE

21FT001 TREND ANALYSIS AND FASHION FORECASTING

3 0 0 3

Course Objectives

- Enable students conduct fashion scans and surveys
- Impart the knowledge of formulating trend capsules
- Enable students create color palettes

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data,and synthesis of the information to provide valid conclusions.
PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess-societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of,and need for sustainable development.
PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and writeeffective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO12:Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
m. PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Explain the characteristics of zeitgeist and appraise the fashion trends.
2. Interpret the fundamental concepts of fashion forecasting process and formulate research strategies for organizing fashion scans
3. Illustrate the color story creation process and examine its validating criteria for establishing the color categories.
4. Interpret the characteristics of color cycles and resolve the factors affecting sales forecasting.
5. Appraise the trend board preparation techniques and critique the trend reporting process.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1		1	1	2	2	1				2		2	3	1
2	1	2		2	3	1	1	1	2	2		2	3	1
3	1	2	1	2	3	1	1	1	2	2		2	3	1
4	1	2	1	2	3	1	1	1	2	2		2	3	1
5	2	2	1	2	3	1	1	1	2	2		2	3	1

UNIT I **9 Hours**

ZEITGEIST

Discovering Zeitgeist, fashion scans, media scans, fashion trends, Consumer segmentation - values, attitudes and Lifestyle (VALS), Fashion culture and direction of fashion change.

UNIT II **9 Hours**

COLOR CYCLES

Color cycles, Color relationship areas across product categories, Color groups, Sources of color ideas and palettes. Product life cycle, fashion cycle FAD, Classic. Factors affecting sales forecasting process -exogenous variables, Aggregation and Seasonality. Framework of using colors in color story.

UNIT III **9 Hours**

COLOR STORY DEVELOPMENT

Color story creation process, Sources of inspiration. Color story project steps, factors affecting color palette creation, relevance of patterns and graphics in emphasizing color story, Color validationprocess, Category prototyping, Analysis of current trends. Spotting new color contrast families.

UNIT IV **9 Hours**

FORECASTING PROCESSES

Long term forecasting process and Short term forecasting process, Trend spotting, Study of Factors affecting forecasting process, Research strategies for Media scan, Interviewing focus groups, Observation of consumer behavior patterns, shopping profiles.

UNIT V **9 Hours**

TREND REPORTING

Trend reporting - Trend labeling, Trend mapping and Trend Quality. Potential of a Trend. Characteristics of Trend board, Ways of creating focal points in trend board. Classical patterns of arrangement of images and text on trend board

Total: 45 Hours

Reference(s)

1. Lorynn Divita, Fashion Forecasting, Fairchild, 2019.
2. Chelsea Roussso and Nancy Kaplan Ostroff, Fashion Forward, Fairchild, 2018
3. Evelyn L. Brannon & Lorynn R. Divita, Fashion forecasting, Fairchild books, 2015
4. Eundeok kim & Ann marie fiore, Fashion Trends: Analysis and Forecasting, Bergpublications, 2011
5. Tracy Diane and Tom Cassidy, Color forecasting, John wiley and sons, 2009
6. Https://www.vogue.com.

21FT002 VISUAL MERCHANDISING 3 0 0 3

Course Objectives

- Enable students conduct visual Merchandising
- Impart the knowledge of elements of visual merchandising
- Enable students create store planning

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data,and synthesis of the information to provide valid conclusions.
PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess-societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of,and need for sustainable development.
PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and writeeffective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply the set one's own work, as a member and leader in ateam, to manage projects and in multidisciplinary environments.
PO12:Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories
PSO2: articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Classify various elements of Visual presentation and understand their significance in visually presenting a display.
2. Analyze and identify the best suitable environment for merchandise including interior, exterior and point of displays.
3. Appraise on various techniques used in presenting merchandise.
4. Plan on optimizing the merchandise and retail space to customers.
5. Summarize the various features available in a computer controlled visual merchandising.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	1	1	2	1	2	2	1	1	2	2		2	3	1
2	2	1	2	2	3	2	1	1	2	2	2	2	2	2
3	2	1	2	2	3	1	1	1	2	2		2	2	2
4	1	2	2	2	3	1	1	1	2	2	1	2	2	2
5					2				2	2		1	3	2

UNIT I **9 Hours**

FUNDAMENTALS OF VISUAL MERCHANDISING

Visual Merchandising-definition, objectives and scope. Types of display and display settings. Retail stores and approaches of visual merchandising -Types of retail stores, store atmospherics, Approaches in Visual Merchandising in various stores-In house staffing, Department Store Approach, Small Store Approach. Role of Visual Merchandising in changing face of retailing.

UNIT II **9 Hours**

ELEMENTS OF VISUAL PRESENTATION

Overview of the various elements - Color, lighting, line and composition, graphics and signage, store exteriors and interiors, sensory stimulants like scent, sound etc. Application of color schemes and color psychology to create mood in garment display.

UNIT III **9 Hours**

MANNEQUINS AND FIXTURES

Mannequins and other human forms, alternatives to mannequins. Criteria for selection of fixtures, dressing fixtures, modular fixtures. Store exterior - Signs, Marquees, Outdoor Lighting, Banners, Planters, Awnings, Windows in Storefront Design, store fronts.

UNIT IV **9 Hours**

STORE INTERIORS AND POINTS OF DISPLAY

Focal points, island displays, risers and platforms, the runway the catwalk, counters and display cases, museum cases, demonstration cubes, ledges, shadow boxes, enclosed displays, fascia, walls. Point of purchase display, industrial display, fashion shows, trade organizations and sources. Display techniques

UNIT V **9 Hours**

STORE PLANNING AND EXECUTION OF A VISUAL PRESENTATION

Store layout planning-grid, racetrack, free form and their direction of flow. Floor plans and reading of floor plans - Plan-o-gram- definition, purpose and planning -theme, ensemble, racks, shelves, bins etc. Assortment planning-Assortment planning, optimize apparel assortments Display calendar and planning a display, scheduling the promotion, budgeting and safety factors in visual merchandising.

Total: 45 Hours

Reference(s)

1. Pegler M.M., "Visual Merchandising and Display", IV Edition, Fair child Publications, NewYork
2. Diamond.J,Diamond,E.,"Contemporary Visual Merchandising", Prentice HallInc. New Jersey
3. PhillipsP.M. Fashion Sales Promotion, IInd Edition, Prentice Hall Inc, New Jersey
4. CurtisE, Fashion Retail, John Wiley and SonsLtd, England

21FT003 ESSENTIALS OF APPAREL MARKETING 3 0 0 3

Course Objectives

- To provide students with a foundational knowledge of apparel marketing concepts and strategies.
- To develop students analytical and critical thinking skills through case studies and real-world applications.
- To prepare students for entry-level positions in the apparel marketing industry.

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess-societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO12:Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories

PSO2: articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Describe the key players and segments within the global apparel market.
2. Analyze consumer behavior and trends influencing apparel purchasing decisions.
3. Formulate effective brand positioning strategies for apparel brands.
4. Analyze on the B2B marketing Strategies
5. Analyze on the organizational Buying and Buyer behaviour

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1				1	1			1	2	2		2	1	3
2	1	2	2	2	2	1		1	2	2		2	2	1
3	1	2	2	2	2	1		1	2	2		2	2	1
4	1	1	2	2	1	2			2	2		1	2	1
5	2	1	2	1	2	2			1	2		1	2	1

UNIT I **9 Hours**

INTRODUCTION TO APPAREL MARKETING

Creating Customer Relationships and Value through Marketing, Developing successful Marketing and Organizational Strategies, Understanding the Marketing Environment, Ethical Behavior, and Social Responsibility. Understanding Consumer Behavior, Understanding Organizations as Customers. Types of Marketing.

UNIT II **9 Hours**

MARKET RESEARCH AND CONSUMER BEHAVIOR

Understanding and Reaching Global Consumers and Markets, Marketing Research: From Customer Insights to Actions, Market Segmentation, Targeting, and Positioning, Developing New Products and Services. Managing Successful Products, Services, and Brands, Pricing Products and Services.

UNIT III **9 Hours**

MARKET COMMUNICATION

Managing Marketing Channels and Supply Chains, Retailing and Wholesaling. Integrated Marketing Communications and Direct Marketing, Advertising, Sales Promotion, and Public Relations, Using Social Media to Connect with Consumers. Personal Selling and Sales Management, Implementing Interactive and Multichannel Marketing

UNIT IV **9 Hours**

INTRODUCTION TO B2B MARKETING

Business marketing, Classifying goods for the business market, Business market customers, Market structure, Environment and Characteristics of Business Marketing, Strategic role of marketing, Commercial enterprises, Commercial and institutional customers, B2B vs B2C Marketing.

UNIT V **9 Hours**

ORGANIZATIONAL BUYING AND BUYER BEHAVIOUR

Organizational buyers" decision process - A Stepwise Model and A Process Flow Model, Organizational and business markets - Government as a customer - Commercial enterprises - Commercial and institutional customers, Value analysis, Buy grid framework, Strategic procurement.

Total: 45 Hours

Reference(s)

1. "Essentials of Apparel Marketing" by Marylouise Linton and Elizabeth Cmiel
2. Essential Apparel Marketing, 2nd Edition by Barbara Ryan and Peter Karlson
3. Fashion Marketing: Key Strategies and Insights for Success by Mary Rose Sweeney
4. The Business of Fashion: A Strategic Guide to the Fashion Industry by John Hooks
5. The Handbook of Marketing and Consumption in the Fashion Industry by Joanne B. Belk and Deborah J.Howard

21FT004 APPAREL RETAIL MANAGEMENT 3 0 0 3

Course Objectives

- Gain knowledge on the fundamentals of retailing
- Understand the importance of effective location for retailing
- Understand the importance of atmospherics and space management of retail outlets

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess-societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of,and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and writeeffective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply the set one's own work, as a member and leader in ateam, to manage projects and in multidisciplinary environments.

PO12:Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories

PSO2: articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Gained knowledge on Indian and global retailing
2. Understood the retail business formats and strategies
3. Understood the importance of effective location for retailing
4. Acquired Knowledge on management of merchandise
5. Ability to outline the benefits of E-commerce business and E marketing

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1					2	1		1	1	2		2	2	1
2	1	1	1	1	2		1	1	2	2		2	2	1
3	2	2	2	2	1	1	1			1	1	1	2	1
4	1	1	1	1	1	1			1	1	1	1	2	1
5	2	2	2	2	3			1	2	1	2	1	2	1

UNIT I **9 Hours**

INTRODUCTION TO RETAILON

Retailing, current global and Indian retail scenario in garment and fashion, key drivers of Indian apparel retail business, growth of organized apparel retail in India; understanding the Indian retail economics, foreign direct investment in Indian apparel retail.

UNIT II **9 Hours**

RETAIL ORGANIZATION AND ITS STRUCTURE

Operational excellence, customer service strategies, pricing strategies, inventory levels and merchandise availability as a strategy, case studies on Indian and International retail stores, retail business formats, retail management information system

UNIT III **9 Hours**

STORE FORMAT AND LOCATION

Objectives of store planning, location, design, retail image mix, layout plan for retail stores. Buying, mark-up and mark-down in merchandise management, private labels; apparel franchising- types, Key success factors.

UNIT IV **9 Hours**

MERCHANDISING MANAGEMENT

Product management, brand management and retailing, merchandise management, model stock plan, constraining factors, types of suppliers and selection criteria, category management, merchandise management planning in retail segments. OTB Planning, sample plan.

UNIT V **9 Hours**

E – BUSINESS

An introduction to fashion e-commerce, apparel and fashion e-business, s-commerce vs. e-business, economic forces - advantages - myths - e-business models, design, develop and management of usiness, web and social networking, mobile commerce - business applications, classifications, and models, payments, security and legal requirements. B2B & B2C Platforms.

Reference(s)

1. Gibson G. Vedamani., "Retail Management Functional Principles & Practices", Third Edition, Jaico Publishing House, 2003, ISBN -10:81-7992-151-4.
2. Martin.M. Pegler., "Visual Merchandising and Display", (fifth edition), Fair ChildPublications, 2011, ISBN 10: 1563674459.
3. Harvey M.Deitel., Paul J.Deitel., and Kate Steinbuhler., "e-business and e-commerce for managers", Pearson, 2011, ISBN: 0130323640 | ISBN-13: 9780130323644.
4. John Fernie, Suzanne Fernie and Christopher Moore, "Principles of Retailing", Reed Elsevier India Private Limited, New Delhi.

21FT005 FASHION BRAND MANAGEMENT 3 0 0 3

Course Objectives

- Understand the fundamentals of brand management in the context of the fashion industry.
- Develop a strong understanding of brand identity and its role in consumer engagement.
- Evaluate different distribution channels and marketing communication methods and Gain practical experience through case studies, guest lectures, and projects.

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess-societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and writeeffective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply the set one's own work, as a member and leader in ateam, to manage projects and in multidisciplinary environments.
PO12:Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories
PSO2: articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Demonstrate knowledge about measuring the brand management control functions.
2. Analyze the brand equity parameters and reorganize them to suit the requirement.
3. Resolve the market scenario requirements and formulate strategies for positioning the brand.
4. Determine the marketing and distribution functions for a particular brand position.
5. Appraise the needs for brand extension.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1					2	1		1	1	2		2	2	1
2	1	1	1	1	2		1	1	2	2		2	2	1
3	2	2	2	2	1	1	1			1	1	1	2	1
4	1	1	1	1	1			1	1	1	1		2	1
5	2	2	2	2	2			1	1	1	2	1	2	1

UNIT I **9 Hours**

OVERVIEW OF BRAND MANAGEMENT

Significance of branding -brand defined -Difference between a Product and a Brand - rationale for building a brand - types of brands - Branding Challenges -Creating a brand - Strategic planning for the brand -Designing brand Identity -Measuring brand personality - Brand Image - Luxury Brands- Organizational culture and brand performance -Brand Mantras and Internal branding for a successful brand - Case study

UNIT II **9 Hours**

UNDERSTANDING AND MEASURING BRAND EQUITY

Introduction - What is brand equity - Brand equity defined - Need for building brand equity -Steps in building a Brand -Researching for brand equity -Tracking a brand -The brand chain - Research techniques -Quantitative research techniques applied to branding - Measuring brand equity -Need for measuring brand equity -Methods to measure brand equity -Case Study

UNIT III **9 Hours**

UNDERSTANDING CONSUMERS AND MAKETS

Consumer behavior and the role of branding - concept of perception- brand evaluation and perception by customers -Consumer attitude -the Indian Consumer - Model of consumer decision making - Factors affecting consumer behavior - Brand loyalty and Brand commitment - Factors affecting brand loyalty - Concept of brand positioning - Positioning defined -Positioning strategy - Guiding principles for positioning -Repositioning- Case Study

UNIT IV **9 Hours**

MANAGING BRANDS

Branding and the marketing programme - Product Strategy -Pricing Strategy -Distribution Strategy - E-branding: Building the brand online -E-business strategy -Marketing and the internet - Branding and marketing communications -Communication options : Personal selling, sales promotions, Events and compaign marketing, Direct Marketing, Publicity and PR, Word of mouth, Internet marketing - Case Study

UNIT V **9 Hours**

BUILDING RESILIENT BRANDS

Defining branding strategy -Strategies for choosing a brand name -Line extension Category Extension - Brand Sketching - Launching a brand extension - Managing brand architecture - Brand roles in the brand portfolio - Brand relationship spectrum -Managing Brands over time - Brand challenges - Reinforcing brands - Brand revitalization -Brand turnaround -Case Study

Total: 45 Hours

Reference(s)

1. David A. Aaker, Managing Brand Equity, Simon and Schuster, 2009.
2. Kirti Dutta , brand management principles and practices-2012, Oxford University Press
3. Kevin Lane Keller, Strategic Brand Management: Building, Measuring and Managing, Prentice Hall, 3rd Edition, 2007.
4. Moorthi YLR, Brand Management I edition, Vikas Publishing House 2012
5. Lan Batey, Asain Branding A Great way to fly, PHI, Singapore, 2002.
6. Paul Tmepoal, Branding in Asia, John Willy, 2000.

21FT006 DIGITAL MARKETING AND E BUSINESS 0 0 0 3

Course Objectives

- Equip students with a comprehensive understanding of digital marketing and its application in E-Business.
- Provide hands-on experience with industry-standard digital marketing tools and platforms.
- Explore the dynamics of E-Business including its models, technologies, and challenges.

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data,and synthesis of the information to provide valid conclusions.
PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and writeeffective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO12:Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories
PSO2: articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Outline of digital fashion marketing and features of E commerce technology
2. Understand E-commerce business and E marketing
3. Explain social media and digital marketing techniques
4. Explain strategic decisions using online technology
5. outline the importance of online marketing and E advertising

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	1	1	1	1	2			1		1		1	1	3
2	1	1	1	1	2			1		1		1	1	3
3	1	1	1	1	3				1	1		1	1	2
4	2	2	2	2	3				1	1		1	1	2
5	2	2	2	2	3				1	1		1	1	2

UNIT I **9 Hours**

INTRODUCTION

Fashion and marketing, evolution of digital fashion marketing, marketing channels, digital marketing strategy, building online, social media evolution, fashion marketing communication environment. History of e-commerce, e-commerce vs e-business, unique features of ecommerce technology, commercial use of the internet, growth of the internet mobile and web, e-commerce opportunities for industries

UNIT II **9 Hours**

FASHION ONLINE AND MARKETING

Website, search engine, email marketing, online advertising, search and display advertising, online branding, finding an audience, analytics, creating website, traditional approach to promotion, marketing communities. Marketing communities environment, fashion advertising and sales promotion, public relations, personal selling, visual marketing, new directions in marketing, various types of promotion and advertising, strategies.

UNIT III **9 Hours**

E-COMMERCE BUSINESS

Social networking and Facebook, Types of e-commerce: business to consumer (B2C), Business to Business (B2B), Consumer to Consumer (C2C), Consumer to Business (C2B), Mobile E- Commerce, Social E-Commerce, Local E-Commerce; e-commerce technology, concepts, approaches.

UNIT IV **9 Hours**

ENABLING TECHNOLOGIES

Internet, Mobile internet access, wireless internet, internet access, web, hypertext markups, emails, messaging, search engine, online forum, cookies, streaming media, online social networks, blogs, wikis, mobile applications. E-Security- Networks and website security, risks, site hack, security and e- mail, firewall concept, phishing, dimensions of good e-commerce security.

UNIT V **9 Hours**

E-MARKETING

Uniqueness of web, satisfying the requirements of website visitors, e-marketing value chain, maintaining a website, online video store, online payment, online marketing, advertising, market research, customer relationship applications, effectiveness of e-advertising, elements of branding, marketing strategy on web

Total: 45 Hours

Reference(s)

1. Harrold Carr., and Barbara Latham., "Technology of Clothing Manufacture", Blackwell Scientific Publications, UK, 2000, ISBN: 0632037482 | ISBN-13: 9780632037483.
2. Ruth E. Glock., and Grace I Kunz., "Apparel Manufacturing Sewn Product Analysis",4th Edition, Prentice Hall, New Jersey,2004, ISBN: 0131119826 | ISBN-13: 9780131119826.

21FT007 KNIT WEAR DEVELOPMENT 3 0 0 3

Course Objectives

- To provide students with a comprehensive understanding of the principles of knitting and knitwear technology.
- To equip students with the skills and knowledge necessary to design, develop, and produce knitted garments.
- To develop students creativity and problem-solving skills in the context of knitwear design and production.

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data,and synthesis of the information to provide valid conclusions.
PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess-societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of,and need for sustainable development.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and writeeffective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO12:Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Understand different types of knitted materials and their application
2. Analyze on the selection of stitches, seams and machine for the construction of children's wear
3. Analyze on the selection of stitches, seams and machine for the construction of women's wear
4. Analyze on the selection of stitches, seams and machine for the construction of men"s wear
5. Analyze on the selection of stitches, seams and machine for the construction of intimate apparels

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1		2	1	2		2	1			2		1	1	2
2	2	2	2	2	2	2	1			2		1	1	2
3	2	2	2	2	2	2	1			2		1	1	2
4	2	2	2	2	2	2	1			2		1	1	2
5	2	2	2	2	2	2	1			2		1	1	2

UNIT I **9 Hours**

INTRODUCTION

Introduction to knitted materials types and features; grain, support and shape trims, linings and interlinings; requirements for sewing knitted fabrics; compression garments.

UNIT II **9 Hours**

CHILDREN'S WEAR

Construction of Children's wear - stitches, seams, sewing and special machine selection and assembly operations; Rompers, Creeper, Jumpsuit, legging and skirts.

UNIT III **9 Hours**

WOMEN'S WEAR

Women's wear construction- stitches, seams, sewing and special machine selection and assembly operations - Tunic, Tank Tops, Sports top's, Capri, Legging.

UNIT IV **9 Hours**

MEN'S WEAR

Construction and assembly of men's wear - stitches, seams, sewing and special machine selection and assembly operations; T-Shirts, Polo Shirts, Raglon, Kimono Tee's, Cap's, Active wear, Sweat shirts, Hooded and non-hooded jackets.

UNIT V **9 Hours**

INTIMATE APPARELS

Construction of Intimate apparels of men's and women's-assembly of men's wear - stitches, seams, sewing and special machine selection and assembly operations; Vests, Briefs, women's Hipster, panties, bikini, thong, brassier and trunks. Decoding a Tech pack.

Total: 45 Hours

Reference(s)

1. Harrold Carr., and Barbara Latham., "Technology of Clothing Manufacture", Blackwell Scientific Publications, UK, 2000, ISBN: 0632037482 | ISBN-13: 9780632037483
2. Ruth E. Glock., and Grace I Kunz., "Apparel Manufacturing Sewn Product Analysis",4th Edition, Prentice Hall, New Jersey,2004, ISBN: 0131119826 | ISBN-13: 9780131119826
3. Lynn Nottage., "Intimate Apparel / Fabulation", Theatre Communications Group, USA, 2006, ISBN: 1559362790 | ISBN-13: 9781559362795
4. Singer., "Sewing Lingerie", CyDecosse Incorporated, Mexico, 1991,ISBN: 0865732604 |ISBN-13: 9780865732605
5. Ann Haggar., "Pattern Cutting for Lingerie, Beachwear and Leisurewear", Black Well Science Limited, France, 2004, ISBN: 140511858X | ISBN-13: 9781405118583

21FT008 CLOTHING COMFORT 3 0 0 3

Course Objectives

- To understand the fiber, yarn and fabric properties that influence the fabric comfort
- To enrich the knowledge on testing, analyzing and predicting the comfort properties of textiles.
- To exemplify the thermal comfort, sensorial comfort and movement comfort

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data,and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess-societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of,and need for sustainable development.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO12:Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories

PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Explain the functions of comfort in clothing
2. Analyze the material composition that contributes to comfort
3. Evaluate the contribution of fiber properties to comfort
4. Examine the tactile and body movement comfort
5. Determine comfort requirements in intimate apparel

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1						2	2		2	2		2	1	2
2	2	1	1	1	2	2	2		2	2		2	1	2
3	2	1	1	1	2	2	2		2	2		2	1	2
4	2	1	1	1	2	2	2		2	2		2	1	2
5	2	1	1	1	2	2	2		2	2		2	1	2

UNIT I **9 Hours**

HUMAN PHYSIOLOGY AND THE ROLE OF CLOTHING

Definition of comfort, Human physiological aspect of comfort, Energy metabolism and physical work, Human heat balance, Clothing as near environment, Various aspects of clothing comfort, Comfort variables, Effective temperature and comfort chart, Response to extreme temperature, Development of heat stress and its control, Protective clothing. Role of Clothing comfort.

UNIT II **9 Hours**

PROPERTIES OF FIBERS AND FABRICS THAT CONTRIBUTE TO HUMAN COMFORT

Comfort properties of fibers, Physical modification of fibers, Comfort properties of yarns, Comfort properties of fabric structures. Improving moisture management in apparel: Transport of perspiration, Fundamentals of moisture transfer between human body and environment, Factors influencing moisture transport, Improving moisture transport, and Clothing requirements for different environmental conditions.

UNIT III **9 Hours**

TESTING, ANALYZING AND PREDICTING THE COMFORT PROPERTIES OF TEXTILES

Measurement of thermo-physiological comfort: Thermo-physiological comfort, Thermal resistance, Water vapour transport, Air permeability, wicking, buffering and absorbency. Characterization of comfort, Testing, analyzing and predicting neurophysiologic comfort, Testing, analyzing and predicting thermo physiological comfort, Design-oriented comfort model.

UNIT IV **9 Hours**

GARMENT PATTERN DESIGN AND COMFORT

Fundamental principles of fit in apparel, Clothing comfort and fit, Manual and mechanical stretch testing, Stretch pattern. Improving body movement comfort in apparel: Fundamental principles of movement in apparel, fashion and functional apparel: aesthetics, protection, performance and movement, Materials and design strategies to provide appropriate movement performance, Movement and garment, stretch/pressure/compression

UNIT V **9 Hours**

ACHIEVING COMFORT IN INTIMATE APPAREL

Sensorial comfort for intimate apparel, Thermal comfort for intimate apparel, Motion comfort for intimate apparel, Aesthetical comfort for intimate apparel, Hygienic comfort for intimate apparel

Total: 45 Hours

Reference(s)

1. Textile Science and Engineering by D. J. Millington and P. H. Darwent
2. Clothing Comfort by Lucien A. Tetreault
3. The Science of Clothing by P. V. Bhattacharjee
4. The American Society for Testing and Materials (ASTM)
5. The International Textile and Apparel Association (ITAA)
6. The Textile Exchange

21FT009 FASHION ACCESSORIES 3 0 0 3

Course Objectives

- Identify and analyze the key design elements and principles used in creating various types of accessories.
- Explore the materials, production techniques, and ethical considerations involved in thefashion accessories industry.
- Appreciate the diverse expressions of personal identity and cultural background conveyed through fashion accessories.

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data,and synthesis of the information to provide valid conclusions.
PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess-societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of,and need for sustainable development.
PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and writeeffective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply the set one's own work, as a member and leader in ateam, to manage projects and in multidisciplinary environments.
PO12:Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Generate the basic sketching for the fashion accessory designs.
2. Evaluate the functional and aesthetic performances of the designed garment accessories.
3. Design leather accessories and apply the concepts of pattern making techniques.
4. Design ornamental accessories by analyzing their functional and aesthetic performances.
5. Design special accessories for fashion styles.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	1	2	2	1	3	2	2		2	1	2	3	3	2
2		1	1	1	1	2	2		2	1	2	3	3	2
3	2	2	2	2	2	2	2		2	1	2	2	3	2
4	2	2	2	2	2	2	2		2	1	2	2	3	2
5	2	2	2	2	2	2	2		2	1	2	2	3	2

UNIT I **9 Hours**

INTRODUCTION TO ACCESSORIES

Definition and importance of accessories in fashion design, classification of accessories, Definition of trims, Difference between trims and accessories, Sketching of basic shapes of various accessories, Concepts of three- dimensional sketching.

UNIT II **9 Hours**

GARMENT ACCESSORIES

Selection of materials, design, functional and aesthetic performance of Ribbons, Laces, appliques, Woven labels, Buttons, Zippers, Hooks and Eyes, Velcro, Scarves, Socks, Stockings, Veils

UNIT III **9 Hours**

LEATHER ACCESSORIES

Selection of materials, design, functional and aesthetic performance and various styles of footwear, belts, gloves, hand bags, hats, wallets. Concepts of pattern making techniques, basic machineries used for stitching.

UNIT IV **9 Hours**

ORNAMENTAL ACCESSORIES

Selection of materials, design, functional and aesthetic performance of Pendants, Necklaces and types of necklace, Rings, Ear rings and types of Earings, Bangles, Bracelets, Anklets.

UNIT V **9 Hours**

SPECIAL ACCESSORIES

Neck gaiters, Tie clips, walking sticks, wigs, mask, handkerchiefs, Occasion gloves, Electronic gadgets, Earmuffs.

Total: 45 Hours

Reference(s)

1. "Accessories of Fashion" by Nancy Davis
2. "The Fashion Accessory Designer's Handbook by Lisa Gaudet
3. Fashion Jewelry: From Antiquity to the Present" by Rita Kosinsky
4. "Bags: A History of Handbags and Clutches" by Judith Brown
5. "Hats: A History of Fashion Headwear" by Juliet Barnes

21FT010 GARMENT FINISHING AND CARE 3 0 0 3

Course Objectives

- To enable the students to learn techniques and machinery for dyeing and finishing of garments and to impart knowledge on different garment care techniques.
- Understand the suitability of different finishing techniques for various fabrics and garments.
- Understand the importance of proper garment care and maintenance.

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data,and synthesis of the information to provide valid conclusions.
PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess-societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of,and need for sustainable development.
PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and writeeffective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO12:Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Apply basic garment dyeing and washing techniques with appropriate machineries.
2. Explain the functional and aesthetic effects of laundering and finishing processes.
3. Select appropriate finishing techniques for different fabrics and garments.
4. Analyze on the stain removal procedures
5. Develop and implement a proper garment care and maintenance routine.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	2	2	2	2	2	2	1	2	2		2	1	2
2	1	1	1	1	2	2	2	1	2	2		2	1	2
3	2	2	2	2	2	1	2	1	2	2		2	1	2
4		1	2	2	2	1	2	1	2	2		2	1	2
5	1	1	1	1	1	1	2	1	2	2		2	1	1

UNIT I **9 Hours**

GARMENT DYEING AND FINISHING

Garment dyeing, dye selection, garment-dyeing machinery. Washing: Stone washing, acid washing, enzyme washing, biopolishing, laser fading and ozone fading- principle, machinery used.

UNIT II **9 Hours**

LAUNDERING AND FINISHING

Principles of laundering; Laundry equipment and reagents-soaps - detergents - cleaning action of soaps, Modern and industrial cleaning agents. Finishing- Optical brightening, stiffening, softening, crease resistant and crease retentive finish, anti-static, anti-bacterial, UV protection, water proofing, flame proofing, soil release finish, mildew and moth proofing; silicone finishing.

UNIT III **9 Hours**

FINISHING TECHNIQUES

Garment finishing room equipment - steam iron - steam busters - vacuum ironing tables- formfinishing equipment - trouser topper, shirt press, collar/cuff press, form finisher for jackets and coats - study of boiler and related equipment for finishing room.

UNIT IV **9 Hours**

STAIN REMOVAL PROCEDURES

Stain removal - characteristics of stain and method of stain removal-blood, tea, rust, oil/grease, colour matter, chemicals. Different methods of washing.

UNIT V **9 Hours**

CARE AND MAINTENANCE

Laundering procedures and care instructions adopted for cellulosic, protein and synthetic materials, storage of household linen and apparel laundries, care labeling. Use of care labels and standards / norms for care labels. Different types of house hold/industrial washing machines - rotary, swirling, pressure, tumble wash. Genetex and FTC regulations

Total: 45 Hours

Reference(s)

1. Dantyagi S., "Fundamentals of Textile and their care", Oriental longmans Ltd, New Delhi.
2. Denlkar, "Household Textiles & laundry work", Atma Ram & Sons, Delhi
3. Sustainable Textiles: The Role of Life Cycle Assessment by Kate Fletcherinishing: Processes and Equipment by William R. Roy
4. American Society for Testing and Materials (ASTM) textile standards
5. Association for Textile and Apparel Professionals (ATAP)
6. Sustainable Apparel Coalition (SAC)

21FT011 HOME FURNISHING 3 0 0 3

Course Objectives

- Students will have fundamental knowledge on home furnishings.
- Students will know the various designs / styles of bed linen, bath linen, kitchen linen, table linen and living room furnishings.
- Students will acquire knowledge on various flammability requirements of home furnishings.

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data,and synthesis of the information to provide valid conclusions.
PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess-societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of,and need for sustainable development.
PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and writeeffective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply the set one's own work, as a member and leader in ateam, to manage projects and in multidisciplinary environments.
PO12:Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Differentiate the home furnishing on the basis of performance requirements
2. Explain the quality parameters of home furnishing and clients requirements.
3. Demonstrate different home furnishing products by their design value.
4. Classify bedroom, kitchen and bathroom furnishings by their design and style.
5. Outline flammability requirements of home furnishings.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1					2	1	1		1	1	2	2	1	2
2	1	1	1	1	1	1	2		1	1	2	2	1	2
3	1				2	1	2		1	1	2	2	1	2
4	1					1	1		2	2	1	2	2	2
5						1	1		2	2	1	2	2	2

UNIT I **9 Hours**

INTRODUCTION

Concept of home furnishing ,Classification, Fibres and fabrics used in various home furnishing, Performance specifications of different home furnishings: Importance of performance specification, Performance requirements of US, UK and Canada market, Special performance requirements: Wrinkle resistance, Stain Repellency, Stain Resistance, Stain Release, Anti-allergen, Moisture wicking, Water repellency and Water resistance, Labelling issues of home textiles.

UNIT II **9 Hours**

BED LINEN

Types -Bed Skirt, Bed Cover, Bed Sheet, Bed Spread, Mattress, Mattress Pad, Mattress Protector, Throw (Small blanket), Duvet, Duvet Cover, Comforter, Comforter Cover, Quilt, Quilt Cover, Blanket, Blanket Cover, Pillow, Pillow Cover, Sham , Mosquito Net. Recommended care of bed linen.

UNIT III **9 Hours**

BATH LINEN AND KITCHEN LINEN

Bath linen: Types, Shower Curtain, Bath Robe, Bath Towels, Bath Mats, Bath Rugs, Face Towels and Hand Towels. Kitchen Linen: Apron, Mitten, Napkin, Dish Cloth, Pot Holder, Place Mat, Kitchen Towel, Coaster, Tea Coyz, Placemat. Recommended care of bath and kitchen linen.

UNIT IV **9 Hours**

TABLE LINEN AND LIVING ROOM FURNISHINGS

Table Pad, Table Protector, Table Cloth, Table Runner, Table Skirt, Table Mat, Chair Cover, Chair Mat, Chair Pad, Sofa Cover, Cushion, Cushion Cover, Teapoy cover, Bolster, Wall coverings. Floor covering: Classification, Hard floor covering Resilient, Manmade and natural stone flooring, Soft floorcovering carpets and rugs. Recommended care of of table linen and living room furnishings.

UNIT V **9 Hours**

FLAMMABILITY OF HOME FURNISHINGS

Introduction, Flammability regulations for different home furnishings: Resilient cellular material, Bean bags, Man-made and Non Man-made filling materials, Cigarette Test, Smouldering screening test, Flammability test of carpets, rugs, blankets, towels, mattress and mattress pad, bed-clothing and curtains. Care instructions for home furnishings during export business.

Total: 45 Hours

Reference(s)

1. Subrata Das, Performance of Home Textiles Second Edition, Woodhead Publishing Pvt. Ltd, 2018
2. T Rowe, Interior textiles- Design and Developments, Woodhead Publishing Pvt. Ltd, 2009
3. Jay Diamond and Ellen Diamond, Fashion Apparel, Accessories, Home Furnishings, Pearson Prentice Hall, New Jersey, 2007.
4. Elsasser and Virginia Hencken, Know Your Home Furnishings, Fairchild Books & Visuals, September, 2003
5. Hamlym, Bed and Table linen, Octopus Publishing Group Ltd, Newyork 2001

21FT012 ADVANCED PRODUCT DEVELOPMENT 3 0 0 3

Course Objectives

- Acquire knowledge on Fashion concept and able to classify apparel products.
- Understand Development of Visualization and communication design on to manufacturability.
- Introduce students to the various stages of the apparel product development process, including: Ideation and concept development, Material selection and sourcing, Patternmaking and grading, Prototyping and sampling, Costing and pricing, Production and quality control.

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess-societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of,and need for sustainable development.
PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and writeeffective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO12:Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Develop a creative concept for an apparel product.
2. Understand Functional Apparel Design and Engineering
3. Understand Line Development and Presentation
4. Analyze of Product Development
5. Create basic patterns and grade them to different sizes and develop Garment Prototype

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	1	2	2	1	3	1	1		2	1		2	3	2
2	1	2	2	1	3	1	1		2	1		2	3	2
3					2				2	2		2	3	2
4		1	1	1	2				2	2		2	3	2
5	2	2	2	2	2				2	2		2	3	2

UNIT I **9 Hours**

DEVELOPING FASHION CONCEPT FOR APPAREL

Definition and classification of apparel products. Design logic of apparel products, concept generation, concept screening. Line concept - Synthesize current issues, describe fashion trends, establish line direction, describe materials, identify group concepts and analyze current line. Principles of creative fashion ideas. Manipulation of Design Elements - silhouette, proportion, pattern, garment details, accessories, texture, prints, colour, fabric.

UNIT II **9 Hours**

FUNCTIONAL APPAREL DESIGN AND ENGINEERING

Introduction to apparel design & its types - aesthetic, functional, exploratory, incremental. Requirements for functional clothing design and engineering- physiological, biomechanical, ergonomic, psychological requirements. Process involved in functional clothing design - material selection, clothing design and evaluation for functionality.

UNIT III **9 Hours**

LINE DEVELOPMENT AND PRESENTATION

Creative design - Develop designs, Create prototype. Line adoption - Determining styles and balancing assortments. Technical design - perfect styling and fit, engineer production patterns, samples, costing and grade patterns. Presentation: Review for adoption, line review, line / style release.

UNIT IV **9 Hours**

ANALYSIS OF PRODUCT DEVELOPMENT

Product Positioning Strategy - Sizing and fit in material selection - Final assembly and finishing - Garment presentation.

UNIT V **9 Hours**

PROTO DEVELOPMENT

Fabric Sourcing and Selection. Analysis of functional and aesthetic characteristics of fabrics and trims - Co-ordinating with availability, ability to enhance product aesthetics and functionality and cost. Visualization and Communication design into manufacturability. Overview to E-proto development and rapid proto development.

Total: 45 Hours

Reference(s)

1. Maurice J. Johnson and Evelyn C.Moore, "Apparel Product Development", Second Edition, Prentice Hall Upper saddle river, New Jersey, 2001.
2. Ruth E Glock and Grace I Kunz, "Apparel Manufacturing - Sewn Product Analysis", Prentice Hall, New Jersey, Fourth Edition, 2005
3. Kathryn McKelvey and Janine Munslow, "Fashion Design: Process, Innovation and Practice", Blackwell Publishing, USA, 2005
4. Mastudaira T and Suresh M.N., "Design Logic of Textile Products", Textile Progress, Textile Institute, Manchester, 2007

21FT013 AUTOMATIONS IN APPAREL MANUFACTURING

3 0 0 3

Course Objectives

- To provide students with a thorough understanding of the different types of automation used in apparel manufacturing.
- To equip students with the knowledge and skills needed to evaluate and implement automation solutions in apparel production.
- To analyze the impact of automation on the apparel industry, including its effect on jobs, productivity, and sustainability.

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess-societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO12:Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Understand automation in apparel industry and its importance
2. Identify and describe the different types of automation used in fabric inspection
3. Identify and describe the different types of automation used in cutting and spreading
4. Identify and describe the different types of automation used in material handling and production systems
5. Identify and describe the different types of automation used in sewing operations

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	1	1	1	1	2	1	1					1	2	2
2	2	2	2	2	3	1	1					1	2	2
3	2	2	2	2	3	1	1					1	2	2
4	2	2	2	2	3	1	1					1	2	2
5	2	2	2	2	3	1	1					1	2	2

UNIT I **9 Hours**

INTRODUCTION

Introduction to Automations in Manufacturing; Global scenario of Automation- Requirements and Fundamentals; Various automation systems and Technologies in Apparel Manufacturing; Prerequisites for adopting automation in Garment Manufacturing; Advantages and Challenges faced during and after adoption of automation; Case studies.

UNIT II **9 Hours**

AUTOMATIONS IN FABRIC INSPECTION

Conventional fabric inspection vs. Automatic fabric inspection, Automatic fabric inspection techniques - Statistical approach, Spectral Approach, Model-based approach; Commercial automated Fabric inspection systems.

UNIT III **9 Hours**

AUTOMATIONS IN CUTTING AND SPREADING

Role of automations in spreading and cutting in garment manufacturing; Automated spreading methods and machines; Automatic Fabric pattern matching; Automations in Cutting methods and systems, automated laser cutting; Advanced technologies for fusing cut components.

UNIT IV **9 Hours**

AUTOMATIONS IN MATERIAL HANDLING AND PRODUCTION SYSTEMS

Automations in material handling; Gripping Technologies for textile material handling; ETON systems; Strategies and key principles for automation in garment production systems, USA principle; Case studies on commercialized automated production systems in Apparel Industry for material handling.

UNIT V **9 Hours**

AUTOMATIONS IN SEWING OPERATIONS

Automation and Robotics for sewing; 3D sewing operations using sewing automats; Sewing preparatory machines with automatic control system; Applications of sewing automats for various garment constructions; Challenges associated with sewing operations automation.

Total: 45 Hours

Reference(s)

1. Rajkishore Nayak and Rajiv Padhye, "Automations in Apparel Manufacturing", Woodhead Publishing, 2018.
2. M.Stott, "Pattern Cutting for Clothing using CAD", Woodhead Publishing, 2012.
3. Jinlian Hu, "Computer Technology for Textiles and Apparel", Woodhead Publishing, 2011

21FT014/21FTH03/21FTM03 LEAN MANUFACTURING

3 0 0 3

Course Objectives

- Develop analytical and problem-solving skills for optimizing production processes and increasing efficiency.
- Enable students to identify and eliminate waste in manufacturing environments.
- Foster the ability to implement and sustain Lean improvements within organizations.

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data,and synthesis of the information to provide valid conclusions.
PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess-societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of,and need for sustainable development.
PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and writeeffective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply the set one's own work, as a member and leader in ateam, to manage projects and in multidisciplinary environments.
PO12:Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Understand the principles and elements of lean manufacture
2. Analyze on JIT, TPM and 5S principles
3. Comprehend application of lean concepts and tools in inventory and production control
4. Understand TQM Tools and Techniques
5. Outline the application of Six Sigma concepts for manufacturing and process control

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1					1	1	1		1	2	1	1	2	2
2	2	2	2	2	3	2	2		2	2	2	2	2	2
3	2	2	2	2	3	2	2		2	2	2	2	2	2
4	1	1	1	1	2	2	1		2	2	2	2	2	2
5	2	1	2	1	2	1	1		2	1	1	1	2	2

UNIT I **9 Hours**

INTRODUCTION TO LEAN MANUFACTURING

Conventional Manufacturing versus Lean Manufacturing - Principles of Lean Manufacturing - Basic elements of lean manufacturing - Introduction to LM Tools. Cellular Manufacturing - Types of Layout, Principles of Cell layout, Implementation.

UNIT II **9 Hours**

JIT, TPM, 5S CONCEPTS

JIT - Principles of JIT and Implementation of Kanban. Application of KANBAN Cards for production planning and control for traceability and identification. Continuous Improvement - application of KAIZEN in reducing rejections. TPM - Pillars of TPM, Principles and implementation of TPM. 5S Principles and implementation - Value stream mapping - Procedure and principles.

UNIT III **9 Hours**

LEAN CONCEPTS IN INVENTORY CONTROL

Lean concepts applied in transparent flow of information and production between processes and customers. Takt Time - Calculation of time for producing exactly quantity required. Reduction of inventory using simple Economic Order Quantity (EOQ) and Batch Production Models.

UNIT IV **9 Hours**

TQM TOOLS AND TECHNIQUES

The seven traditional tools of quality, New management tools, and Six sigma: Concepts, methodology, applications to manufacturing, service sector including IT, Bench marking, Reason to bench mark, Bench marking process, FMEA, Stages, and Types. Quality circles, Quality Function Deployment (QFD), Taguchi quality loss function, Concepts, improvement needs, Cost of Quality, Performance measures.

UNIT V **9 Hours**

SIX SIGMA

Six Sigma - Definition, statistical considerations, variability reduction, design of experiments - Six Sigma implementation.

Total: 45 Hours

Reference(s)

1. Askin Ronald G; Goldberg Jeffrey B, "Design and Analysis of Lean Production Systems", JohnWiley & Sons Inc, 2003
2. Rajmanohar T P, "Lean Product Development: Concept and Models", ICFAI Press, 2009.
3. Desai, Aruna, "Lean manufacturing: Perspectives and Applications", ICFAI Press, 2008
4. Besterfield, D H, "Total Quality Management", 3rd Edition, Pearson Education, 2008

21FT015/21FTH02/21FTM02

SUPPLY CHAIN MANAGEMENT FOR APPAREL INDUSTRY **3 0 0 3**

Course Objectives

- Understand the critical role of supply chain management in the apparel industry.
- Analyze the key components of an apparel supply chain, including sourcing, production, logistics, and distribution.
- Develop effective strategies for optimizing apparel supply chain performance.

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess-societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and writeeffective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO12:Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories

PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Understand on basics of Supply chain Management
2. Understand the framework and scope of supply chain networks and functions
3. Understand the importance of logistics in supply chain
4. Acquire skills on sourcing and coordination in supply chain
5. Comprehend the knowledge on role of information technology in supply chain

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1					2	1	1		1	1		2	2	2
2	1	1	1	1	2	1	1		1	1		2	2	2
3	2	2	2	2	2	1	2		2	2		1	2	2
4	2	2	2	2	2	1	2		2	2		1	2	2
5	1	1	2	2	2	1	2		2	2		1	2	2

UNIT I **9 Hours**

INTRODUCTION

Role of Logistics and Supply chain Management: Scope and Importance- Evolution of Supply Chain- Decision Phases in Supply Chain - Competitive and Supply chain Strategies- Drivers of Supply Chain Performance and Obstacles.

UNIT II **9 Hours**

SUPPLY CHAIN NETWORK DESIGN

Role of Distribution in Supply Chain-Factors influencing Distribution network design-Design options for Distribution Network Distribution Network in Practice-Role of network Design in Supply Chain-Framework for network Decisions.

UNIT III **9 Hours**

LOGISTICS IN SUPPLY CHAIN

Role of transportation in supply chain-factors affecting transportations decision-Design option for transportation network-Tailored transportation - Routing and scheduling in transportation.

UNIT IV **9 Hours**

SOURCING AND COORDINATION IN SUPPLY CHAIN

Role of sourcing supply chain supplier selection assessment and contracts- Design collaborationsourcing planning and analysis-supply chain co-ordination-Bull whip effect-Effect of lack of coordination in supply chain and obstacles-Building strategic partnerships and trust within a supply chain.

UNIT V **9 Hours**

SUPPLY CHAIN AND INFORMATION TECHNOLOGY

The role IT in supply chain-The supply chain IT frame work Customer Relationship Management-Internal supply chain management-supplier relationship management-future of IT in supply chain- E-Business in supply chain.

Total: 45 Hours

Reference(s)

1. Sunil Chopra, Peter Meindl and Kalra, "Supply Chain Management, Strategy, Planning, and operation", Pearson Education, 2010.
2. David Simchi-Levi., Philip Kaminsky., and Edith Simchi-Levi., "Designing and Managing the Supply Chain: Concepts, Strategies, and Cases", 3rd Edition, Tata McGraw-Hill, 2012, ISBN: 0073341525 / ISBN: 978-0073341521
3. Srinivasan G.S, "Quantitative models in Operations and Supply Chain Management", PHI, 2010
4. Jeremy F.Shapiro, "Modeling the supply chain", Thomson Duxbury, 2002.

21FT016/21FTH04/21FTM04

SOCIAL COMPLIANCES AND QUALITY ASSURANCE IN APPAREL INDUSTRY

3 0 0 3

Course Objectives

- To impart knowledge on the concepts of social compliance
- To provide insight on compliance norms for apparel manufacture and industry
- To impart knowledge on concepts of ethical trading and international compliance for apparel Business

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data,and synthesis of the information to provide valid conclusions.
PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess-societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and writeeffective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO12:Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Explain the concepts of social compliance and its importance in the apparel industry
2. Understand the general norms on labour and safety
3. Interpret health and environment compliance in apparel industry
4. Interpret wage compliance norms for the industry
5. Relate and practice concepts of ethical trading and international compliance for apparel business

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	1	2	3	3	2	2		2	2			2		2
2		1	2	3	2	3		3	1	3		2		2
3		2	2	2		3		2	2	3		2		2
4	2	2	2	2		1		2	1	2		1		2
5	1	2	2	2	1	1		2	1	2		2		2

UNIT I **9 Hours**

SCOPE AND NEED OF SOCIAL COMPLIANCE

Social Compliance - concept, need, benefits for industry, workers, society. Social accountability and Corporate Social responsibility - scope and need. Social Compliance in supply chain management.

UNIT II **12 Hours**

GENERAL NORMS ON LABOUR AND SAFETY

Conventions on discrimination, forced labour, child labour- Direction and risk in the supply chain. ILO convention on child labour, worst Form of child labour, Hazardous child labour, Environment and climate, health and safety-safety norms and measures to been forced for safe working Environment, working hours-norms, remuneration-minimum wages Conventions on Acquired Immune Deficiency Syndrome (AIDS) and Gender.

UNIT III **8 Hours**

HEALTH AND ENVIRONMENT COMPLIANCE

Minimum age Convention, freedom of association, collective bargaining, corruption and bribery- effect and risk in the supply chain. Global Reporting Initiatives (GRI) sustainability reporting guide line. Organization for Economics Co-operation and Development (OECD) guide lines for multinational discrimination.

UNIT IV **9 Hours**

WAGE COMPLIANCE

Freedom of association, collective bargaining agreements (C87, C98-ILO) compensation-norms applicable in India. Working hours-code of conduct.

UNIT V **7 Hours**

ETHICAL TRADING AND INTERNATIONAL COMPLIANCE

Ethical Trading Initiative (ETI). Basic code of labour practice. Worldwide Responsible Apparel Production (WRAP) purposes, WRAP Principle, certification process, SA8000. National and international regulating organizations - OSHA, WRAP, GOTS, OEKO TEX. Corporate Social Responsibility (CSR) - mandatory requirements - benefits to company, labour and society.

Total: 45 Hours

Reference(s)

1. Rajesh Chhabara, "Social Accountability", AvasoftechPvt.Ltd.2005
2. Rebocak Leifziger, "SA 8000: The first decade", Greech Leaf Publishers, May2009.
3. Venkatesh Selvaraj, "Handbook for social compliance audit: a step by step approach", Kindle Store, 2021
4. Muhammad Azizul Islam, "Social Compliance Accounting", Springer, 2015

21FT017/21FTH01/21FTM01

ADVANCED TECHNOLOGIES FOR APPAREL INDUSTRY

3 0 0 3

Course Objectives

- Understand the major technological trends impacting the apparel industry.
- Explore the application of artificial intelligence and data analytics in apparel retail.
- Discuss the ethical and sustainability considerations of using advanced technologies in the apparel industry.

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess-societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and writeeffective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply the set one's own work, as a member and leader in ateam, to manage projects and in multidisciplinary environments.
PO12:Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Understand the advancements in apparel designing using CAD
2. Analyze the developments in garment sizing and fabric draping
3. Evaluate the alternative techniques to stitches and seams
4. Outline the applications of AI in apparel industry
5. Analyze the automations in garment manufacturing process

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1					2	1	1		1	1	2	1	2	2
2	1	1	1	1	2	1	1		1	1	2	1	2	2
3	1	1	1	1	2	1	1		1	1	2	1	2	2
4	1	1	1	1	2	1	1		1	1	2	1	2	2
5	1	1	1	1	2	1	1		1	1	2	1	2	2

UNIT I **9 Hours**

APPLICATIONS OF CAD IN GARMENT INDUSTRY

Computer aided garment design using three dimensional body models, computerized made-to measure systems, technological advances in fabric designing, embroidery designing; consumer based virtual pattern and garment panels designing.

UNIT II **9 Hours**

ADVANCEMENTS IN GARMENT SIZING AND FABRIC DRAPE

Apparel sizing and garment fit - key issues, technological advancements in virtual fitting; digital body measurement techniques, virtual measurements, AI powered body measuring; 3D body scanningtypes-light based, laser based, sound wave and microwave-based systems; modelling fabric and garment drape-geometrical and physical, 2D and 3D garment drape modelling.

UNIT III **9 Hours**

TECHNOLOGICAL ADVANCEMENTS IN SEWING GARMENTS

Seamless technologies: seamless techniques and seamless knitting machine, 3D seamless knitting, application of seamless garments; advancements in technologies for fabric joining, seam sealing, welding technology, bonding, methods of joining fabrics to accessories; applications, advantages and disadvantages.

UNIT IV **9 Hours**

ARTIFICAL INTELLIGENCE IN APPAREL INDUSTRY

Introduction to AI - Neural networks (NN) in apparel industry; application of AI in garment designing, production planning, manufacturing, inspection, supply chain and retail. Challenges and future trends AI in garment Industry.

UNIT V **9 Hours**

ADVANCEMENTS IN GARMENT MANUFACTURING

Automations in material handling - gripping technologies, conveyor systems and digital tracking; automation in sewing machines - under bed trimmers, bobbin changers; automation in pressing and fusing; automation in garment inspection and packing.

Total: 45 Hours

Reference(s)

1. Alison Beazley & Terry Bond, "Computer Aided Pattern Design and Product Development", Blackwell Science Publisher, USA, 2004.
2. Aldrich Winfred, "CAD in Clothing and Textiles", Blackwell Science Ltd.,
3. Edited by Catherine Fairhurst, "Advances in Apparel Production", Woodhead Publishing Ltd, 2008

21FT018/21FTH05/21FTM05

COMPUTER APPLICATIONS IN APPAREL MANUFACTURING **3 0 0 3**

Course Objectives

- To introduce students to the basic concepts of computer-aided design (CAD) and computer-aided manufacturing (CAM).
- To give students hands-on experience with popular apparel industry software programs.
- To teach students how to use computer technology to improve efficiency, accuracy, and quality in apparel manufacturing.

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data,and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess-societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and writeeffective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply the set one's own work, as a member and leader in ateam, to manage projects and in multidisciplinary environments.

PO12:Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

m. PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories

PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Understand Computer based systems and techniques used in apparel manufacturing
2. Analyze the features available in different textile design software
3. Analyze the features available in different garment design and production software
4. Apply 3D body scanning technologies to develop size charts and evaluate clothing fit
5. Apply 3D modelling and virtual garmenting features for apparel and textile product design using CAD

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	1	1	1	1	2	1	1		1	1	2	1	2	2
2	1	1	1	1	2	1	1		1	1	2	1	2	2
3	1	1	1	1	2	1	1		1	1	2	1	2	2
4	1	1	1	1	2	1	1		1	1	1	1	2	2
5	1	1	1	1	2	1	1		1	1	1	1	2	2

UNIT I **9 Hours**

INTRODUCTION

Introduction to terminology - CAM, CAD, CIM, EDI, CAA, Block Chain, Artificial System, Expert System, E-Proto typing, Rapid Prototyping; techniques for 3D garment design - sketch-based garment design, surface flattening for virtual garments; Online garment shopping system: problems and solutions.

UNIT II **9 Hours**

COMPUTER AIDED TEXTILE DESIGN SOFTWARE

Features and modules of Textile designing software - image editing, woven, knits, embroidery; digital printing technology for textiles and apparel; computerized colour matching

UNIT III **9 Hours**

COMPUTER AIDED GARMENT DESIGN SOFTWARE

Application of computers in each stage of apparel design- market research, fashion tend forecasting, fashion and garment designing- Illustration software, pattern making, grading, marker making, laying & spreading, fabric defect checking, cutting, ticketing and assembling, production planning, production systems, customization, warehouse, ERP and MIS, retail and EXIM procedures.

UNIT IV **9 Hours**

SIZE AND FIT

Importance and development of Size Chart, key issues affecting apparel size and fit, objective evaluation of clothing fit; types of body scanning - light based, laser based, microwave based, advantage and disadvantage of body scanning; tools and features of virtual garmenting software usedto evaluate clothing fit.

UNIT V **9 Hours**

3D TECHNOLOGIES FOR VIRTUAL APPAREL AND TEXTILE DESIGN

Model development, Simulation of garment appearance based on fabric construction, technologies of human body modelling in 3D, development of the body surface, animation, generic vs. individualized body models, applications of 3D human body modelling, virtual try on technologies in apparel Retailing.

Total: 45 Hours

Reference(s)

1. Jinlian Hu, "Computer Technology for Textiles and Apparel", Woodhead Publishing, 2011.
2. M.Stott, "Pattern Cutting for Clothing using CAD", Woodhead Publishing, 2012.
3. Inga Dabolina, AusmaVilumsone, "The Role of the Latest Clothing CAD/CAM System Applications in the Educational Process", Material Science. Textile and Clothing Technology, Vol.7, pp. 63-68, 2012.
4. Joyce AdwoaOppong, Eunice Antiaye and Vivian Biney-Aidoo, "Appraising the Use of Computer Technology in Garment Production Firms in Accra/Tema Metropolis", Arts and Design Studies, Vol.17, pp. 25 - 33, 2014

21FT019 OPERATIONS RESEARCH IN APPAREL INDUSTRY **3 0 0 3**

Course Objectives

- To understand the basic concepts of operations research
- To be able to identify and formulate decision making problems in the apparel industry
- To understand the limitations of OR models and the importance of ethical considerations

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Design Operations Research problems from the cases arising in the apparel Industry and determine solution for linear programming problems
2. Construct and solve transportation problems
3. Construct and solve assignment problems and understand decision making under different conditions
4. Carryout replacement analysis and inventory control
5. Construct and solve project scheduling by PERT and CPM techniques and resource levelling

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	3	2	1	1				1					2
2	1	2	1	1	1				1					2
3	2	3	2	1	1				1					2
4	2	2	1	1	3				1					2
5	2	2	1	1	3				1					2

UNIT I **9 Hours**

INTRODUCTION TO OPERATION RESEARCH

Introduction - History of Operations Research, Scope of Operation Research, applications and limitations: Linear programming problem -construction , solution by graphical method, the Simplex method and its extension by the Big M method; integer programming- introduction; application of the LP technique in the field of apparel technology

UNIT II **9 Hours**

TRANSPORTATION MODELS

Transportation problem - construction, initial basic feasible solution - North West Corner rule, lowest cost entry method, Vogel"s Approximation Method; the optimality test - Modified Distribution method, stepping stone method; transshipment problem

UNIT III **9 Hours**

ASSIGNMENT MODELS

The Assignment problem - construction, solution by Hungarian method, application in the apparel industry; sequencing problems from apparel industry; Decisions theory - decisions under assumed certainty, decision under risk, decision under uncertainty, illustrations from apparel industry

UNIT IV **9 Hours**

INVENTORY CONTROL

Replacement analysis; inventory control - ABC, VED analysis, EOQ - application in apparel industry, simulation-introduction, Monte Carlo method.

UNIT V **9 Hours**

PROJECT MANAGEMENT

Project planning and control models: CPM, PERT - network representation, determining critical path, project duration; crashing of project duration; resource levelling

Total: 45 Hours

Reference(s)

1. Hillier, F. S., & Lieberman, G. J. (2010). Introduction to operations research (9th edition).McGraw-Hill.
2. Taha, H. A. (2016). Operations research: An introduction (10th edition). Pearson.
3. J. George Shrock & James T. Blackburn (2008) Quantitative Operations Management,Prentice Hall
4. Randolph, A. B. (2009). Logistics engineering and management: Planning and controlling the flow of goods and services (5th edition). Taylor & Francis.
5. Tersine, R. (2018). Principles of inventory and logistics management (7th edition), Springer.

21FT020 ENTERPRISE RESOURCE PLANNING IN APPAREL INDUSTRY **3 0 0 3**

Course Objectives

- To understand the fundamental concepts of ERP systems and their relevance to the apparel industry.
- Analyze the key modules of an ERP system and their applications in various apparel business functions.

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and writeeffective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO12:Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Define and explain key terms related to ERP systems and the apparel industry
2. Describe the core modules of an ERP system and their functionalities within the apparel business context
3. Analyze the potential benefits and challenges of implementing ERP in an apparel company
4. Develop a plan for successful ERP implementation in a specific apparel industry scenario
5. Evaluate the impact of ERP on various aspects of the apparel business, such as supply chain management, production planning, and financial control.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1					3			1	1	1		2		2
2					3			1	1	1		2		2
3		2	1	2	2			1	1	1		2		2
4	1	1	1	1	2			1	1	1		1		2
5	2	1	1	1	2			1	1	1		1		2

UNIT I **9 Hours**

INTRODUCTION TO ERP AND APPAREL INDUSTRY

Introduction to ERP-Definition, history, evolution, and benefits. Overview of the Apparel Industry: Structure, value chain, and challenges. The Role of ERP in the Apparel Industry- Aligning business processes and improving efficiency. Case Studies: Examples of successful ERP implementations in apparel companies

9 Hours

UNIT II

CORE ERP MODULES

Finance and Accounting-General ledger, accounts payable/receivable, payroll, budgeting, and cost accounting. Supply Chain Management- Procurement, inventory management, production planning, and logistics. Customer Relationship Management (CRM) -Sales order processing, customer service, and marketing automation. Human Resource Management (HRM) - Payroll, benefits administration, recruitment, and performance management. Product Lifecycle Management (PLM) - Design, sourcing, development, and production

UNIT III **9 Hours**

IMPLEMENTATION AND CHALLENGES

ERP Implementation Strategies: Waterfall, Agile, and phased approaches. Data Migration and System Integration. Change Management and User Training. Security and Compliance Considerations. Common Challenges and Risks of ERP Implementation in the Apparel Industry

UNIT IV **9 Hours**

INDUSTRY-SPECIFIC APPLICATIONS

Demand Forecasting and Inventory Optimization. Quality Management and Compliance. Sustainability and Supply Chain Transparency. Multi-Channel Retail and E-commerce Integration. Data Analytics and Business Intelligence

UNIT V **9 Hours**

THE FUTURE OF ERP IN THE APPAREL INDUSTRY

Emerging Technologies: Artificial Intelligence, Machine Learning, Big Data, and Internet of Things (IoT). Industry Trends: Sustainability, Customization, On-demand Manufacturing, and Block chain. The Impact of ERP on the Future of the Apparel Industry

Total: 45 Hours

Reference(s)

1. Sadagopan. S., "ERP-A Managerial Perspective", Tata McGraw-Hill, New Delhi, 2001
2. Jose Antonio Hernandez, "The SAP R/3 Handbook", Tata McGraw-Hill, New Delhi, 2001
3. Vinod Kumar Crag and Bharat Vakharia, "Enterprise Resource Planning Strategy", Jaico Publishing house, Mumbai, 1999
4. Garg and Venkitakrishnan, "ERPWARE, ERP Implementation Framework", Prentice Hall of India, New Delhi, 1999
5. Vinod Kumar Grag and Venkitakrishnan N.K., "Enterprise Resource Planning", Prentice Hall of India, New Delhi, 2001

21FT021 INTERNATIONAL BUSINESS IN APPAREL INDUSTRY **3 0 0 3**

Course Objectives

- Understand the key drivers and trends shaping the global apparel industry.
- Analyze the impact of international trade policies, regulations, and agreements on apparel businesses.
- Evaluate different sourcing strategies and their implications for cost, quality, and ethical sourcing.

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess-societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply the set one's own work, as a member and leader in ateam, to manage projects and in multidisciplinary environments.
PO12:Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Evaluate the factors influencing the internationalization of the apparel industry.
2. Develop and implement effective sourcing strategies for global apparel businesses.
3. Design and execute marketing and distribution plans for international apparel markets.
4. Analyze the ethical and social responsibility issues within the global apparel supply chain and propose solutions for improvement.
5. Effectively communicate their understanding of international apparel business through written and oral presentations.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	1	1	1	1		2			1		1	1	1	2
2	2	2	1	1		2			1	1	1	1	1	2
3	1	1	1	1		2			1	1	1	1	1	2
4	1	1	2	1		3			1		1	1	1	2
5	1	1	1	1		1			1	3	1	1	1	2

UNIT I **9 Hours**

INTRODUCTION TO THE GLOBAL APPAREL INDUSTRY

Overview of the global apparel market size, scope, and key players. Drivers of globalization in the apparel industry. Impact of technology and innovation on the global apparel industry.

UNIT II **9 Hours**

INTERNATIONAL TRADE AND THE APPAREL INDUSTRY

Trade policies and agreements affecting the apparel industry (e.g., WTO, GSP, FTA). Trade barriers and their impact on apparel businesses. Free trade agreements and their implications for the apparel industry.

UNIT III **9 Hours**

SOURCING STRATEGIES IN THE GLOBAL APPAREL INDUSTRY

Factors influencing sourcing decisions (e.g., cost, quality, lead time, ethical considerations).Different sourcing models (e.g., nearshoring, offshoring, outsourcing).Supplier selection and evaluation criteria.

UNIT IV **9 Hours**

MARKETING AND DISTRIBUTION IN INTERNATIONAL APPAREL MARKETS

Understanding cultural differences and consumer preferences in international markets. Developing effective marketing strategies for different regions and segments. Distribution channels and logistics management in the global apparel industry.

UNIT V **9 Hours**

ETHICAL AND SOCIAL RESPONSIBILITY IN THE GLOBAL APPAREL INDUSTRY

Labor standards and working conditions in the apparel industry. Environmental impact of the apparel industry. Ethical sourcing practices and corporate social responsibility.

Total: 45 Hours

Reference(s)

1. Fashion, Globalization and Sustainability: A Critical Introduction by Juliet Ashdown (2022)
2. The Handbook of Global Fashion Management edited by Christina Birtwistle and Peter Cooke (2023)
3. Sourcing Strategies in the Fashion Industry by Marie-Sophie Jones (2020)
4. Marketing Fashion Globally by Peter J. Davis (2019)
5. Fashion and Sustainability: A Critical Thinking Approach by Sandy Black (2022)

21FT022 ENTREPRENEURSHIP IN APPAREL MANUFACTURING **3 0 0 3**

Course Objectives

- Develop an understanding of the apparel manufacturing industry and its entrepreneurial landscape.
- Identify and evaluate potential business opportunities in the apparel sector.
- Formulate a comprehensive business plan for an apparel manufacturing startup.

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3:Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data,and synthesis of the information to provide valid conclusions.
PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of,and need for sustainable development.
PO8:Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO10:Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and writeeffective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply the set one's own work, as a member and leader in ateam, to manage projects and in multidisciplinary environments.
PO12:Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Analyze the feasibility of potential apparel business ideas.
2. Understand different stages involved in launching and operating an apparel manufacturing business.
3. Analyze essential business skills such as market research, financial analysis, and operations management.
4. Effectively communicate their business ideas to potential investors and partners.
5. Develop a strong awareness of the ethical and social responsibility considerations within the apparel industry.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	1	2	1	2						1	1	1	1	2
2	1	1	1	2						1	2	1	1	2
3				1						1	2	1	1	2
4					2		1			3	2	1	1	2
5					2		1	1		1	2	1	1	2

UNIT I **9 Hours**

INTRODUCTION TO ENTREPRENEURSHIP IN APPAREL MANUFACTURING

Overview of the apparel industry-Trends and drivers of the apparel market-Identifying entrepreneurial opportunities in apparel-The entrepreneurial mindset and skillset

UNIT II **9 Hours**

BUSINESS PLANNING FOR APPAREL STARTUPS

Developing a business concept-Conducting market research-Competitive analysis-Financialprojections and business models-Writing a business plan

UNIT III **9 Hours**

PRODUCTION AND OPERATIONS MANAGEMENT

Sourcing materials and fabrics-Garment production processes Quality control and assurance-Supply chain management

UNIT IV **9 Hours**

MARKETING AND BRANDING FOR APPAREL BUSINESSES

Target market identification and segmentation-Branding and brand positioning-Product development and pricing strategies-Marketing channels and communication strategies

UNIT V **9 Hours**

FINANCIAL MANAGEMENT FOR APPAREL STARTUPS

Financial statements and analysis-Funding options for apparel businesses-Cost control and profitability management-Risk management and mitigation strategies

Total: 45 Hours

Reference(s)

1. Fashion Entrepreneurship: The Essential Guide to Starting and Growing a Fashion Business by Peter Marino (2023)
2. The Business of Fashion: A Strategic Guide to the Fashion Industry by Christine M.Kenneally (2022)
3. Start, Run and Grow Your Fashion Business: The Complete Guide to Success in the Fashion Industry by Susan Gregg (2021)
4. Sustainable Fashion and Textiles: Design, Economics, and Policy by Kate Fletcher (2020)
5. The Fashion Entrepreneur: A Guide to Launching and Growing a Fashion Business by Sarah Kritikos (2019)

21FT023 SUSTAINABLE APPAREL BUSINESS MANAGEMENT

3 0 0 3

Course Objectives

- Understand the key concepts and principles of sustainable apparel business.
- Analyze the environmental and social impacts of the apparel industry.
- Identify and evaluate sustainable practices throughout the apparel supply chain.

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess-societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7:Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8:Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO10:Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply the set one's own work, as a member and leader in ateam,to manage projects and in multidisciplinary environments.
PO12:Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Define and discuss the key concepts of sustainable apparel business.
2. Analyze the environmental and social impacts of the apparel industry.
3. Identify and evaluate sustainable practices throughout the apparel supply chain.
4. Develop and implement a sustainability plan for an apparel business.
5. Develop marketing and communication strategies for sustainable apparel brands.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1					2	1	1			1	2	1	1	2
2	1	1	1	1		2	2	1				2	1	2
3	1	2	2	1		2	2	1				2	1	2
4	1	2	2	1		1	2	1				2	1	2
5	2	2	2	1		1	2	1				2	1	2

UNIT I **9 Hours**

INTRODUCTION TO SUSTAINABLE APPAREL BUSINESS

Definition and scope of sustainable apparel business-The environmental and social impacts of the apparel industry -The business case for sustainability-Drivers and challenges of sustainable apparel

UNIT II **9 Hours**

SUSTAINABLE SOURCING AND PRODUCTION

Sustainable fiber and material choices-Organic and recycled materials-Sustainable manufacturing processes-Fair trade and labor practices

UNIT III **9 Hours**

SUSTAINABLE SUPPLY CHAIN MANAGEMENT

Supply chain mapping and analysis-Supplier selection and collaboration-Traceability and transparency-Circular economy principles

UNIT IV **9 Hours**

SUSTAINABLE PRODUCT DESIGN AND DEVELOPMENT

Eco-design principles-Life cycle assessment-Durability and repairability-End-of-life options

UNIT V **9 Hours**

SUSTAINABLE MARKETING AND BRANDING

Communicating sustainability to consumers-Greenwashing and transparency-Building a sustainable brand identity-Marketing channels and strategies

Total: 45 Hours

Reference(s)

1. Fletcher, Kate. Sustainable Fashion and Textiles: Design for Change. Routledge, 2014.
2. Hardin, Cate. Sustainable Fashion: Practical Strategies for Change. Thames & Hudson, 2017.
3. Gewering, Lisa, and Stephen Jones. Fashion & Sustainability: Design for Change. Laurence King Publishing, 2020.
4. Clapp, Jennifer. How We Make Clothes: A Journey Through the Global Textile Industry. New Press, 2014.
5. Fletcher, Kate, and Lynda Grose. Fashion and Sustainability: Design for Change: 2nd Edition. Routledge, 2023.

21FT024 APPAREL PRODUCTION MANAGEMENT 3 0 0 3

Course Objectives

- To understand the key concepts and theories of apparel production management.
- To be able to apply these concepts and theories to real-world apparel production problems.
- To develop critical thinking and problem-solving skills in the context of apparel production.

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Understand the process of PPC in apparel Industry
2. Apply the procedure of fabric utilization in cutting department
3. Analyze about the garment production systems
4. Outline about the flow process grids in Apparel production
5. Evaluate the Plant Loading and Capacity Planning for apparel production

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1				1			1		2				1	2
2	2	2	2	2	1		1		2				1	2
3		1	1	1	1		1		2				1	2
4	2	1	2	2	2		1		2		1			2
5	2	1	2	2	2		1		2		1			2

UNIT I **9 Hours**

PRODUCTION PLANNING AND CONTROL IN GARMENT INDUSTRY

Production Strategies in Garment Industry-Roles of PPC Department in Garment Industry-Standard Allowed Minute-Performance Measurement Parameters in Production Planning-Production Planning Software for Apparel Industry

UNIT II **9 Hours**

FABRIC UTILISATION IN CUTTING ROOM

Cut Order Planning-Roll Allocation-Fabric Grouping-Performance Measurement Parameters in Cutting Section

UNIT III **9 Hours**

GARMENT PRODUCTION SYSTEMS

Make through System-Whole Garment Production System-Assembly Line System-Modular Production System-Evaluation of Garment Production Systems

UNIT IV **9 Hours**

FLOW PROCESS GRID

Flow Process Grids and Charts-Construction of Flow Process Grids-Operation Breakdown-Control Forms in Production Department

UNIT V **9 Hours**

PLANT LOADING AND CAPACITY PLANNING

Setting Up of a Garment Industry-Plant Layout-Influencing Factors of Plant Layout-Types of Layout-Line Balancing-Determination of Machinery Requirements for a New Factory-Estimation of Production Capacity of a Garment Factory-Sewing Room Capacity-Determination of Operator Efficiency-Determination of Efficiency of a Production Line-Line Loading Plan for Garment Production

Total: 45 Hours

Reference(s)

1. T Karthik, P. Ganesan, D.Gopalakrishnan ,"Apparel Manufacturing Technology", CRC Press, Taylor and Francis Group,2017.
2. Paula J. Myers-McDevitt,"Apparel Production Management and the Technical Package",Fairchild Books,2010.
3. A.J. Chuter., " Introduction to Clothing Production Management ", Blackwell Scientific Publications
4. Jacob Solinger, Apparel Manufacturing Handbook, Bobbin Blenheim Media Corporation, Nashville, USA, 1988.
5. David J. Tyler., " Materials Management in Clothing Production ", Blackwell Scientific Publications Professional Books

21FT025 TECHNOLOGY OF NON WOVENS 3 0 0 3

Course Objectives

- To understand the fundamental principles and processes involved in the production of non-woven fabrics.
- To acquire knowledge of various non-woven fabric structures and their properties. To gain insights into the applications of non-woven fabrics in diverse fields.
- To develop skills in the characterization and evaluation of non-woven fabrics.

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess-societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Explain the basic concepts and terminology related to non-wovens.
2. Describe the production methods for various types of non-woven fabrics, including web formation, bonding, and finishing.
3. Select appropriate non-woven fabrics for specific applications based on their properties and performance requirements.
4. Analyze the properties of non-woven fabrics, such as strength, permeability, and flammability.
5. Identify the applications of non-woven fabrics in various industries, such as apparel, automotive, filtration, and medical textiles.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1						1	1		1	2			1	2
2	1	1	1	1		1	1		1	2			1	2
3	2	2	2	2		1	1		1	2			1	2
4	2	1	2	1		1	1		1	2			1	2
5	2	1	2	1	2	1	1		1	2				2

UNIT I **9 Hours**

INTRODUCTION TO NON-WOVENS

Definition and historical development of non-wovens-Classification of non-wovens based on fiber type, structure, and bonding methods. Applications of non-wovens in diverse fields. Comparison of non-wovens with woven and knitted fabrics

UNIT II **9 Hours**

FIBER PREPARATION AND WEB FORMATION

Natural and synthetic fibers used in non-wovens. Opening, cleaning, and blending of fibers. Carding, combing, and other web formation techniques. Factors affecting web uniformity and quality

UNIT III **9 Hours**

BONDING AND FINISHING PROCESSES

Chemical bonding methods: adhesive bonding, resin bonding, powder bonding. Mechanical bonding methods: needle punching, stitch bonding, thermal bonding. Other bonding techniques: flame bonding, ultrasonic bonding, water-jet bonding. Finishing processes: calendering, brushing, coating, and printing

UNIT IV **9 Hours**

PROPERTIES OF NON-WOVENS

Mechanical properties: tensile strength, tear strength, puncture resistance. Physical properties: weight, thickness, porosity, air permeability. Thermal properties: heat insulation, flame retardancy. Chemical properties: resistance to acids, alkalis, and solvents

UNIT V **9 Hours**

APPLICATIONS OF NON-WOVENS

Apparel and home textiles: interlinings, wipes, disposable garments. Automotive textiles: headliners, floor mats, sound insulation. Filtration textiles: air filters, liquid filters, medical masks. Medical textiles: surgical gowns, wound dressings, hygiene products. Other applications: geotextiles, agricultural textiles, packaging materials

Total: 45 Hours

Reference(s)

1. "Non-Woven Fabrics: Technology, Design, and Applications" by Peter R. Lord
2. "Handbook of Nonwoven Fabrics" by George J. Fielsch
3. "Non-Woven Textiles: Production, Properties, and Applications" by Alberto Gomez-Martinez

21FT026 PROTECTIVE GARMENTS 3 0 0 3

Course Objectives

- Understand the various types of protective garments and their applications.
- Analyze the different hazards and risks associated with various work environments.
- Evaluate the selection, use, care, and maintenance of protective garments.

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess-societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and writeeffective reports and design documentation, make effective presentations, and give and receive clear instructions.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Identify and describe the various types of protective garments based on their functions and applications.
2. Explain the relationship between textile fiber properties, fabric structures, and garment performance in providing protection.
3. Analyze and evaluate the design features and materials used in specific protective garments for different hazards.
4. Interpret and apply relevant standards and regulations related to protective garment safety and performance.
5. Design and develop prototypes of protective garments for specific applications, considering material selection, garment construction, and user needs.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1						1	1	1		2			1	2
2	1	1	2	1	2	1	1	1		2			1	2
3	1	1	1	1	2	1	1			2			1	2
4	2	2	2	2	3	1	1			2			1	2
5	2	1	2	1	3	1	1			2			1	2

UNIT I **9 Hours**

INTRODUCTION TO PROTECTIVE GARMENTS

Overview of protective garments and their applications Classification of protective garments based on function and hazard type-Factors influencing garment performance: materials, construction, standards, and testing

UNIT II **9 Hours**

TEXTILE MATERIALS FOR PROTECTION

Fiber properties and their influence on protective performance (e.g., flame retardancy, chemical resistance, water repellency). Fabric structures and their impact on garment function (e.g., breathability, barrier properties, comfort) Non woven and composite materials for specific applications

UNIT III **9 Hours**

DESIGN AND CONSTRUCTION OF PROTECTIVE GARMENTS

Design principles for different types of protective garments. Ergonomic considerations for comfort and mobility-Seam technology and closures for optimal protection. Finishing and treatment techniques for enhancing garment performance

UNIT IV **9 Hours**

STANDARDS AND REGULATIONS

Introduction to international and national standards for protective garments. Testing methods for evaluating garment performance against different hazards. Certification processes and regulatory requirements for specific applications

UNIT V **9 Hours**

CASE STUDIES AND APPLICATIONS

Analysis of specific types of protective garments used in healthcare, fire fighting, military, industrial, and outdoor settings. Emerging trends and innovations in protective garment design and technology

Total: 45 Hours

Reference(s)

1. "Protective Clothing: Materials and Design," by Peter Townsend
2. "Handbook of Textile Standards," by Hyung Wook Park
3. "Textiles for Protection," by William C. Groves
4. "The Science of Protective Clothing," by David A. Pendergrass

21FT027 INTIMATE APPARELS 3 0 0 3

Course Objectives

- To elucidate the basics of human structure and measurements
- To develop knowledge about fabric selection and styles for intimate apparels.
- To impart technical knowledge about fabric properties that deals with the functional aspect of intimate apparels

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories

PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Compare the different sizing systems of brasseires and identify the differences between them.
2. Construct basic block patterns for Brasseires.
3. Classify the types of girdles and analyze fabric properties role in girdle design
4. Analyze girdle pressure sensing systems and factors affecting girdle pressure
5. Determine the functional requirements of knitted and seamless apparels.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	2	2	2	2				1	1			2	2
2	3	2	2	2	3				1	1			2	2
3	1	1	1	1					1	1			2	2
4	2	2	2	2	3				1	1			2	2
5	1	1	1	1					1	1			2	2

UNIT I **9 Hours**

BREAST MEASUREMENT AND SIZING

Breast measurement and sizing- measurement of breast dimensions-Control of posture and clothing-Body landmarks-Manual measurements-2D measurements.Latest technologies for breast measurements, breast sizing systems.

UNIT II **9 Hours**

BRA PATTERN TECHNOLOGY

Bra pattern technology - introduction -Basic block of bra pattern -Direct drafting of flat pattern - Direct drafting of soft bra - Direct drafting of wired bra-Direct drafting of push-up bra-Tracing from the sample-Three- dimensional modeling on the mannequin. Computerised 3D Intimate Pattern Design.

UNIT III **9 Hours**

INNOVATIONS OF GIRDLES

Historical development of girdles - classification of modern girdles - innovations of shape-up girdles-inventions of health promoting girdles -new materials for girdles - considerations of fabric properties in girdle design.

UNIT IV **9 Hours**

PRESSURE EVALUATION OF BODY SHAPERS

Physiological effects resulting from clothing pressure - Studies using direct pressure sensing systems - Indirect pressure prediction -Factors affecting girdle pressure absorption . Intimate apparel with special functions - Sports Bra -Pantyhose - Swimwear - Mastectomy Bras - Maternity Underwear.

UNIT V **9 Hours**

KNITTED AND SEAMLESS INTIMATE APPAREL

Functional requirements of knitted underwear -Engineering of knitted underwear fabrics - Performance evaluation of knitted underwear - Properties of commercial knitted underwear fabrics. Process innovation in seamless intimate apparel -Lamination - Moulding - Seamless knitting technology.Intimate apparels for men.

Total: 45 Hours

Reference(s)

1. The Fashion Archive (2020) by Cally Blackman: Explores the history of underwear from a cultural and sociological perspective, featuring stunning visuals.
2. The Secret History of the Bra (2010) by Susannah Frankel: Delves into the evolution of the bra, its social impact, and its role in female empowerment.
3. Intimate Apparel: 500 Years of Fashion Underneath (2015) by Lynn Sherr: A comprehensive overview of undergarments across different cultures and periods, with detailed descriptions and illustrations.

21FT028 SMART TEXTILES AND GARMENTS 3 0 0 3

Course Objectives

- Understand the fundamental concepts of smart textiles and their functionalities.
- Explore the different types of smart materials and their applications in textiles.
- Analyze the various methods of integrating sensors, actuators, and electronics into textiles.

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data,and synthesis of the information to provide valid conclusions.
PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess-societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO12:Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Identify and describe different types of smart materials and their potential applications in textiles.
2. Understand the various methods of integrating technology into textiles and the challenges involved.
3. Design and develop simple smart textile prototypes.
4. Analyze the benefits and limitations of smart textiles and their impact on society.
5. Develop effective communication and research skills related to smart textiles.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1						1	1		1			1	2	2
2	1	1	1	1	1	1	1		1			1	2	2
3	2	2	2	2	1	1	1		1			1	2	2
4					1	1	2					1	2	2
5					1	1	2			2		1	2	2

UNIT I **9 Hours**

INTRODUCTION TO SMART TEXTILES AND GARMENTS

Definition and history of smart textiles-Classification of smart materials-Functional properties of smart textiles-Applications of smart textiles in various fields

UNIT II **9 Hours**

MATERIALS AND TECHNOLOGIES FOR SMART TEXTILES

Polymers, fibers, and yarns for smart textiles-Conductive materials, sensors, and actuators-Energy harvesting and storage technologies-Microfabrication and nanotechnology for smart textiles

UNIT III **9 Hours**

INTEGRATING TECHNOLOGY INTO TEXTILES

Textile finishing and coating techniques-Embroidery and weaving techniques for integrating electronics-3D printing and other additive manufacturing methods-Smart textile design principles and challenges

UNIT IV **9 Hours**

APPLICATIONS OF SMART TEXTILES

Smart garments for healthcare and wellness-Sportswear and protective clothing-Military and emergency response applications-Fashion and design with smart textiles-Architectural and building applications

UNIT V **9 Hours**

ETHICAL AND ENVIRONMENTAL CONSIDERATIONS

Sustainability of smart textiles and materials-E-waste and end-of-life management-Ethical sourcing and production practices- Privacy and security concerns with wearable technology

Total: 45 Hours

Reference(s)

1. "Smart Textiles and Garments for Fashion and Medical Applications" by Theresa McClements and Isik C. Bayraktar
2. "Intelligent Textiles and Clothing" by Rajesh B. Shrivastava
3. "Electronic Textiles: Technologies and Applications" by William C. Wilson
4. "The Handbook of Textile Product Development" by Peter J. Hauser
5. Wearable and Implantable Sensors for Personalized Health Monitoring" by Patricia T.Gardner

21FT029 SPORTS TEXTILES AND GARMENTS 3 0 0 3

Course Objectives

- To learn about the design and construction of sports garments.
- To be able to evaluate the performance of sports apparel.
- To develop an understanding of the sustainability of sports apparel.

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data,and synthesis of the information to provide valid conclusions.
PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess-societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of,and need for sustainable development.
PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and writeeffective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO12:Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Explain physiological comfort requirement of sports textile products
2. Explain development and application of coated and laminated textiles as sports textiles.
3. Design sports garments
4. Design sports footwear, glove and protective gears.
5. Explain evaluating of sportswear

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1						1	1		1	1			2	2
2	1	1	1	1	1	1	1					1	2	2
3	2	2	2	2	2	1	1					1	2	2
4	2	2	2	2	2	1						1	2	2
5	1	1	1	1	1	1						1	2	2

UNIT I **9 Hours**

SPORTSWEAR - PHYSIOLOGICAL COMFORT

Sportswear - introduction, types; textiles in sportswear; sportswear - comfort and protection from injury, functional requirements; wear comfort of sportswear, measurement of physiological comfort; heat exchange mechanism and heat balance, water resistance, water vapour transfer, condensation problem in waterproof breathable fabrics for sportswear.

UNIT II **9 Hours**

COATED AND LAMINATED TEXTILES IN SPORTSWEAR

Sports products from coated and laminated fabrics; fibre and fabric preparation for coated fabrics; transfer, rotary screen, micro porous coating; determination of coating add-on; lamination in sportswear; finishes for sportswear- mechanism, chemistry and application.

UNIT III **9 Hours**

SPORTS GARMENT DESIGNING

Design of sports garments - selection of fibre, yarn and fabrics for different types of sports, construction of sports garments; advancements in textile materials for active wears

UNIT IV **9 Hours**

OTHER SPORTS PRODUCTS DESIGNING

Design of sports foot wear, protective gears, glove - components, design features, selection of material, construction.

UNIT V **9 Hours**

EVALUATION OF SPORTS TEXTILES

Standards and test methods for sports textiles, testing of coated and laminated sportswear fabrics

Total: 45 Hours

Reference(s)

1. R.Shishoo, "Textiles for sportswear", Woodhead Publishing Series in Textiles, Cambridge, England, 2015
2. A.R. Horrocks& S.C. Anand (Edrs.), "Handbook of Technical Textiles", The Textile Institute, Manchester, U.K., Woodhead Publishing Ltd., Cambridge, England, 2000.
3. Schindler W.D and Hauser P., "Chemical Finishing of Textiles"., Woodhead Publications, ISBN: 18557390545. Richard. A.Scott, Textiles for Protection, CRC press, Woodhead Publication, USA, 2005
4. Sports Bras: Science, Technology, and Design by Janice Miller (2012): Explores the design and engineering of sports bras for optimal support and comfort.
5. Protective Clothing for Sports by David I. Newton (2015): Examines the materials and technologies used in protective gear for different sports.

21FT030 MEDICAL TEXTILES AND GARMENTS 3 0 0 3

Course Objectives

- Understand the fundamental principles of textile science and technology as applied to the medical field.
- Learn about the various manufacturing processes and finishing techniques used in medical textiles.
- Explore the regulatory requirements and standards for medical textiles and garments.

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and writeeffective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO12:Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Explain medical textiles and its base material
2. Analyze wound dressing and bandage textiles and manufacture
3. Analyze implantable textiles
4. Compare healthcare and hygiene textiles and manufacture
5. Evaluate the methods used in medical textiles

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1					1		1			2		1	2	2
2	1	1	1	1	2		1			1		1	2	2
3	1	1	1	1	2		1			1		1	2	2
4	2	2	2	2	1		1			1		1	2	2
5	2	2	2	2	1		1			1		1	2	2

UNIT I **9 Hours**

METERIALS IN BIO MEDICAL APPLICATION

Metals, ceramics, polymers used for bio medical applications - manufacture, features and limitations; super absorbent polymers, cell- biomaterial interaction

UNIT II **9 Hours**

WOUND DRESSING BANDAGES AND NON IMPLANTABLES

Non-implantable materials: wound dressing- requirements of wound dressing, types, properties and applications; bandages - types, evaluation and applications; design and manufacture of wound dressings and bandages

UNIT III **9 Hours**

IMPLANTABLE TEXTILES

Implantable biomedical devices: vascular grafts, sutures - types, properties and applications; extra-corporeal devices; scaffolds for tissue engineering: development and characterization

UNIT IV **9 Hours**

HEALTH CARE AND HYGIENE TEXTILES

Healthcare and hygiene products: A surgical gown, masks, respirators, wipes, napkins, antibacterial, antiodour textiles design and manufacture of above products

UNIT V **9 Hours**

STANDARDS IN MEDICAL TEXTILES

Standards; safety, legal and ethical issues involved in conducting trials with medical textile materials; disposal of medical textile products

Total: 45 Hours

Reference(s)

1. Handbook of Medical Textiles
2. Medical Textiles and Biomaterials for Healthcare:
3. Medical and Healthcare Textiles
4. Medical Textiles - 1st Edition

21FT031 HISTORY OF CLOTHING AND FASHION 3 0 0 3

Course Objectives

- To enable Students understand and comprehend different fashion theories.
- To enable Students understand the social, cultural and emotional motivations of contemporary dress culture
- To enable Students interpret and mark gender roles in fashion.

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess-societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Distinguish the etymological concepts of fashion clothing and determine the different notions about fashion.
2. Interpret the framework of fashion system and resolve the characteristics of fashion.
3. Assess the anthropological approach and other identities of fashion clothing.
4. Classify the fashion clothing in terms of its gender specific characteristics
5. Respond to the generational characteristic of segment focused in fashion studies.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2					3				2			2	2
2	2					3				2			2	2
3	2					3				2			2	1
4	2					3				2			2	2
5	2					3				2			2	2

UNIT I **9 Hours**

ETYMOLOGY OF FASHION

Etymology of fashion - difference between dress, clothing, costume and fashion. Feminization of fashion, Fashion as a Concept and a Phenomenon, Proponents and Opponents of Fashion , Studiesof Fashion in Social Science - use of visual materials as evidence.

UNIT II **9 Hours**

FASHION SYSTEMS AND MODELS

Fashion systems model - beginning of fashion system, fashion as a myth, concept. Different approaches to fashion, Institutionalization of French fashion, fashion adoption and consumption - trickle down, trickle across and trickle up theories. Characteristics of fashion - Social changes, Appearance and identity

UNIT III **9 Hours**

ANTHROPOLOGICAL STUDIES OF FASHION

Contemporary dress and culture, Anthropological approach to fashion studies - Social, cultural and emotional motivations. Consumer behavior, Process of fashion change and adoption. Fashion and social identity - role of dressing, social restrictions on clothing and relevant reactions.

UNIT IV **9 Hours**

GENDERING FASHION

Gendering fashion - Beyond binaries, soft assemblages, marking, unmarking and remarking gender, sex. Gender and style fashion dress, feminist deconstruction, theorizing body and style - fashion dress, menswear out of academic closet, Multiple masculinities.

UNIT V **9 Hours**

GENERATION CHARACTERISTICS

Bodies in motion through time and space - Age, generation and place, Time and space, Open intersectionalization, Selfhood and mind, Self image and Public image, Phenomenon of social media expressions, Generation Z.

Total: 45 Hours

Reference(s)

1. Diana Crane, Fashion and its social agenda: class, gender and identity in clothing, University of Chicago Press, 2012.
2. Susan B Kaiser, Fashion and cultural studies, Berg publishers, 2013
3. Joanne B eicher and Sandra lee evenson, The visible self: Global perspectives on dress, culture and society, Bloomsbury, 2014.
4. Agnes rocamura and Anneke smelik, Thinking through fashion: a guide to key theorists, I.B. Tauris, 2015.
5. http://www.tandfonline.com

21FT032 FASHION STYLING AND MODELLING 3 0 0 3

Course Objectives

- To enable the Students identify fashion ideas and styling trends
- To impart the knowledge of formulating different looks.
- To enable the Students derive fashion show presentation concepts.

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess-societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO12:Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Demonstrate knowledge of various styling concepts in the history of fashion design
2. Explain the characteristic features of subcultures.
3. Develop new concepts for style development devise photo shoot techniques for presentation themes.
4. Resolve the model requirements for runway, high fashion and catalogue modeling.
5. Analyze the characteristics of concept photoshoot styling and create new looks inspired from the fashion runways.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1					2	3	1		1	2		1	2	2
2					2	3	1		1	2		1	2	2
3	1	1	1	1	2	3	1		1	2		1	2	2
4	2	2	2	2	2	3	1		1	2		1	2	2
5					3	3	1		1	2		1	2	2

UNIT I **9 Hours**

INTRODUCTION TO FASHION DESIGN HISTORY

Evolution of fashion from 17th century to the current: major silhouettes, shapes, colors, garment detail and look. Fashion categories and Clothing genres Active wear, swimwear, sportswear separates,dresses, suits, evening wear, outerwear. Core visual fashion concepts ethnic, postmodern, avant-garde, historic, modernity, sexuality and sporty.

UNIT II **9 Hours**

FASHION SUBCULTURES

Review of notable fashion icons - 20 designers and fashion Innovators - 20 designers. Styles from the street, subculture and aesthetics: The Dandy, Hiphop, Skater, Grunge, Punk, Fetish, Goth, steam punk, Japanese style tribes, Minimalist, Classic, romantic, sporty, urban, postmodern, Deconstructivist

UNIT III **9 Hours**

FASHION CHOREOGRAPHY

Fashion choreography concept development, Create visual art plans and presentation themes, Design briefing and content development, Photo shooting, Choosing models, Selection criteria for makeup concept.

UNIT IV **9 Hours**

FASHION MODELING

Fashion modeling types: Editorial fashion modeling, High fashion modeling (runway, ad campaign), catalog modeling.Fashion model size requirements, working on expression and pose, art of posing, posing styles. Enhancing physical features through styling

UNIT V **9 Hours**

PREPARATION OF MODELING AND STYLING PORTFOLIO

Conceptual styling, coordinating with themes, choosing accessories, understanding the recent looks from the runways

Total: 45 Hours

Reference(s)

1. Coco Rocha study of pose: 1000 pose, Coco Rocha, harper design 2014
2. Alicia Kennedy, Emily stoehrer, Jay calderin, Fashion design referenced, Rockport publishers, 2013.
3. Frank Doorhof, Mastering the Photoshoot, Peachpitpress, 2013
4. Beverly Massachusetts, Fashion details 1000 ideas from neckline to waistline, pockets to pleats, Mao mao, 2011.
5. Chris gatcum, Light and shoot: 50 fashion photos, Illex, 2011.
6. Nishantbaxi, Farout fashion, NKBs publishing, 2015

21FT033 FASHION PHOTOGRAPHY AND CHOREO 3 0 0 3

Course Objectives

- Develop a critical understanding of the history and theory of fashion photography and choreography.
- Explore the use of movement, form, and narrative in fashion photography.
- Analyze the relationship between the body, clothing, and space in fashion imagery.

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess-societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO12:Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Identify and analyze key concepts in fashion photography.
2. Create mood boards and storyboards for fashion photography projects.
3. Develop and execute a concept for a fashion photography shoot involving choreography.
4. Shoot and edit high-quality fashion photographs using various lighting and camera techniques.
5. Collaborate effectively with a team of creative professionals on a fashion photography shoot.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1					2	2			1	2		1	2	2
2	2	2	2	2	2	2			1	2		1	2	2
3	2	2	2	2	2	3			1	2		1	2	2
4	2	2	2	2	2	3			1	2		1	2	2
5						2	1		3	2		2	2	2

UNIT I **9 Hours**

INTRODUCTION

Introduction to fashion photography and choreography-The history and evolution of both disciplines-Key figures and influential works-The creative process: from concept to execution

UNIT II **9 Hours**

THE BODY IN MOTION

The body as a canvas in fashion photography-Exploring movement and gesture-Choreography as a tool for storytellingAnatomy for photographers: understanding movement and pose.

UNIT III **9 Hours**

HANDLING COLOUR IN SLIDE PHOTOGRAPHY

Using the changing light, Exploring the light and angle, Angle of view, Light and shade, Monochromatic colour, Dominant colour, A touch of colour, Harmonic and discordant colour, Contrasting colour, Composition and line, Balance, position and scale, Point of interest, Shape and silhouette, Form and modelling, Tone and hue, Texture, Pattern, Perspective, Framing, Existing backgrounds, Planned backgrounds, Movement, High speed photography, Colour in close-ups, Macro-photography, Photographing through microscopes using reflected images.

UNIT IV **9 Hours**

LIGHT AND COMPOSITION

Lighting techniques for fashion photography-Compositional strategies for capturing movement-Working with different shooting locations and environments-Using light and shadow to create drama

UNIT V **9 Hours**

STUDIO PRACTICE

Introduction to studio lighting equipment-Setting up a fashion shoot-Working with models and dancers in the studio-Directing and capturing movement

Total: 45 Hours

Reference(s)

1. Light: Science & Magic for Digital Photography by Fil Hunter (2015)
2. Fashion Photography: The Art of the Image by Michael Freeman (2019)
3. Vogue: The Book of Fashion Photography by Juliet Ashdown (2016)
4. Choreography: An Encyclopedia by Gerald McAvoy (2019)
5. Moving Stories: An Introduction to Choreography by Janis Brenner (2015)

21FT034 FASHION COMMUNICATION 3 0 0 3

Course Objectives

- Equip the students about the fundamental fashion communication concepts.
- Enable the students to choose graphics and presentation concepts for disseminating fashion information
- Acquire the knowledge of writing fashion journal articles.

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess-societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Appraise the fashion communication concepts in design and articulate the framework ofprocess parameters engaged in design.
2. Illustrate the graphic design concepts and resolve the layout & typography requirements for presenting fashion concepts
3. Resolve the visual merchandising requirements for making an effective visual display in both brick stores and online
4. Determine the documentation processes and review processes for reporting and publishing in journals.
5. Interpret the fashion photography aspects and examine the light settings & camera parameters for organizing fashion photo shoots, choreography and fashion motion photography.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2			2	1		2					2	2
2	3	2			2	1		2					2	2
3	3	2			2	2		2					2	2
4	3	2			2	2		2			2			2
5	3	2			2	2		2			2			2

UNIT I **9 Hours**

FASHION COMMUNICATION IN DESIGN

Communication concepts and processes - Mood board, Trend board, Sketches, Tech pack, Look book, Styling, Catalogue, Brochure

UNIT II **9 Hours**

GRAPHIC DESIGN FOR PRESENTATION

Grids and formations -columns, grids, modules. Types of grids, Layout design -gestalt principles, reality layouts and representational layouts. Matrices patterns, pixels and pointillism. Typography - anatomy, types.

UNIT III **9 Hours**

VISUAL MERCHANDISING

Different kinds of images, Display types. Display setting types. Elements of Display- Mannequins, dress forms, stands-T stand, 4 way stand, rounder, spiral stands. Color planning for store interiors.

UNIT IV **9 Hours**

FASHION VIEWS

Writing runway reviews, Fashion week reviews, Trend reporting -trend labeling, trend mapping and trend quality. Writing editorials, Framing advertisement contents, Craft documentation, Writing design coverage report, Writing travelogues, lifestyle reporting.

UNIT V **9 Hours**

FASHION PHOTOGRAPHY

Street photography, Choreography for fashion shows, fashion photo shoot, Subject lighting, Guidelines for selecting lighting conditions for different moods. Motion photography.

Total: 45 Hours

Reference(s)

1. Kate Nelson Bet, The history and fashion journalism, Berg publishers, 2017.
2. Harriet Posner, Marketing Fashion: Strategy, Branding and Promotion, Laurence king publishing, 2015. 2nd edition
3. Alicia Kennedy, Emily stoehrer, Jay calderin, Fashion design referenced, Rockport publishers, 2013
4. Marian Frances Wolbers, Uncovering fashion: Fashion communications across the media, Fairchild books, 2009.
5. Https://www.globalfashionagenda.com

21FT035 FASHION VISAGE 3 0 0 3

Course Objectives

- Explain the impact of fashion in visage through different forms of outcome.
- Execute the fashion visage through illustration and poses by incorporating the features.
- Apply fashion expressions using the blurring, fading, positive vibes or distortion ways of visage

Programme Outcomes (POs)

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO12:Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Show the influence of fashion visage from the past to the current trends.
2. Analyze the types of art forms to express the visage
3. Differentiate the visages through types of photoshoots.
4. Critiquing the fashion trends using distortion like deconstructionism
5. Show the use of fashion visages from research to design execution.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1			1									2	2	
2										3		1		2
3			2										2	3
4				1								2	3	
5				1									3	2

UNIT I **9 Hours**

FASHION VISAGE IN PAST ERA

Definition - Fashion visage-13th century to 19th century- 20"s modernism-Post modernism-Haute-couture- Avant-garde-Deconstruction fashion.

UNIT II **9 Hours**

FASHION ART FORMS

Conceptual art-Pop art-Abstract art-Cubism-Performance art-Installation art-Impressionism-Modern art-surrealism-Minimalism-Decorative arts.

UNIT III **9 Hours**

HISTORY OF ART INSPIRED FASHION

Madeleine Vionnet: A Fashion Designer That Channeled Ancient History-Valentino And Hieronymus Bosch-Dolce & Gabbana And The Baroque Of Peter Paul Rubens-History Of Art And Fashion: El Greco"s Mannerism And Cristobal Balenciaga-Alexander McQueen And Gustav Klimt"s Symbolism-Christian Dior, The Designer Of The Dreams, And Claude Monet"s Impressionist Paintings-Yves Saint Laurent- Mondrian And De Stijl-Elsa Schiaparelli And Salvador Dali-Fashion Designers & Pop Art: Gianni Versace And Andy Warhol.

UNIT IV **9 Hours**

DECONSTRUCTION AND DISTORTION FASHION

Deconstructed Visage in Fashion Illustration-Deconstructed Visage of Francis Bacon"s Painting-Reconstruction design techniques.

UNIT V **9 Hours**

PHOTOGRAPHY AND ART

Types of photography-High fashion, street wear, Editorial photography, Catalogue photography-Photography and art-Wearing culture-Expressionism of fashion.

Total: 45 Hours

Reference(s)

1. https://www.thecollector.com/9-art-history-inspired-fashion-designers/
2. https://www.eden-gallery.com/news/7-different-forms-of-art
3. https://photographycourse.net/the-4-different-types-of-fashion-photography/
4. https://issuu.com/visageknitwear/docs/visage_aw23_lookbook
5. https://www.researchgate.net/publication/264174983_An_analysis_on_the_Deconstructed_Visage_in_Fashion_Illustration
6. https://www.thepinknews.com/2021/02/17/michelle-visage-drag-race-fashion-gender- rulebook-nandos-diversity-inclusion-speakers/

21FT036 CHRONICLE OF FASHION 3 0 0 3

Course Objectives

- Explain the impact of fashion in fiction through the past and current world.
- Execute the designing silhouettes of fashion history based on the type of silhouette according to the fiction.
- Apply fashion terminologies in real time fashion industry through different modes of fictions.

Programme Outcomes (POs)

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO12:Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Show the influence of fashion fiction from the past during the late 13 to 19 th century.
2. Analyse the types of arts and culture from the past period to the current modern world.
3. Differentiate the principles and classification of style development.
4. Critiquing the silhouettes of fashion history to learn the inspired creation of popular trends from past to present fashion world.
5. Show the use of fashion terminologies from research to design execution

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1			1									2	2	
2										3		1		2
3			2										2	3
4				1								2	3	
5				1									3	2

UNIT I **9 Hours**

FASHION IN FICTION

Definition - Fashion in fiction-Fiction in Fashion, Fashion - means of communication, Three modes of fiction-Realism, Modernism and Post-modernism.

UNIT II **9 Hours**

FASHION COMMUNICATION

Definition - Communication, Fashion - means of communication, Fashion Journalism, Methods of visual communication-Fashion photography, Fashion magazines, The Catalogue

UNIT III **9 Hours**

FUNCTION OF FASHION CLOTHING

Material function - protection, modesty and concealment, immodesty and attraction. Cultural functions -communication, individuality expressions, social status, social role, economic status, political status, religious status, social rituals.

UNIT IV **9 Hours**

FASHIONING PRIVILEGE

Commodification, Consumption, and Corruption. Margaret Mitchell: Fashioning A-Historical and Anti-Canonical White Modernism. Toni Morrison: Re fashioning white privilege

UNIT V **9 Hours**

FASHION PRESTIGE IN CURRENT FASHION

Fashion and Literature-Expressing ideals of beauty. Fiction world of 201 to 213- Japanese culture, World via sounds emitted by living organisms, complete matching wardrobe, Complementing strangers, Clothing to community, Secondhand gifts-babies clothing, Textural sculptures from textile waste, Feelings and opinions, dating back to 1845, natural resources in place of chemicals, Cotton-to- cloth, Natural year-round textiles thrive, Transparency and traceability the norm. Material Futures- Aesthetic Prophesies-Responsible visions.

Total: 45 Hours

Reference(s)

1. https://www.prestigeonline.com/th/lifestyle/art-plus-design/love-affair-between-fashion-and-literature/
2. https://www.eurolitnetwork.com/fashion-fiction/
3. https://www.bloomsburycollections.com/book/fashion-in-fiction-text-and-clothing-in-literature-film-and-television/ch6-the-fashioned-world-of-andrea-zittel
4. https://www.bbc.com/culture/article/20210602-literatures-greatest-fashion-disasters
5. https://fashionfictions.org/the-worlds/
6. https://www.vanartgallery.bc.ca/exhibitions/fashion-fictions

21FT037 TEXTILE HERITAGE 3 0 0 3

Course Objectives

- Recognize the enduring influence of these ancient cultures on modern societies and thought.
- Analyze and interpret primary sources such as archaeological finds, textual documents, and artistic expressions.
- Identify the interactions, trade networks, and cultural exchanges between traditional textiles

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess-societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply the set one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12:Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Understand the evolution of clothing
2. Identify and appreciate the various traditional textiles and costumes of Northern India
3. Identify and appreciate the various traditional textiles and costumes of Southern India
4. Identify and appreciate the various traditional textiles and costumes of Eastern India
5. Identify and appreciate the various traditional textiles and costumes of Western India

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	1		1			2				2		2	2	2
2	1		1			2				2		2	2	2
3	1		1			2				2		2	2	2
4	1		1			2				2		2	2	2
5	1		1			2				2		2	2	2

UNIT I **9 Hours**

INTRODUCTION

Evolution of clothing - Origin & functions of clothing -beginning of civilization - Greek, Roman and Egyptian. Study of Historical designs of different countries - Persian, Mughal, Chinese, Japanese and American.

UNIT II **9 Hours**

NORTHERN TRADITIONAL TEXTILES

Traditional Woven textiles of North India - Brocades of Banaras, Balucheri, Chanderi and Tanchoi. Traditional Embroideries of North India - Kashida, Phulkari, Chambarumal and Chikankari. Traditional costumes of North States of India - Jammu & Kashmir, Punjab, Himachal Pradesh,Haryana, Uttaranchal and Uttar Pradesh.

UNIT III **9 Hours**

SOUTHERN TRADITIONAL TEXTILES

Traditional woven textiles of Southern states of India -Paithani and Pitamber, Pochampalli, Kancheevaram, Himrus, Kalamkari, Pipli, Mysore silk, Aarni Silk. Traditional embroideries of South India - Thoda embroidery, Kasuti of Karnataka and Aari embroidery. Traditional costumes of Southern states of India - Tamil Nadu, Kerala, Karnataka and Andhra Pradesh.

UNIT IV **9 Hours**

EASTERN TRADITIONAL TEXTILES

Traditional woven textiles of Eastern states of India - Dacca muslin, Applique work of Bihar. Traditional embroideries of East India - Kantha of Bengal, Sujaini embroidery, Manipuri embroidery and Nagaland embroidery. Traditional costumes of Eastern states of India - West Bengal, Bihar, Jaharkand, Arunachal Pradesh, Assam, Sikkim, Nagaland, Manipur, Mizoram, Meghalaya and Tirupura

UNIT V **9 Hours**

WESTERN TRADITIONAL TEXTILES

Traditional woven textiles of Western states of India - Maheshwari sarees of Madhya Pradesh, Patola, Bandhini and Amrus. Traditional embroideries of Western India - Sindhi embroidery - Kutch, Ari Bharath, Kanbi Bharath, Mochi Bharath, Shisha embroidery. Traditional costumes of Western states of India - Rajasthan, Gujarat, Maharashtra, Madhya Pradesh, Chhattisgarh and Goa.

Total: 45 Hours

Reference(s)

1. John Gillow & Nicholas Barnad, "Traditional Indian Textiles". Thames & Hudson, 1993.
2. Rta Kapur chishti & Amba Sanyal, "Saris of India - Madhya Pradesh," Wiley Eastern Ltd.1989.
3. Martand Singh, "Saris" of India - Bihar & West Bengal", Wiley Eastern Ltd. 1993.
4. Costumes and textiles of Royal India - Ritu Kumar Published by Christie's Books.
5. Traditional Embroideries of India Shailaja D. Naik.

21FT038 DATA MANAGEMENT TECHNIQUES 3 0 0 3

Course Objectives

- Comprehend the importance of data-driven decision making in the fashion industry.
- Apply data insights to various fashion business aspects, such as product development, marketing, merchandising, and supply chain management.
- Develop critical thinking and problem-solving skills in the context of data analysis.

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess-societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO12:Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Design and implement a data collection plan for a specific fashion business challenge.
2. Analyze and interpret data using relevant statistical methods and visualization tools.
3. Develop data-driven recommendations for improving various aspects of a fashion business.
4. Demonstrate effective communication skills in presenting data insights to a diverse audience.
5. Understand the ethical considerations of data collection and analysis in the fashion industry.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	1	2	1	2	3	1				2		1	1	2
2	2	1	2	1	3	1				2		1	1	2
3	1	2	1	2	3	1				2		1	1	2
4	2	2	2	2	3	1				2		1	1	2
5	2	2	2	2	2	1				2		1	1	2

UNIT I **9 Hours**

INTRODUCTION TO DATA MANAGEMENT IN FASHION BUSINESS

The role of data in fashion decision-making-Types of data relevant to fashion businesses-Data-driven vs. intuition-driven approaches

UNIT II **9 Hours**

DATA COLLECTION TECHNIQUES

Market research: primary and secondary sources-Customer surveys and data analysis-Social media analytics and sentiment analysis-Point-of-sale data and transactional analysis

UNIT III **9 Hours**

DATA MANAGEMENT AND ORGANIZATION

Data warehousing and data lakes-Data cleansing and data quality management-Master data management and data governance

UNIT IV **9 Hours**

DATA ANALYSIS TECHNIQUES

Descriptive statistics and data visualization-Data mining and predictive analytics-Regression analysis and forecasting models-Big data and its applications in fashion

UNIT V **9 Hours**

APPLICATIONS OF DATA IN FASHION BUSINESS

Product development and trend forecasting-Marketing and customer segmentation-Merchandising and inventory management -Supply chain optimization and logistics-Customer relationship management (CRM)

Total: 45 Hours

Reference(s)

1. Fashion Forecasting: Principles and Practices by Lidewij Edelkoort
2. Fashion Data Science: How to Use Data Analytics to Win in the Fashion Industry by Anjan Chatterjee and Ashish Dash
3. The Data-Driven Fashion Entrepreneur: Using Retail Analytics to Build a Thriving Business by Andrea Di Marchi and Paolo Piacenza
4. Retail Analytics: The New Science of Winning in Fashion by Lorrie Vogelgesang
5. The Fashion Forecasting Manual: A Comprehensive Guide to Fashion Forecasting Techniques by Laurie Pressman

21FT039 PRINCIPLES OF WEB DESIGN 3 0 0 3

Course Objectives

- To equip students with the knowledge and skills necessary to design effective and engaging websites for fashion businesses.
- To understand the latest trends and best practices in web design for the fashion industry.
- To develop critical thinking skills for evaluating website usability and user experience.

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess-societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO12:Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Identify the key principles of web design in the context of the fashion industry.
2. Create user-friendly and visually appealing fashion websites.
3. Optimize websites for search engines and social media.
4. Analyze website traffic and make data-driven decisions.
5. Evaluate and defend their website design concepts.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1					2	1		2	1	1		2	2	2
2		2	1	2	3	1		2	1	1		2	2	2
3	2	2	2	2	3	1		2	1	1		2	1	2
4	2	1	2	1	3	1		2		1		2	1	2
5	2	2	2	1	3	1		2		1		2	1	2

UNIT I **9 Hours**

INTRODUCTION TO WEB DESIGN FOR FASHION

Fundamentals of web design-Importance of web design for fashion businesses-User experience (UX) and user interface (UI) design principles-Trends and best practices in web design for fashion-Case studies of successful fashion websites

UNIT II **9 Hours**

PLANNING AND CONTENT STRATEGY

Defining target audience and user personas-Setting website goals and objectives-Developing a website content strategy -Information architecture and website navigation-Creating compelling visual content for fashion websites

UNIT III **9 Hours**

DESIGN AND DEVELOPMENT

Layout and composition principles-Typography and color theoryUse of imagery and video-Responsive design and mobile optimization-Website accessibility guidelines-Introduction to web development tools (e.g., HTML, CSS)

UNIT IV **9 Hours**

E-C OMMERCE FUNCTIONALITY

Integrating e-commerce functionality into websites-Product pages and shopping cart design-Payment gateways and secure checkout process-Customer account management and order tracking-Marketing and analytics for e-commerce websites

UNIT V **9 Hours**

WEBSITE OPTIMIZATION AND MAINTENANCE

Search engine optimization (SEO) principles for fashion websites-Social media integration and marketing-Website analytics and performance tracking

Total: 45 Hours

Reference(s)

1. Web Design for the Real World by Lisa Lopuck and Luke Wroblewski
2. Fashion Websites: Design and Usability by Envato Tuts+
3. The Fashion Design Reference & Resource by Marian McEvoy
4. E-commerce Marketing Strategy by Chris Goward

21FT040/21FTH07 E COMMERCE IN FASHION 3 0 0 3

Course Objectives

- Apprise the students with the concepts of E Commerce for solving problems in Fashion Industry.
- Understand the basic concepts of E Commerce, its function and characteristics.
- To impart knowledge on E Commerce and implementation in Fashion Industry.

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess-societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply the set one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Recognize importance of E-Commerce in Fashion Industry.
2. Understand the concept of web-based E-Commerce for consumers.
3. Implement the strategy in electronic exchange of data.
4. Apply the security system in E-Commerce for Fashion Industry.
5. Integrate the issues of E-Commerce in Fashion Business requirement.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	2	2	2	2	2		2	2	2	2		2	2
2	3	3	3	3	3	3		3	3	3	3		2	2
3	3	3	2	2	2	2		3	3	3	3		2	2
4	2	2	2	2	2	2		2	2	2	2		2	2
5	1	1	1	1	1	1		1	1	1	1		2	2

UNIT I **9 Hours**

E-C OMMERCE AND ITS TECHNOLOGICAL ASPECTS

Overview of developments in Information Technology and Defining E Commerce in Fashion: The scope of E commerce, Electronic Market, Electronic Data Interchange, Internet Commerce, Benefits and limitations of E Commerce, Produce a generic framework for E Commerce, Architectural framework of Electronic Commerce, Web based E Commerce Architecture for Fashion Industry. Ratio of E commerce in overall business.

UNIT II **9 Hours**

CONSUMER ORIENTED E COMMERCE

Fashion E-Retailing: Traditional retailing and e retailing, Benefits of e retailing, Key success factors, Models of Fashion e-retailing, Features of e-retailing. E-services: Categories of e-services, Web- enabled services, matchmaking services, Information-selling on the web, e-entertainment, Auctionsand other specialized services. Business to Business Electronic Commerce. Highest impact of E commerce business.

UNIT III **9 Hours**

ELECTRONIC DATA INTERCHANGE

Benefits of EDI, EDI technology, EDI standards, EDI communications, EDI Implementation, EDI Agreements, EDI Security in Fashion Business. Electronic Payment Systems, Need of Electronic Payment System: Study and examine the use of Electronic Payment system and the protocols used, Study Electronic Fund Transfer and secure electronic transaction protocol for credit card payment. Digital economy: Identify the methods of payments on the net - Electronic Cash, cheques and credit cards on the Internet. Data Hacking methods.

UNIT IV **9 Hours**

SECURITY IN E COMMERCE FOR FASHION

Threats in Computer Systems in Fashion Industry: Virus, Cyber Crime Network Security: Encryption, Protecting Web server with a Firewall, Firewall and the Security Policy, Network Firewalls and Application Firewalls, Proxy Server

UNIT V **9 Hours**

ISSUES IN E COMMERCE FOR FASHION

Understanding Ethical, Social and Political issues in E-Commerce in Fashion: A model for Organizing the issues, Basic Ethical Concepts, Analyzing Ethical Dilemmas, Candidate Ethical principles Privacy and Information Rights: Information collected at ECommerce Websites, The Concept of Privacy, Legal protections Intellectual Property Rights: Types of Intellectual Property protection, Governance in Fashion World.

Total: 45 Hours

Reference(s)

1. Elias. M. Awad, “Electronic Commerce", Prentice-Hall of India Pvt Ltd.
2. RaviKalakota, Andrew B. Whinston, "Electronic Commerce-A Manager's guide", Addison-Wesley.
3. Efraim Turban, Jae Lee, David King, H. Michael Chung, "Electronic Commerce-A Managerial Perspective", Addison-Wesley.
4. Elias M Award, "Electronic Commerce from Vision to Fulfilment", 3rd Edition, PHI, Judy Strauss, Adel El-Ansary, Raymond Frost, "E-Marketing", 3rd Edition, Pearson Education.

21FT041 ERP FOR FASHION BUSINESS 3 0 0 3

Course Objectives

- Acquaint the students with the concepts of ERP for solving problems in Fashion Industry.
- Understand the basic concepts of ERP, its function and characteristics
- To impart knowledge on enterprise resource planning and implementation in apparel business

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply the set one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories

Course Outcomes (COs)

1. Recognize Enterprise resource planning in Fashion Business
2. Understand the concept of data management in fashion business process
3. Implement the strategy of ERP in social, security and safety aspects
4. Apply the important features of ERP in Fashion Industry
5. Integrate the information type and character in Fashion Business requirement

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	3	3	3				3	3	3		2	
2	3	3	3	3	3				2	2	2		2	
3	3	3	3	3	3				2	2	2		2	
4	3	3	3	3	3			2	2	2	2		2	
5	3	3	3	3	3			2	2	2	2		2	

UNIT I **9 Hours**

INTRODUCTION

Enterprise Resource Planning - principle, framework, application and suitability in garment production

UNIT II **9 Hours**

DATA MANAGEMENT

Client/Server architecture; technology choices; SCM, CRM -concepts, Business Process Re - engineering, Data ware Housing, Data mining, ERP system packages.

UNIT III **9 Hours**

STRATEGY AND IMPLEMENTATION

ERP implementation strategies -organizational and social issues, data safety & security, ERP implementation in a garment production facility. Effect of ERP in different businesses.

UNIT IV **9 Hours**

APPLICATION IN APPAREL PRODUCTION

Time study, cutting, production tracking, cut panel process, garment quality control, order completion, machine repairs and maintenance, reports

UNIT V **9 Hours**

CHARACTERISATION OF INFORMATION

Information - requirements, properties and scope, information economics, types and characteristics.

Total: 45 Hours

Reference(s)

1. Sadagopan. S., "ERP-A Managerial Perspective", Tata McGraw-Hill, New Delhi, 2001.
2. Jose Antonio Hernandez, "The SAP R/3 Handbook", Tata McGraw-Hill, New Delhi, 2001.
3. Vinod Kumar Crag and Bharat Vakharia, "Enterprise Resource Planning Strategy", Jaico Publishing house, Mumbai, 1999.
4. Garg and Venkitakrishnan, "ERPWARE, ERP Implementation Framework", Prentice Hall of India, New Delhi, 1999.
5. Vinod Kumar Grag and Venkitakrishnan N.K., "Enterprise Resource Planning", Prentice Hall of India, New Delhi, 2001.

21FT042 INTRODUCTION TO AI APPLICATION 3 0 0 3

Course Objectives

- To impart knowledge on AI application in apparel production planning and Control
- Acquire knowledge on the computer controlled machineries in garment industry
- Develop critical thinking skills to analyze the potential and limitations of AI in fashion.

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Identify the AI tools for the implementation in the Fashion industry
2. Identify the AI tools to develop the new product development
3. Create the Tools for collecting the customer experience
4. Outline the AI tools for the Fashion marketing and Merchandising
5. Correlate the impacts of population and human activities on environment.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2			3								2	2
2	2	2			3								2	2
3	2	2			3								2	2
4	2	2			3								2	2
5	3	2			3								2	2

UNIT I **9 Hours**

INTRODUCTION TO ARTIFICIAL INTELLIGENCE IN THE FASHION INDUSTRY

Overview of artificial intelligence and its applications in the fashion industry. Historical background and evolution of AI in fashion. Impact of AI on various aspects of the fashion industry, such as design, production, marketing, and retail Current trends and developments in AI technologies relevant to fashion

UNIT II **9 Hours**

AI-DRIVEN FASHION DESIGN AND PRODUCT DEVELOPMENT

AI-based design tools and platforms for creating innovative fashion designs. Virtual prototyping and 3D modeling using AI algorithms. Automated pattern generation and garment sizing using machine learning. AI-driven fabric and material selection for enhanced sustainability and performance. Application of AI in supply chain optimization and inventory management

UNIT III **9 Hours**

AI-POWERED PERSONALIZATION AND CUSTOMER EXPERIENCE

AI algorithms for personalized recommendations and styling advice. Virtual try-on technologies and augmented reality in fashion retail. Natural language processing and chatbots for improved customer interactions. Sentiment analysis and social media monitoring for brand management.AI-driven virtual assistants and personal shoppers in the fashion industry

UNIT IV **9 Hours**

AI IN FASHION MARKETING AND SALES

Predictive analytics and data-driven decision-making in fashion marketing. Customer segmentation and targeting using AI algorithms. Image and video analysis for visual search and product recognition. Pricing optimization and dynamic pricing strategies with AI.AI-driven demand forecasting and inventory management for fashion retailers

UNIT V **9 Hours**

ETHICAL AND SOCIAL IMPLICATIONS OF AI IN FASHION

Ethical considerations and challenges in AI adoption within the fashion industry. Bias and fairness issues in AI algorithms and data collection. Sustainability and environmental impact of AI-driven fashion production. Intellectual property and copyright concerns in AI-generated designs. Future prospects and emerging trends in AI application for fashion

Total: 45 Hours

Reference(s)

1. Thomassey, S., & Huang, H. (2019). Artificial Intelligence for Fashion Industry in the Big Data Era. Springer.
2. Burke, S. (2002). Fashion Computing: Design Techniques and CAD. Fairchild Publications.
3. Luce, L. (2021). Artificial Intelligence in Fashion: A Primer. Independently published.
4. Rinaldi, F., Deserti, A., & Maffei, S. (2020). Fashion 4.0: From Traditional to Digital.Springer.
5. Grigsby, M. (2014). Fashion Retail Analytics: Forecasting and RFID-Driven Planning and Operations. Wiley.
6. Wang, L., & Tong, V. C. H. (2020). Artificial Intelligence in Fashion and Textiles: A Multidisciplinary Approach. CRC Press.

21FT043 IOT IN FASHION 3 0 0 3

Course Objectives

- Understand the core concepts of IoT and its relevance to the fashion industry.
- Identify key applications of IoT in fashion design, production, retail, and consumer experience.
- Analyze the potential benefits and challenges of implementing IoT in fashion.

Programme Outcomes (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess-societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PSO1: Understand and incorporate: Interpret trends, decipher fashion movements, apply the knowledge of elements of design and Gestalt theory of visual perception; and incorporate sustainable decisions into their design artworks, fashion products and accessories
PSO2: Articulate, collaborate and solve: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Understand the landscape of IoT in fashion.
2. Develop the ability to critically assess the potential and limitations of IoT applications in specific fashion contexts.
3. Design and present innovative ideas for integrating IoT technologies into fashion products and services.
4. Effectively communicate the value proposition and impact of IoT in fashion to diverse audiences.
5. Collaborate effectively in teams to research, analyze, and propose creative solutions related to IoT and fashion.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	1				3	1	2						2	2
2	2	1	3		3	1							2	2
3	2	1	2		3	1							2	2
4	1	2		2	3	1							2	2
5	1				3	1	2						2	2

UNIT I **9 Hours**

INTRODUCTION TO IOT AND FASHION

Overview of Internet of Things (IoT) technology-Exploring the emergence of IoT in fashion-Impact of IoT on consumer behavior and preferences-Case studies of existing IoT applications in fashion

UNIT II **9 Hours**

IOT IN FASHION DESIGN AND PRODUCTION

Smart textiles and materials with embedded sensors-Digital design tools and processes for wearable technology-Additive manufacturing and 3D printing in fashion-Supply chain optimization and transparency through IoT

UNIT III **9 Hours**

IOT IN RETAIL AND THE CONSUMER EXPERIENCE

Interactive retail spaces and personalized shopping experiences-Augmented reality and virtual reality applications in fashion-Data analytics and customer insights from connected garments-Wearable tech for health and fitness monitoring

UNIT IV **9 Hours**

ETHICAL AND SUSTAINABILITY CONSIDERATIONS

Privacy concerns and data security in IoT-enabled fashion Environmental impact of smart textiles and production processes-Ethical sourcing and responsible use of technology in fashion-Designing for circularity and end-of-life solutions

UNIT V **9 Hours**

FUTURE TRENDS AND INNOVATION

Emerging technologies and their potential impact on fashion Artificial intelligence and machine learning in fashion design and production-Personalization and customization through advanced IoT platforms-Exploring the ethical frontiers of wearable technology

Total: 45 Hours

Reference(s)

1. "Fashioning the Future: Design for the Digital Age" by Christine Steiner
2. "Wearable Technology: A Primer" by Suzanne M. Burnstein
3. The Internet of Things in Fashion" by Francesca Rosella
4. "Fashion Reimagined: Design for a Sustainable Future" by Dilys Williams

21FT044/21FTH06/21FTM06

TECHNICAL DESIGN FORGARMENT MANUFACTURING

3 0 0 3

Course Objectives

- Students will have fundamental knowledge about technical design.
- Students will understand the technical requirements of fabrics
- Students will acquire knowledge on determining the product care specifications.

Programme Outcomes (POs)

PO1: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PSO2: Articulate design aesthetics, communicate product values, collaborate across disciplines as member and leader; and envision solutions in fashion systems: design, technology, production and management.

Course Outcomes (COs)

1. Differentiate the components of tech pack.
2. Determine the technical requirements of fabrics.
3. Attribute the seam specifications with reference to the product type.
4. Appraise the product care requirements
5. Outline trim specifications and their standard performance characteristics.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2												
2	2	2	3											2
3	2	3	2											2
4	3	2	1											2
5	3	2												2

UNIT 1 **7 Hours**

COMPONENTS OF TECH PACK

Introduction to Technical design, Tech pack – Flat sketch, Sewing Details, Points of Measurement (or POM), Wash Description (if any), Labels and Hangtag Placement, Bill of Materials (or BOM), Packaging Instructions.

UNIT II **11 Hours**

TECHNICAL REQUIREMENTS OF FABRICS

Understanding fabric specifications for apparel design – fabric weight categories & drapability for different silhouettes, fabric fitness for seasonal weather, Tailorability of Apparel fabrics.

UNIT III **10 Hours**

DEVELOPMENT OF SEAM SPECIFICATION

Woven garments – Top wear: Edge finishing seams, Seams for coordinating garment parts, Assembly seams, Top stitching seams. Bottom wear: Edge finishing seams, Seams for coordinating garment parts, Assembly seams, Top stitching seams. Knitted garments – Edge finishing seams, Seams for attaching trims, Assembly seams, Top stitching seams.

UNIT IV **8 Hours**

PRODUCT CARE

Determination of washing parameters for regular product care- Shrinkage, fastness, Appearance. Material specific Ironing temperature specifications, Dry cleaning conditions. Flammability regulations.

UNIT V **9 Hours**

FRAMING TRIM SPECIFICATIONS

Introduction to different types of trims, Trim performance standards- Buttons, Zippers, Velcro, Hook & Eye fasteners, Interlinings. Seams for Trims – labels, tags, fasteners.

FOR FURTHER READING

New Apparel Trims, Applications of seams.

Total: 45 Hours

Reference(s)

1. Subrata Das, Quality characterization of Apparels – Second Edition, Woodhead Publishing Pvt. Ltd, 2019.
2. David J Tyler, Carr and Latham's Technology of clothing manufacture, Blackwellscience, 2nd edition, 2000.
3. Ruth E Glock and Grace I Hunz, Apparel Manufacturing: Sewn product analysis, 4rthedition, Pearson, 2004.
4. Kathleen Fasanella, Entrepreneur's guide to sewn product manufacturing, Appareltechnical Svcs, 1998.
5. Jacob Solinger, Apparel manufacturing handbook, Bobbin Media Corporation, 1998.
6. https// http://www.garmenco.org/index.html

21OCE01 ENERGY CONSERVATION AND MANAGEMENT

3 0 0 3

Course Objectives

- To develop an understanding and analyze the energy data of industries.
- To carryout energy accounting and balancing.
- To conduct energy audit and suggest methodologies for energy savings.
- To utilize the available resources in optimal ways.

Programme Outcomes (POs)

PO1.Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2.Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, naturalsciences, and engineering sciences.
PO3.Design/ Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO11.Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12.Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Course Outcomes (COs)

1. Classify and characterize the various energy utilization techniques.
2. Identify suitable technique to provide an energy efficient system.
3. Identify the need for thermal systems with latest technologies.
4. Choose suitable techniques doe conserving energy with respect to emerging trends.
5. Assess the impact economics on the conservation of energy.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	1										1	3
2	1	3									1	3
3	1	3									2	3
4	1	3	2								3	3
5	1	2	2								1	3

UNIT I **9 Hours**

INTRODUCTION

Energy - Power – Past & Present scenario of World; National Energy consumption Data – Environmental aspects associated with energy utilization – Energy Auditing: Need, Types, Methodology and Barriers. Role of Energy Managers. Instruments for energy auditing.

UNIT II **9 Hours**

ELECTRICAL SYSTEMS

Components of EB billing – HT and LT supply, Transformers, Cable Sizing, Concept of Capacitors, Power Factor Improvement, Harmonics, Electric Motors - Motor Efficiency Computation, Energy Efficient Motors, Illumination – Lux, Lumens, Types of lighting, Efficacy, LED Lighting and scope ofEncon in Illumination.

UNIT III **9 Hours**

THERMAL SYSTEMS

Stoichiometry, Boilers, Furnaces and Thermic Fluid Heaters – Efficiency computation and Encon measures. Steam: Distribution & Usage: Steam Traps, Condensate Recovery, Flash Steam Utilization,Insulators & Refractories.

UNIT IV **9 Hours**

ENERGY CONSERVATION IN MAJOR UTILITIES

Pumps, Fans, Blowers, Compressed Air Systems, Refrigeration and Air Conditioning Systems – Cooling Towers – D.G. sets

UNIT V **9 Hours**

ECONIMICS

Energy Economics – Discount Rate, Payback Period, Internal Rate of Return, Net Present Value, Life Cycle Costing –ESCO concept .

Total: 45 Hours

Reference(s)

1. Energy Manager Training Manual (4 Volumes) available at www.energymanager training.com,a website administered by Bureau of Energy Efficiency (BEE), a statutory body under Ministry of Power, Government of India, 2004.
2. Witte. L.C., P.S. Schmidt, D.R. Brown, "Industrial Energy Management and Utilization" Hemisphere Publication, Washington, 1988.
3. Callaghn, P.W. "Design and Management for Energy Conservation", Pergamon Press, Oxford, 1981.
4. Dryden. I.G.C., "The Efficient Use of Energy" Butterworths, London, 1982.
5. Turner. W.C., "Energy Management Hand book", Wiley, New York, 1982.
6. Murphy. W.R. and G. Mc KAY, "Energy Management", Butterworths, London 1987.

21OCS01 OBJECT ORIENTED PROGRAMMING 3 0 0 3

Course Objectives

- To understand the concepts of Object-Oriented Programming.
- To study the concepts of objects and classes.
- To familiarize in the types of constructors.

Programme Outcomes (POs)

PO1.Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2.Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3.Design/ Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO5.Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

Course Outcomes (COs)

1. Identify the characteristics and data types of C++ language.
2. Develop programs using objects and classes for real world applications.
3. Construct programs to implement operator overloading and inheritance techniques.
4. Apply Polymorphism and File streams concepts to develop C++ program.
5. Design applications using templates and apply exception handling mechanisms.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	1	2			3									
2	1	2	3		3									
3	1	2	2		3									
4	1	2	3		3									
5	1	2	3		3									

UNIT I **8 Hours**

INTRODUCTION

Need for object-oriented programming - Procedural Languages vs. Object oriented approach - Characteristics Object oriented programming - C++ Programming Basics: Basic Program Construction - Output Using Cout - Input with Cin - Data types- Variables and Constants - Operators - Control Statements-Manipulators - Type conversion. Function Prototyping- call by reference, return by reference- Inline function- Default arguments - Function overloading. (Sona).

UNIT II **8 Hours**

OBJECTS AND CLASSES

Objects and Classes Simple Class - C++ Objects as Physical Objects - C++ Object as Data types- CONSTRUCTORS: Parameterized Constructors - Multiple Constructors in a Class - Constructors with Default Arguments - Dynamic Initialization of Objects - Copy and Dynamic Constructors - Destructors(PSG) - Structures and Classes - Arrays and Strings.

UNIT III **9 Hours**

OPERATOR OVERLOADING AND INHERITANCE

Operator Overloading and Inheritance Need of operator overloading- Overloading Unary Operators- Overloading binary Operators - Overloading Special Operators - Data Conversion Inheritance: Derived Class and Base Class - Derived Class Constructors-Overriding Member Functions-Class Hierarchies- Public and Private Inheritance-Levels of Inheritance-Multiple Inheritance.

UNIT IV **10 Hours**

POLYMORPHISM AND FILE STREAMS

Polymorphism and File Streams Virtual Function - Friend Function - Static Function-Assignment and Copy Initialization- Memory Management: new and delete Pointers to Objects, this Pointer- Streams - String I/O - Character I/O - Object I/O - I/O with Multiple Objects - File Pointers - Disk I/O with Member Functions- Error Handling in File I/O.

UNIT V **10 Hours**

TEMPLATES AND EXCEPTION HANDLING

Templates: Introduction - Function Templates - Overloading Function Templates-, user defined template arguments(Sona) - Class Templates - Exception Handling - Syntax, multiple exceptions, exceptions with arguments.

Total: 45 Hours

Reference(s)

1. Deitel & Deitel, C++ How to program, Prentice Hall, 2005.
2. Robert Lafore, Object Oriented Programming in-C++, Galgotia Publication.
3. D.S.Malik, C++ Programming, Thomson, 2007.
4. K.R. Venugopal, Rajkumar and T.Ravishankar, Mastering C++, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 2006.
5. E.Balagurusamy, Object Oriented Programming with C++, Tata McGraw Hill Publishing.

21OCS02 JAVA FUNDAMENTALS **3 0 0 3**

Course Objectives

- Implement applications based on core Java Concepts with examples.
- Construct application using inheritance, packages and exception handling for real time problems.
- Integrate the Java I/O concepts to handle input and output operations.
- Develop programs to perform string manipulation in java.
- Design GUI with Java for event handling and database applications.

Programme Outcomes (POs)

PO1.Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2.Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3.Design/ Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO5.Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

Course Outcomes (COs)

1. Demonstrate applications based on core Java Concepts with examples.
2. Construct application using inheritance, packages and exception handling for real time problem.
3. Explain the Java I/O concepts to handle input and output operations.
4. Develop programs to perform string manipulation in Java.
5. Design GUI with Java for event handling and database applications.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	3	2		2									
2	2	3	2		2									
3	3	3	3		3									
4	2	2	2		2									
5	2	2	2		2									

UNIT I **9 Hours**

BASICS OF JAVA

The Genesis of Java - Overview of Java - Data Types, Variables, and Arrays - Operators – Control Statements - Introducing Classes - Methods and Classes.

UNIT II **9 Hours**

INHERITANCE, PACKAGES AND EXCEPTIONS

Inheritance: Basics - Using Super - Creating a Multilevel Hierarchy - Method overriding - Using Abstract Classes - Packages and Interfaces: Packages - Access Protection - Importing Packages- Interfaces Definitions and Implementations - Exception Handling: Types - Try and Catch - Throw.

UNIT III **9 Hours**

EXPLORING JAVA I/O

I/O Basics - Reading Console Input -Writing Console output - Native Methods - I/ O Classes and Interfaces - File - The Byte Streams - The Character Streams - Using Stream I/ O - Serialization.

UNIT IV **9 Hours**

JAVA STRINGS

String Handling: Special String operations and Methods - String Buffer - Exploring java. Lang: Simple type Wrappers - System - Math - Collections Framework: Collections Interfaces and Classes – Utility Classes: String Tokenizer - Date and Time.

UNIT V **9 Hours**

GUI WITH JAVA

Applet Basics - Applet Architecture - Applet Display Methods - Parameter Passing - Event Handling Mechanisms - Event Classes - Event Listener - Working with Windows, Graphics, Colors and Fonts - AWT Controls - Layout Managers and Menus – JDBC.

Total: 45 Hours

Reference(s)

1. Herbert Schildt, Java 2-Complete Reference, Tata Mc Graw Hill, 2015.
2. Deitel & Deitel, Java How to Program, Prentice Hall of India, 2010.
3. Gary Cornell and Cay S. Horstmann, Core Java Vol.1 and Vol.2, Sun Microsystems Press, 2008.

21OCS03 KNOWLEDGE DISCOVERY IN DATABASES

3 0 0 3

Course Objectives

- Introduce the basic concepts of data warehousing.
- Impart knowledge about the data mining functionalities.
- Assess the strengths and weaknesses of association mining and cluster analysis.

Programme Outcomes (POs)

PO1.Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2.Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3.Design/ Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4.Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

Course Outcomes (COs)

1. Explain the concepts of Data Warehousing architecture and business analysis process.
2. Illustrate the process of Data Mining and preprocessing techniques for data cleansing.
3. Apply the association rules for mining the various kinds of data.
4. Analyse Classification and Clustering algorithms for various problems with high dimensional data.
5. Illustrate the various data mining techniques on complex data objects.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2													
2	2	3	2											
3	2	2	2											
4	3	2	2	2										
5	2	2	2	2										

UNIT I **9 Hours**

DATA WAREHOUSING AND BUSINESS ANALYSIS

Data warehousing Components -Building a Data warehouse -Data Warehouse and DBMS- Metadata-Multidimensional data model - Data Extraction, Cleanup and Transformation Tools - Reporting, Query tools and Applications - OLAP vs OLTP - OLAP operations - Data Warehouse Schemas: Stars, Snowflakes and Fact constellations.

UNIT II **8 Hours**

INTRODUCTION TO DATA MINING

Introduction - Steps in knowledge discovery from databases process - Architecture of a Typical Data Mining Systems - Data Mining Functionalities - Classification of Data Mining Systems - Data mining on different kinds of data - Different kinds of pattern - Task Primitives - Integration of a Data Mining System with a Data Warehouse - Major issues in Data mining.

UNIT III **9 Hours**

ASSOCIATION RULE MINING

Market Basket Analysis- Frequent Item Set Mining methods: Apriori algorithm - Generating Association Rules - A Pattern Growth Approach- Pattern mining in multilevel and multidimensional space - Mining Various Kinds Of Association Rules - Association Analysis to Correlation Analysis - Constraint Based Association Mining.

UNIT IV **9 Hours**

CLASSIFICATION AND CLUSTERING

Decision Tree Induction - Bayesian Classification - Rule Based Classification - Classification by Back propagation - Support Vector Machines - Clustering: Types of data - Partitioning methods: k-means, k- medoid - Hierarchical Methods: distance based agglomerative and divisible clustering, BIRCH – Density Based Method: DBSCAN - Grid Based Method: STING.

UNIT V **10 Hours**

DATA MINING APPLICATIONS

Mining complex data objects - Text Mining - Graph mining - Web mining - Spatial Data mining -Application and trends in data mining - Social impacts of Data mining.

Total: 45 Hours

Reference(s)

1 Jiawei Han, Micheline Kamber and Jian Pai , Data Mining: Concepts and Techniques, Morgan Kauffman, 3rd Edition, 2013.

2 Alex Berson and Stephen J Smith, Data Warehousing, Data Mining, and OLAP, Tata McGraw- Hill, 1997.

3 David Hand, Heikki Manila, Padhraic Symth, Principles of Data Mining, MIT Press, 2001.

4 Margaret H.Dunham, Data Mining: Introductory and Advanced Topics, Pearson Education 2003.

21OCS04 E-LEARNING TECHNIQUES 3 0 0 3

Course Objectives

- Understand the technologies involved in e-learning.
- Gain the fundamentals of e-learning techniques.
- Determine the characteristics of Teaching-Learning Process.

Programme Outcomes (POs)

PO1.Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2.Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3.Design/ Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

Course Outcomes (COs)

1. Acquire knowledge about the basic concepts of e-learning.
2. Explain the technology mediated communication in e-learning.
3. Exemplify of e-learning and content the process management.
4. Analyse the teaching and learning processes in e-learning environment.
5. Assess the various applications of e-learning.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	2												
2	2	2	3											
3	3	3	3											
4	2	2	2											
5	2	2	2											

UNIT I **9 Hours**

INTRODUCTION

Evolution of Education - Generations of Distance Educational Technology - Role of E-Learning - Components of e-learning: CBT, WBT, Virtual Classroom - Barriers to e-Learning Roles and Responsibilities: Subject Matter Expert - Instructional Designer - Graphic Designer - Multimedia Author - Programmer - System Administrator - Web Master.

UNIT II **9 Hours**

TECHNOLOGIES

Satellite Broadcasting - Interactive Television - Call Centers - Whiteboard Environment - Teleconferencing: Audio Conferencing - Video Conferencing -Computer Conferencing. Internet: E-mail, Instant Messaging, Chat, Discussion Forums, Bulletin Boards, Voice Mail, File Sharing, Streaming Audio and Video.

UNIT III **9 Hours**

MANAGEMENT

Content: E-Content, Dynamic Content, Trends - Technology: Authoring, Delivery, Collaboration - Services: Expert Service, Information Search Service, Knowledge Creation Service - Learning Objects and E-Learning Standards. Process of E-Learning: Knowledge acquisition and creation, Sharing of knowledge, Utilization of knowledge - Knowledge Management in E-Learning.

UNIT IV **9 Hours**

TEACHING-LEARNING PROCESS

Interactions: Teacher-Student - Student-Student - Student-Content - Teacher- Content - Teacher-Teacher - Content-Content Role of Teachers in E-Learning - Blended Learning -Cooperative Learning - Collaborative Learning - Multi Channel learning -Virtual University - Virtual Library.

UNIT V **9 Hours**

APPLICATIONS

Customer service training - Sales training - Customer training - Safety training - IT training – Product training - Healthcare training.

Total: 45 Hours

Reference(s)

1. E-Learning: An Expression of the Knowledge Economy, Gaurav Chadha, S.M. Nafay Kumail, Tata McGraw-Hill Publication, 2002.
2. E-Learning: New Trends and Innovations, P.P. Singh, Sandhir Sharma, Deep & Deep Publications, 2005. 4. 4. Michael Allen's Guide to E-Learning, Michael W. Allen, Michael Allen, Wiley Publication, 2002.
3. E-Learning: Concepts, Trends and Applications, Epignosis LLC, LLC publications, 2014.
4. Michael Allen's Guide to E-Learning, Michael W. Allen, Michael Allen, Wiley Publication, 2002.

21OCS05 SOCIAL TEXT AND MEDIA ANALYTICS 3 0 0 3

Course Objectives

- Understand the basic ideas of Text mining.
- Analyse the methods and approaches used in analytics.
- Gain knowledge on various types of analytics like web, social network, and social media.

Programme Outcomes (POs)

PO1.Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2.Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3.Design/ Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4.Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5.Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

Course Outcomes (COs)

1. Demonstrate the concepts and applications of text mining.
2. Explain Content analysis and Sentiment analysis.
3. Illustrate web analytics with a suitable model.
4. Illustrate social network analytics with suitable example.
5. Illustrate social media analytics with suitable example.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	3		2	3									
2	2	3		2	2									
3	2	3		3	3									
4	2	2	2	3	2									
5	2	3		2	3									

UNIT I **7 Hours**

TEXT MINING

Introduction, Core text mining operations, Preprocessing techniques, Categorization, Clustering, Information extraction, Probabilistic models for information extraction, Text mining applications.

UNIT II **9 Hours**

METHODS

Content Analysis-Natural Language Processing-Clustering & Topic Detection-Simple Predictive Modeling-Sentiment Analysis; Sentiment Prediction.

UNIT III **9 Hours**

WEB ANALYTICS

Web analytics tools-Clickstream analysis-A/B testing, online surveys-Web search and retrieval-Search engine optimization-Web crawling and Indexing-Ranking algorithms-Web traffic models.

UNIT IV **10 Hours**

SOCIAL NETWORK ANALYTICS

Social contexts: Affiliation and identity - Social network analysis - Social network and web data and methods. Graphs and Matrices - Basic measures for individuals and networks.

UNIT V **10 Hours**

SOCIAL MEDIA ANALYTICS

Information visualization - Making connections: Link analysis - Random graphs and network evolution.

Total: 45 Hours

Reference(s)

1. Ronen Feldman and James Sanger, The Text Mining Handbook: Advanced Approaches inAnalyzing Unstructured Data, Cambridge University Press, 2006.
2. Hansen, Derek, Ben Sheiderman, Marc Smith. Analyzing Social Media Networks with NodeXL:Insights from a Connected World, Morgan Kaufmann, 2011.
3. Avinash Kaushik. Web Analytics 2.0: The Art of Online Accountability, 2009.
4. Hanneman, Robert and Mark Riddle. Introduction to Social Network Method, 2005.
5. Wasserman, S. & Faust, K. Social network analysis: Methods and applications. New York:Cambridge University Press, 1994.
6. Monge, P. R. & Contractor, N. S. Theories of communication networks. New York: OxfordUniversity, 2003.

21OME01 DIGITAL MANUFACTURING 3 0 0 3

Course Objectives

- To understand the process of generating 3D Computer Aided Design (CAD) model by different method.
- To explain the constructional features and develop simple program for CNC lathe and Milling machines.
- To provide an exhaustive knowledge on various generic process and benefits of Additive Manufacturing.
- To familiarize about materials and process parameters of liquid and solid based AM techniques.
- To educate powder-based methodology and emerging trends with case studies, applications of AM techniques.

Programme Outcomes (POs)

PO1.Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2.Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3.Design/ Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4.Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5.Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PSO1. Design, analyse and evaluate the performance of mechanical systems.
PSO2. Choose the appropriate methodology, materials, tools and machinery to manufacture quality products at economical cost.

Course Outcomes (COs)

1. Design a 3D model from the 2D data.
2. Develop a CNC program for simple components.
3. Generate still file and manipulate parameters of AM machine.
4. Select appropriate liquid or solid materials-based AM process to the respective application.
5. Select appropriate process to fabricate a functional/prototype for aerospace, automotive, electronics, manufacturing and medical applications.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	2	2		2								1	2	
2	2	2	2		2								1	2	
3	2	2	2		2								1	2	
4	2	2	2		2								1	3	
5	2	2	2		2								1	2	

UNIT I **9 Hours**

CAD MODELING

Introduction - Design process - Stages. CAD - Input and Output devices, Modelling methods - Wire frame modelling, Surface modelling, Solid modelling - Constructive Solid Geometry and Boundary Representation Techniques. CAD/CAM data exchange - IGES, STEP. Product Life cycle management (PLM).

UNIT II **10 Hours**

AUTOMATION AND CNC MACHINES

Introduction to Automation - Definition, types, reasons for automating. CNC Machines - Principles, types, features, advantages, applications. CNC Machine structure - Linear motion bearings, Recirculating ball bearings, drive system, and control system. CNC Lathe and Milling programming - Linear and circular interpolation, threading and drilling programs.

UNIT III **7 Hours**

ADDITIVE MANUFACTURING

Introduction - Impact of Additive Manufacturing (AM) and Tooling on Product Development - Distinction between AM and CNC Machining - The Generalized AM Process chain - CAD Model - Input file formats - Generation and Conversion of STL file - File Verification and Repair - Build File Creation - Part Construction - Part Cleaning and finishing - AM Benefits - Classification of AM process

UNIT IV **8 Hours**

LIQUID AND SOLID MATERIAL BASED SYSTEMS

Stereo lithography Apparatus (SLA), Digital Light Processing (DLP), Fused Deposition Modelling (FDM) and Laminated Object Manufacturing (LOM) - Working Principle, Construction, Process, Materials and Applications

UNIT V **11 Hours**

POWDER BASED PROCESSES AND APPLICATIONS OF ADDITIVE MANUFACTURING

Selective Laser Sintering (SLS), Colour Jet Printing (CJP), Electron Beam Melting (EBM) and Laser Engineered Net Shaping (LENS) - Working Principle, Construction, Process Variables, Materials and Applications. Reverse Engineering using 3D scanner. Application of Additive Manufacturing in Medical field, Manufacturing, Automotive industries, Aerospace and Electronics and Retail industries.

Total: 45 Hours

Reference(s)

1. Ibrahim Zeid, R. Sivasubramanian, CAD/CAM Theory and Practice, Tata McGraw Hill, 2010.
2. M. Aditan, B.S. Pabala, CNC Machines, New age International, 2012.
3. C. K. Chua, K. F. Leong and C. S. Lim, Rapid prototyping: Principles and applications, Cambridge University Press, 2010.
4. D. T.Pham, S. S.Dimov, Rapid manufacturing, Springer-Verlag, London, 2001.
5. I. Gibson, D. W. Rosen, and B. Stucker, Additive Manufacturing Technologies 3D Printing, Rapid Prototyping and Direct Digital Manufacturing, Springer, 2015 http://www.springer.com/978-1-4939-2112-6.
6. www.grabcad.com, www.all3dp.com.

21OME02 INDUSTRIAL PROCESS ENGINEERING 3 0 0 3

Course Objectives

- To impart the knowledge on production planning methodologies and layout design.
- To learn about production planning and its control methods.
- To provide the knowledge of work study, process charts and ergonomic condition.
- To impart the knowledge on inventory control and material handling.
- To learn about system analysis and different types of maintenance processes.

Programme Outcomes (POs)

PO1.Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2.Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3.Design/ Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO5.Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO11.Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PSO2. Choose the appropriate methodology, materials, tools and machinery to manufacture quality products at economical cost.

Course Outcomes (COs)

1. Select proper plant layout for the required production system.
2. Plan the resources required for the production and to perform the control methods.
3. Apply work study method, prepare charts to outline the process and develop ergonomic condition suitable for the processes.
4. Analyse the inventory required based on production needs and material handling.
5. Perform system analysis and use different types of maintenance process for smooth operations.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	3	1		1									2	
2	3	3	1		2						2			2	
3	1	3	3		2									2	
4	2	3	1		2									2	
5	2	3	1		2									2	

UNIT I **9 Hours**

INDUSTRIAL ENGINEERING AND PRODUCTION SYSTEM

Industrial engineering - Concept, History and development, Applications, Roles of Industrial engineer- Production management, Industrial engineering versus production management, operations management. Plant layout, Criteria for good layout, Types of layouts - Process layout, Product layout, Combination layout and fixed position layout, Flow (material movement) pattern, Workstation Selection and design.

UNIT II **10 Hours**

PROCESS PLANNING AND PRODUCTION CONTROL

Introduction to Process Planning-Definition, Procedure, Process selection, Machine capacity, Process sheet. Process analysis - Group technology, classification and coding system, formation of component family - Production planning, loading, scheduling. Production control -dispatching, routing - Progress control bar, curve, Gantt chart, route and schedule chart.

UNIT III **8 Hours**

WORK STUDY AND ERGONOMICS

Work study - Definition, Need, Advantages, objectives of method study and work measurement, method study procedure, Process chart - symbols, outline process chart, flow process chart, principles of motion economy, ergonomics- applications of ergonomic principles in the shop floor- work benches- seating arrangement, Industrial physiology.

UNIT IV **10 Hours**

INVENTORY MANAGEMENT

Inventory control, classification, management, objectives, functions. Economic order quantity, Economic batch quantity, inventory models, ABC analysis, Material Requirement Planning(MRPI), Manufacturing Resource Planning (MRPII), Operating cycle, lean manufacturing, Supply chain management - Material handling.

UNIT V **8 Hours**

SYSTEM ANALYSIS AND MAINTENANCE

System concept - system analysis, systems engineering, value engineering, value control, types of values. Plant maintenance - objectives, importance. Maintenance engineer - duties, functions and responsibilities. Types - breakdown, scheduled, preventive and predictive - Plant maintenance schedule, Condition monitoring.

Total: 45 Hours

Reference(s)

1. Khanna O.P., Industrial Engineering and management, Dhanpat Rai Publications., 2010.
2. Martand T. Telsang, Industrial Engineering and Production Management, S Chand Publishers, 2006.
3. Panneerselvam R., Production and operations management, Heritage Publishers, 2006.
4. Ravi Shankar, Industrial Engineering and Management, Golgotia Publications Pvt. Ltd., New Delhi, 2009.

21OME03 MAINTENANCE ENGINEERING 3 0 0 3

Course Objectives

- To understand the principles, objectives and importance of maintenance adopted in industry for successful progress.
- To introduce different maintenance categories, its merits and types of lubrication.
- To expose the idea of condition monitoring, methods and instruments used for allied measurements.
- To learn about failure analysis and repair methods for few mechanical elements.
- To promote computerization in maintenance and inventory management.

Programme Outcomes (POs)

PO1.Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2.Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3.Design/ Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO5.Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6.The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7.Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PSO2. Choose the appropriate methodology, materials, tools and machinery to manufacture quality products at economical cost.

Course Outcomes (COs)

1. Explain the principles, objectives and importance of maintenance adopted in industry.
2. Select the suitable maintenance category and lubrication type.
3. Apply the appropriate methods and instruments for condition monitoring.
4. Analyze the failures of mechanical systems and select suitable repair methods.
5. Utilize computers in maintenance and inventory management.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	2												2	
2	2	2												2	
3					2	2	1							2	
4	1	2	1		2	2	2							2	
5	2	2	2		1	1	1							2	

UNIT I **9 Hours**

PRINCIPLES OF MAINTENANCE PLANNING

Basic principles of maintenance planning - Objectives and principles of planned maintenance activity - Importance and benefits of sound maintenance systems - Maintenance organization - Maintenance economics.

UNIT II **9 Hours**

MAINTENANCE CATEGORIES AND LUBRICATION

Maintenance categories - Comparative merits of each category - Preventive maintenance, Maintenance schedules, Repair cycle - Total Productive Maintenance - Principles and methods of lubrication.

UNIT III **9 Hours**

CONDITION MONITORING

Condition based maintenance - Cost comparison with and without Condition Monitoring - Methods and instruments for condition monitoring - Noise, vibration, wear and temperature measurement.

UNIT IV **9 Hours**

FAILURE ANALYSIS AND REPAIR METHODS

Failure analysis - Failures and their development - Role of Non-Destructive Testing in failure analysis - Repair methods for bearings, cylinder block, fuel pump, shaft.

UNIT V **9 Hours**

COMPUTER AIDED MAINTENANCE MANAGEMENT

Approach towards Computerization in maintenance - computer-aided maintenance management system (CAMMS) - Advantages of CAMMS - spare parts and inventory centre performance reporting.

FURTHER READING

Retrofitting, objectives, classification of retrofitting, cost effectiveness through retrofitting (economical aspects), circumstances leading to retrofitting, features and selection for retrofitting.

Total: 45 Hours

Reference(s)

1. Srivastava S.K, Maintenance Engineering, S Chand and Company, 2010.
2. Mishra R.C, Pathak K, Maintenance Engineering and Management, Second edition, Prentice Hall India Learning Pvt. Ltd., 2012.
3. Keith Mobley R, Lindley R. Higgins and Darrin J. Wikoff, Maintenance Engineering Handbook, Seventh edition, McGraw-Hill Professional, 2008.
4. Davies A, Handbook of Condition Monitoring: Techniques and Methodology, Springer, 2012.
5. Otegui Jose Luis, Failure Analysis, Fundamentals and Applications in Mechanical Components, Nineteenth edition, Springer, 2014.

21OME04 SAFETY ENGINEERING 3 0 0 3

Course Objectives

- To study the principles of safety management system.
- To introduce the provisions contained in the industrial laws.
- To provide knowledge on safety requirements for engineering industry.
- To learn safety requirement for chemical industry.
- To study the various safety measures adopted in construction industries.

Programme Outcomes (POs)

PO1.Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2.Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO5.Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6.The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO8.Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9.Individual and Teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10.Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions
PO12.Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PSO1. Design, analyse and evaluate the performance of mechanical systems.
PSO2. Choose the appropriate methodology, materials, tools and machinery to manufacture quality products at economical cost.
PSO3. Address all the fluid flow and heat transfer related problems of mechanical systems.

Course Outcomes (COs)

1. Explain safety management system of an industry.
2. Implement the provisions of acts and rules in industries.
3. Implement and review the safety performance followed in various industries.
4. Evaluate safety appraisal in chemical industries.
5. Generate safety reports on construction industries.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1					2	1		1						2	2
2					1			3					2	1	
3	2											3	1		2
4	2	3							2				2		1
5					2					3				3	

UNIT I **8 Hours**

SAFETY MANAGEMENT

Concepts - Evolution, International Labour Organization (ILO), National Safety Council, Techniques - Job Safety Analysis (JSA), Safety survey, Safety inspection, Safety Sampling, Accident Reporting and Investigation - Concept of an accident, Accident causation models, cost of accident, investigation, Safety Performance Monitoring - Safety indices.

UNIT II **10 Hours**

SAFETY AND LAW

Factory Act 1948-Safety and Health chapters, Tamil Nadu Factories Rules- Safety and Health chapters, Environment and Pollution Laws, Building and other construction works act 1996, Electricity Rules.

UNIT III **10 Hours**

SAFETY IN ENGINEERING INDUSTRIES

Safety in machine shop - Principles of machine guarding - Personal protective equipment- Safety in handling industrial gases - Safety in cold forming and hot working of metals- Safety in finishing, inspection and testing, heat treatment, electro plating, leak test, radiography.

UNIT IV **9 Hours**

SAFETY IN CHEMICAL INDUSTRIES

Safety in process design, unit operations, pressure vessel, heat exchanger, safety valves -Plant commissioning and inspection, pressure vessel, Plant maintenance and emergency planning, management of maintenance HAZOP study.

UNIT V **8 Hours**

SAFETY IN CONSTRUCTION INDUSTRY

Construction regulations, contractual clauses, permit to work, - Education and training-Hazards of construction and prevention- excavation, scaffolding, dismantling, road works, construction of high-rise buildings - Working at heights, -Working on fragile roofs, work permit systems-Construction machinery, cranes, chain pulley blocks, earth moving equipment, conveyors- Manual handling, Safety in demolition work, - Safety in confined spaces

FOR FURTHER READING

Case Studies- Major accidents at Flixborough, UK, Seveso, Italy, Victoria Dock, India, Bhopal, India.

Total: 45 Hours

Reference(s)

1. Blake R.B., Industrial Safety, Prentice Hall, Incorporated, New Jersey, 1973.
2. National Safety Council, Accident Prevention Manual for Industrial Operations, Chicago, 1988. Subramanian V., The Factories Act, 1948, with Tamil Nadu Factories Rules, 1950, Madras.
3. Environmental Pollution Control Act, 1986.
4. BOCW Act, 1996, Madras Book agency, Chennai-1.
5. Explosive Act, 1884, Eastern Book Company, Lucknow -266 001.

21OBT01 BIOFUELS **3 0 0 3**

Course Objectives

- To understand and explore the scope of biofuels the most efficient renewable source of energy.
- To develop the expertise in the technology pertaining to their generation and employment in order to surrogate the existing conventional fuels and hence strives towards sustainable development
- To give way to the bolster green technology and incline towards more eco-friendly options.

Programme Outcomes (POs)

PO1.Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO3.Design/ Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO7.Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PSO3. Conceive Plan and Deploy bio-resources for the benefit of society and environment.

Course Outcomes (COs)

1. Apply the bioresources that can be used for the production of biofuels.
2. Analyze the physical and chemical properties of the biodiesel.
3. Analyze the mechanisms of improvising the quality and performance of engines using biofuels.
4. Analyze the bio-fuel conversion technologies and their environmental attributes.
5. Evaluate the designing aspects of major unit processes/operations of an integrated bio- refinery.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	1		2				3								1
2	2						1								3
3	1						3								2
4	2						3								3
5	1						1								

UNIT I **9 Hours**

CLASSIFICATION AND RESOURCES

Introduction, biofuel as a renewable energy, classification of biofuels - First, second, third and fourth generation biofuels, different plant sources as biofuel feedstocks, Biogases, physical and chemical characteristics of vegetable oils - iodine number, hydroxyl, acid values, rancidity, hydrogenolysis and hydrolysis, Food vs energy.

UNIT II **9 Hours**

BIODIESEL

Definition, basics and chemistry of biodiesel, vegetable oils in biodiesel production, Trans esterification: Chemical methods, enzymatic methods and types of catalysts, separation and purification, physical properties and characterization of biodiesel - Cloud point, pour point, cold filter plugging point, flash point, viscosity and cetane number.

UNIT III **9 Hours**

QUALITY BIODIESEL AND ENVIRONMENT

Producing Quality Biodiesel, quality control, test methods, ASTM specifications. Oxidative andthermal stability, estimation of mono, di, triglycerides and free glycerol, engine performance test, blending of ethanol with biodiesel, blending of biodiesel with high-speed diesel (HSD) and their combustion properties.

UNIT IV **9 Hours**

BIOETHANOL AND BIOGASES

Ethanol as a fuel, microbial and enzymatic production of ethanol from biomass - lignocellulose, sugarcane, sugar beet, corn, wheat starch, purification - wet and dry milling processes, saccharification-chemical and enzymatic. Production of bio methane and bio hydrogen.

UNIT V **9 Hours**

BIOREFINERIES

Definition and types of biorefineries, co-products of biorefineries-oil cake and glycerol, purification of glycerol obtained in biodiesel plant; anaerobic and thermal gasification of biomass, economics of biorefineries.

Total: 45 Hours

Reference(s)

1. Caye Drapcho, John Nghiem and Terry Walker, Biofuels Engineering process technology, McGraw Hill Professional, 2008.
2. Mousdale, Biofuels, CRC Press, 2008.
3. Ahindra Nag, Biofuels Refining and Performance, McGraw-Hill Professional, 2007.
4. Lisbeth Olsson, Biofuels (Advances in Biochemical Engineering/ Biotechnology), Springer, 2007.

21OFD01 TRADITIONAL FOODS 3 0 0 3

Course Objectives

- Understand the importance of traditional foods and food habits.
- Know the traditional processing of snack, sweet and dairy food products.
- Infer the wide diversity and common features of traditional Indian foods and meal patterns.

Programme Outcomes (POs)

PO1.Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2.Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3.Design/ Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO8.Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

Course Outcomes (COs)

1. Justify the processing methods of traditional foods in terms of its health benefits.
2. Assess the production methods of traditional sweets, snacks and dairy products.
3. Differentiate Traditional fermented foods products based on its raw material.
4. Implement a large-scale production of tradition foods for its increased consumption.
5. Compare the health aspects of traditional foods with modern foods.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	1													
2		1												
3	2	1	1											
4								2						
5								2						

UNIT I **9 Hours**

TRADITIONAL METHODS OF FOOD PROCESSING

Introduction - food culture -geographical features and food. Traditional methods of milling grains - rice, wheat and corn - equipment and processes as compared to modern methods. Equipment and processes for edible oil extraction- comparison of traditional and modern methods. Energy costs, efficiency, yield, shelf life and nutrient content comparisons. Traditional methods of food preservation - sun-drying, osmotic drying, brining, pickling and smoking.

UNIT II **9 Hours**

TRADITIONAL SWEETS, SNACKS AND DAIRY PRODUCTS

Production, formulation, preparation and processing of Indian traditional sweet and snack food products: -Rasgolla, Gulab jamun; formulation and preparation of namkeen, potato chips, banana chips. Acid coagulated and fermented dairy products- paneer, dahi, shrikhand, lassi - processing conditions, defects etc. Fat rich products- Butter, ghee and its processing.

UNIT III **9 Hours**

TRADITIONAL FERMENTED FOOD PRODUCTS

Idli, Soya sauce, fish pickle, dry fish, meat and vegetable fermented products. Various alcohol-based products. Ways to increase nutritional quality of food such as enrichment, fortification, fermentation and mutual supplementation. Best cooking and processing methods to retain nutrients.

UNIT IV **10 Hours**

COMMERCIAL PRODUCTION OF TRADITIONAL FOODS

Commercial production of traditional breads, snacks, ready-to-eat foods and instant mixes, frozen foods -types marketed, turnover; role of SHGs, SMES industries, national and multinational companies; commercial production and packaging of traditional beverages such as tender coconut water, neera, lassi, buttermilk, dahi. Commercial production of intermediate foods - ginger and garlic pastes, tamarind pastes, masalas (spice mixes), idly and dosa batters

UNIT V **8 Hours**

HEALTH ASPECTS OF TRADIONAL FOODS

Comparison of traditional foods with typical fast foods / junk foods - cost, food safety, nutrient composition, bioactive components; energy and environmental costs of traditional foods; traditional foods used for specific ailments /illnesses.

Total: 45 Hours

Reference(s)

1. Sen and Colleen Taylor, Food Culture in India, Greenwood Press, 2005.
2. Davidar, Ruth N. "Indian Food Science: A Health and Nutrition Guide to Traditional Recipes:" East West Books, 2001.
3. Steinkrus.K.H. Handbook of Indigenous Fermented Foods, CRC press, 1995.
4. Aneja. R.P, Mathur.BN, R.C. Chandan,and Banerjee.A.K. Technology of Indian Milk Products. Dairy India Year Book, 2009.

21OFD02 FOOD LAWS AND REGULATIONS

3 0 0 3

Course Objectives

- Introduce the concept of food hygiene, importance of safe food and laws governing it.
- Learn common causes of food borne illness - viz. physical, chemical and biological and identification through food analysis.
- Understand food inspection procedures employed in maintaining food quality.

Programme Outcomes (POs)

PO1.Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2.Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3.Design/ Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO6.The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7.Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8.Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

Course Outcomes (COs)

1. Analyse the food safety strategies and nutritional quality of the food.
2. Check the food regulatory mechanism and mandatory laws for food products.
3. Determine the national and international regulatory agencies.
4. Understand and apply the voluntary regulatory standards.
5. Assess the implementation of food safety for a food processing industry.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	1	2	1											
2		1				1	2	1						
3		1												
4	1	2												
5	1	2												

UNIT I **10 Hours**

INTRODUCTION

Introduction, concept of food safety and standards, food safety strategies. Food hazards and contaminations - biological (bacteria, viruses and parasites), chemical (toxic constituents / hazardous materials) pesticides residues / environmental pollution / chemicals) and physical hazards. Preventive food safety systems - monitoring of safety, wholesomeness and nutritional quality of food. Prevention and control of physical, chemical and microbiological hazards. Principles of food safety - Establishment: design and facilities - emergency preparedness - Maintenance cleaning and sanitation - personal hygiene - packaging and labelling - transportation - traceability - recall procedure - visitor policy. Adulteration: Intentional and unintentional - Preservatives - antioxidants, sweeteners, flavours, colours, vitamins, stabilizers - indirect additives - organic resides - inorganic residues and contaminants.

UNIT II **10 Hours**

FOOD LAWS

Indian and Food Regulatory Regime (Existing and new), PFA Act and Rules, Food Safety and Quality Requirements, Additives, Contaminants and Pesticide Residue. Food Safety and Standards Act, 2006, FSSAI roles and responsibilities, Essential Commodities Act, 1955, Global Scenario, Codex Alimentarius, WHO/FAO Expert Bodies (JECFA/ JEMRA/JMPR) WHO/FAO Expert Bodies (JECFA/ JEMRA/JMPR). Food safety inspection services (FSIS) and their utilization.

UNIT III **10 Hours**

REGULATIONS

Introduction to OIE & IPPC, Other International Food Standards (e.g. European Commission, USFDA etc). WTO: Introduction to WTO Agreements: SPS and TBT Agreement, Export & Import Laws and Regulations, Export (Quality Control and Inspection) Act, 1963. Role of Agricultural and Processed Food Products Export Development Authority (APEDA), Customs Act and Import Control Regulations, Other Voluntary and mandatory product specific regulations, Other Voluntary National Food Standards: BIS Other product specific standards; AGMARK. Nutritional Labelling, Health claims.

UNIT IV **10 Hours**

STANDARDS

Voluntary Quality Standards and Certification GMP, GHP, HACCP, GAP, Good Animal Husbandry Practices, Good Aquaculture Practices ISO 9000, ISO 22000, ISO 14000, ISO 17025, PAS 22000, FSSC 22000, BRC, BRCIOP, IFS, SQF 1000, SQF 2000. Role of NABL,CFLS.

UNIT V **5 Hours**

IMPLEMENTATION AND RISK ASSESSMENT

Implementation of food safety for a desired food processing industry. Risk assessment studies: Risk management, risk characterization and communication.

Total: 45 Hours

Reference(s)

1. Singal RS (1997). Handbook of indices of food quality and authenticity. Woodhead Publ. Cambridge, UK.
2. Shapton DA (1994). Principles and practices of safe processing of foods. Butterworth Publication, London. Winton AL (1999) Techniques of food analysis, Allied Science Publications New Delhi.
3. Pomeranze Y (2004). Food analysis - Theory and Practice CBS Publications, New Delhi.
4. Jacob MB (1999). The chemical analysis of foods and food products. CBS Publ. New Delhi.

21OFD03 POST HARVEST TECHNOLOGY OF FRUITS AND VEGETABLES

3 0 0 3

Course Objectives

- To understand the importance and different methods of post-harvest handling and storage of fruits and vegetables.
- To gain knowledge on different preservation methods of fruits and vegetables.
- To familiarize with the value-added products from fruits and vegetables.

Programme Outcomes (POs)

PO1.Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2.Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3.Design/ Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4.Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO7.Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

Course Outcomes (COs)

1. Implement the different post-harvest handling practices for the storage of fruits and vegetables.
2. Analyse the suitable preservation method (sugar, salt or dehydration) to produce value added products from fruits and vegetables.
3. Evaluate the requirement of low temperature and irradiation methods to preserve specific fruits and vegetables.
4. Apply the concentration and fermentation methods to preserve fruits and vegetables.
5. Implement the canning method to preserve fruits and vegetables.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	1	1	2	1			1							
2	1	1												
3	1	2												
4	1		1											
5	2	1	1											

UNIT I **9 Hours**

POST-HARVEST PRACTICES AND PROCESSING

Maturity indices for harvesting; pathological spoilage's during storage, ripening and control measures, post-harvest handling, sorting & grading, packaging, storage, transportation, Methods of pre-cooling, post-harvest treatments to hasten and delay ripening; Methods of storage at farm level - cold storage, controlled/modified atmosphere storage, Quality management, export requirements, Nutritive value, nutraceutical properties.

UNIT II **9 Hours**

PRESERVATION AND VALUE ADDITION

General principles and methods of fruit and vegetable preservation. Preservation using sugar: Principle and Preparation of jam, jelly, marmalade, squash, RTS, carbonated beverages, crush, nectar, cordial, fruit bar, preserves, candies and carbonated fruit beverages. Processing using salt: Principle - Brining - Preparation of pickles, chutney and sauces, ketchup.

UNIT III **9 Hours**

PRESERVATION BY LOW TEMPERATURE AND IRRADIATION

Preservation by low temperature: definition, principle, methods - Refrigeration, freezing. Methods of freezing- changes during freezing. Preparation of frozen foods. Minimal Processing of Fruits and Vegetables - techniques involved - Preservation by irradiation: definition- principle, application, irradiation unit.

UNIT IV **9 Hours**

PRESERVATION BY DRYING

Machineries involved in processing of fruits and vegetables products. Drying and dehydration: definition, principle, Types of driers: Solar, cabinet, spray drier, drum drier, fluidized bed drier. Preparation of product for dehydration. Dehydration principles and equipment. Preparation of fruits - powder production. Problems related to storage of dehydrated products.

UNIT V **9 Hours**

PRESERVATION BY CANNING

Canning: principles, Types of cans, packing of canned products-preparation of canned products - general considerations in establishing a commercial fruit and vegetable cannery, machineries involved in canning and bottling unit- spoilage of canned foods. Bottling of fruit and vegetable. Precautions in canning operations.

Total: 45 Hours

Reference(s)

1. S. Ranganna, Hand Book of Analysis and Quality Control for Fruit and Vegetable Products, McGraw Hill Education (India) Private Limited, Chennai, 2017.
2. N.W. Desrosier, the Technology of Food Preservation, CBS Publisher & Distributions, New Delhi, 1987.
3. R.P. Srivastava and S. Kumar, Fruit and Vegetable Preservation: Principles and Practices, Second Edition, International Book Distribution Co., Lucknow, 1998.
4. G. Lal, G. Siddappa and G.L. Tondon, Preservation of Fruits and Vegetables, Indian Council of Agricultural Research, New Delhi, 1986.
5. Chakraverty, A.S. Mujumdar, G.S.V. Raghavan and H.S. Ramaswamy, Handbook of Post-harvest Technology, Marcel Dekker Press, USA, 2001.
6. D.K. Salunkhe, and S.S. Kadam, Handbook of Fruit Science and Technology: Production, Composition and Processing, Marcel Dekker, New York, 1995.

21OFD04 CEREAL, PULSES AND OIL SEED TECHNOLOGY

3 0 0 3

Course Objectives

- Understand the application of scientific principles in the processing technologies specific to the materials.
- Understand the storage methods and handling techniques followed for cereals, pulses and oil seeds.
- Develop the knowledge in the area of Cereals, pulses and oil seed processing and technology.

Programme Outcomes (POs)

PO1.Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2.Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO4.Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO6.The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PSO2. Practical and research training imparted to the students will pave the way for introducing novel technologies in food processing sectors for global sustenance.

Course Outcomes (COs)

1. Identify the specific processing technologies employed for cereals.
2. Analyse the composition of millets and their nutritional importance.
3. Relate the compositional changes and processing methods of pulses and legumes.
4. Create the competence in processing of oilseeds technology.
5. Relate the storage processing of food grains with quality aspects.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2		2		2								
2	1	2		2		1								
3	2	2		1		2								
4	2	3		2		2								2
5	2	2		2		3								

UNIT I **9 Hours**

CEREALS

Cereal Grains- Basic agricultural aspects, structure and composition; Storage, Insect control; Processing: Wheat- milling, (Atta and Maida), quality aspects of flour, wheat proteins and their function, rheology of flour; wheat based baked products - Bread, Biscuit, Cakes, Extruded products, Pizza, Chapatis, malting and malt products; Rice-Milling, Parboiling, Quick cooking rice, Traditional Indian Products- Puffed Rice, flaked rice, Idli/Dosa/vada mixes and other savouries; Corn- Wet and dry milling, Corn Products - Corn flakes, Corn starch, canned corn products, puffed product; Oats-Milling, Oat Products - Steel cut, rolled oats, quick cooking; Traditional and Fermented cereal products.

UNIT II **9 Hours**

OTHER CEREALS AND MILLETS

Sorghum, Pearl Millet, Finger millet, Foxtail Kodo Millet - Basic agricultural millet, aspects, structure and composition; storage, insect control; processing - pearling, Milling, Malting, Malt based foods, flaked and fermented products; Traditional and Nutritional products based on finger millet.

UNIT III **9 Hours**

PULSES AND LEGUMES

Basic agricultural aspects, structure, composition, storage, insect control, processing Milling/splitting, dhal milling, products - puffed, flakes, flour, legume-based traditional products, flour based Indian sweets and savouries, soya milk, soy protein Isolate, soya paneer

UNIT IV **9 Hours**

OIL SEEDS AND NUTS

Basic agricultural aspects structure, composition, Storage, Insect control; processing: traditional and modern methods of oil extraction, refining, bleaching, deodorizing, hydrogenation; oil blends; applications of different oils and fats in food processing & products.

UNIT V **9 Hours**

STORAGE AND HANDLING

Bag Storage - Advantages and Disadvantages, Cover Plinth Storage Structures, CAP storage (Cover and Plinth Storage). Protection against Rodents, Fungi, Pests and Mites. Fumigation Processes for bag storage piles. Bulk Storage in silos and large Bins. Conveyors and Elevators for feeding and discharging.

Total: 45 Hours

Reference(s)

1. Chakraverty, A.: Post Harvest Technology of Cereals, Pulses and Oilseeds. Oxford and IBH Publishing Co, Calcutta, 1995.
2. Delcour, Jan A. and R. Carl Hoseney., Principles of Cereal Science and Technology, 3rd Edition, American Association of Cereal Chemists, 2010.
3. Karl Kulp, Handbook of Cereal Science and Technology, 2nd Rev. Edition, CRC Press, 2000.
4. N.L.Kent and A.D.Evans, Technology of Cereals (4th Edition) Elsevier Science (Pergaman),Oxford, UK, 1994.
5. Matz, Samuel A., The Chemistry and Technology of Cereals as Food and Feed, 2ndEdition, CBS, 1996.
6. Morris, Peter C. and J.H. Bryce., Cereal Biotechnology, CRC/Wood head publishing, 2004.

21OPH01 NANOMATERIALS SCIENCE 3 0 0 3

Course Objectives

- Impart knowledge on Nanoscience.
- Explore different techniques of producing nanomaterials.
- Create expertise on the applications of nanomaterials in various fields.

Programme Outcomes (POs)

PO1.Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2.Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

Course Outcomes (COs)

1. Summarize the origin and advance of nanomaterials and its classification.
2. Compare the different types of methods adopted for synthesizing nanomaterials.
3. Analyse the characterization techniques for analysing nanomaterials.
4. Explain the physical properties exhibited by nanomaterials.
5. Organize the nanomaterials developed for advanced technological applications.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	1	1												
2	2	2												
3	3	1												
4	1	1												
5	2	3												

UNIT I **9 Hours**

NANO SCALE MATERIALS

Introduction-Feynman's vision-national nanotechnology initiative (NNI) - past, present, future - classification of nanostructures, nanoscale architecture - effects of the nanometer length scale - changes to the system total energy, and the system structures- effect of nanoscale dimensions on various properties -differences between bulk and nanomaterials and their physical properties.

UNIT II **9 Hours**

NANOMATERIALS SYNTHESIS METHODS

Top-down processes - mechanical milling, nanolithography and types based on radiations - Bottom-up process physical method: physical vapour deposition, RF sputtering, CVD- chemical method: colloidal and sol-gel methods - template based growth of nanomaterials - ordering of nanosystems, self-assembly and self-organization.

UNIT III **9 Hours**

CHARACTERIZATION TECHNIQUES

General classification of characterization methods - analytical and imaging techniques - microscopy techniques - electron microscopy, scanning electron microscopy, transmission electron microscopy, atomic force microscopy - diffraction techniques - X-ray spectroscopy - thermogravimetric analysis of nanomaterials.

UNIT IV **9 Hours**

SEMICONDUCTOR NANOSTRUCTURES

Quantum confinement in semiconductor nanostructures - quantum wells, quantum wires, quantum dots, super lattices-epitaxial growth of nanostructures-MBE, metal organic VPE, LPE - carbon nano tubes-structure, synthesis and electrical properties -applications- quantum well laser- quantum efficiency of semiconductor nanomaterials.

UNIT V **9 Hours**

NANOMACHINES AND NANODEVICES

Microelectromechanical systems (MEMS) and Nanoelectromechanical systems (NEMS)-fabrication, actuators-organic FET- principle, description, requirements, integrated circuits- single electron transistor - - organic photovoltaic cells- spintronics

Total: 45 Hours

Reference(s)

1. Willam A. Goddard, Donald W.Brenner, "Handbook of Nanoscience, Engineering, and Technology", CRC Press, 2012.
2. Charles P. Poole Jr and. Frank J. Owens, "Introduction to Nanotechnology", Wiley Interscience, 2007.
3. Guozhong Cao, Y. Wang, "Nanostructures and Nanomaterials-Synthesis, Properties & Applications", Imperials College Press, 2011.
4. T. Pradeep, "NANO: The Essentials Understanding Nanoscience and Nanotechnology", McGraw - Hill Education (India) Ltd, 2012.
5. Robert W. Kelsall, Ian W. Hamley, Mark Geoghegan, "Nanoscale Science and Technology", John Wiley and Sons Ltd, 2006.
6. Viswanathan B, AuliceScibioh M, "Fuel cells: Principles and Applications", University Press, 2009.

21OPH02 SEMICONDUCTOR PHYSICS AND DEVICES 3 0 0 3

Course Objectives

- Impart knowledge in physical properties of semiconducting materials.
- Analyse the factors affecting the operation of semiconductor devices.
- Apply the physics of semiconductors to develop semiconductor devices.

Programme Outcomes (POs)

PO1.Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2.Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

Course Outcomes (COs)

1. Exemplify the band gap, drift and diffusion current densities due to carrier transport in semiconductors.
2. Analyse the energy band diagram in thermal equilibrium and space charge width of PN junction.
3. Illustrate the operation of Bipolar Junction transistor at different modes and different configurations.
4. Illustrate the operation of metal oxide field effect transistor and their memory devices.
5. Represent the working mechanism of opto-electronic devices.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	1												
2	2	1												
3	2	1												
4	2	1												
5	2	1												

UNIT I **9 Hours**

ENERGY BANDS AND CARRIER TRANSPORT PROPERTIES

Energy Bands: Formation of energy bands - doping effects - energy levels - electron and hole concept in semiconductor. Carrier transport: Carrier drift-drift current density - conductivity- diffusion current density - total current density

UNIT II **9 Hours**

P-N JUNCTION

Basic structure and fabrication process of p-n junction - current - voltage characteristics - energy band diagram - equilibrium Fermi levels - depletion region - junction breakdown phenomena - Zener - avalanche breakdown.

UNIT III **9 Hours**

BIPOLAR JUNCTION TRANSISTOR

The basic transistor action - operation in the active mode - current gain - static characteristics - carrier distribution in emitter, base and collector region - modes of operation - current - voltage characteristics of common base and emitter configuration - frequency response and switching of bipolar transistor.

UNIT IV **9 Hours**

MOSFET

The ideal MOS diode - basic fundamentals and characteristics - types - CMOS and BiCMOS - CMOS inverter - MOSFET on insulator - thin film transistor (TFT) - silicon on insulators (SOI) devices - MOS Memory structures - DRAM and SRAM

UNIT V **9 Hours**

PHOTONIC DEVICES

Radiative transitions and optical absorption-light emitting diodes-organic LED - infrared LED - semiconductor laser - temperature effect - photo detector - photo diode - silicon and compound semiconductor solar cells - efficiency

Total: 45 Hours

Reference(s)

1. Donald A Neamen, "Semiconductor Physics and Devices", Tata McGraw Hill, 2012.
2. S. M. Sze and M. K. Lee, "Semiconductor Devices, Physics and Technology", John-Wiley & Sons, 2015.
3. Ben. G. Streetman and S. K. Banerjee, "Solid State Electronic Devices", Pearson Education Ltd, 2015.
4. C. Kittel, "Introduction to Solid State Physics", John-Wiley & Sons, 2012.
5. J. Millman and C. Halkias, "Electronic Devices and Circuits", Tata McGraw Hill, 2010.
6. Hagen Klauk, "Organic Electronics: Materials, Manufacturing and Applications", Wiley-VCH, 2006.

21OPH03 APPLIED LASER SCIENCE 3 0 0 3

Course Objectives

- Impart knowledge on laser science.
- Explore different strategies for producing lasers.
- Create expertise on the applications of lasers in various fields.

Programme Outcomes (POs)

PO1.Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2.Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

Course Outcomes (COs)

1. Illustrate the transition mechanisms and the components of a laser system.
2. Compare the different types of lasers based on pumping method, active medium and energy levels.
3. Compute the rotation of earth, velocity and distance using lasers and apply the same for day today applications.
4. Analyse the role of lasers in surgical and endoscopy applications.
5. Apply the laser techniques in industrial applications.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	1												
2	1	2												
3	2	1												
4	2	1												
5	1	2												

UNIT I **9 Hours**

LASER FUNDAMENTALS

Introduction - principle - absorption and emission of light - thermal equilibrium - Einstein's prediction - Einstein's relations - A and B coefficients - condition for large stimulated emission - spontaneous and stimulated emission in optical region - light amplification - condition for light amplification - population inversion- Components of lasers - pumping methods - pumping mechanisms - optical resonator.

UNIT II **9 Hours**

LASER BEAM CHARACTERISTICS AND TYPES

Characteristics of laser - Classification of lasers - principle, construction, working, energy level diagram and applications of molecular gas laser (CO2 laser) - liquid laser (dye laser) - excimer laser - Solid state laser (Nd: YAG laser) - semiconductor laser (homojunction laser).

UNIT III **9 Hours**

LASERS IN SCIENCE

Introduction - Harmonic generation (SHG) - Stimulated Raman emission - lasers in chemistry - laser in nuclear energy - lasers and gravitational waves - rotation of the earth - measurement of distance - Light detection And Ranging (LIDER) - velocity measurement – holography.

UNIT IV **9 Hours**

LASERS IN MEDICINE AND SURGERY

Light induced biological hazards: Eye and skin - Eye laser surgery - photocoagulations - homeostasis - dentistry - laser angioplasty - different laser therapies - advantages & disadvantages - laser endoscopy.

UNIT V **9 Hours**

LASERS IN INDUSTRY

Applications in material processing: laser welding - hole drilling - laser cutting - Lasers in electronics industry: information storage - bar code scanner- Lasers in defence: laser based military weapons - laser walls.

Total: 45 Hours

Reference(s)

1. K. Thiyagarajan and A. K. Ghatak, "LASERS: Fundamentals and Applications", Springer, USA, 2015.
2. M. N. Avadhanulu, "An Introduction to Lasers Theory and Applications", S. Chand Publisher, 2013.
3. W. Koechner, M. Bass, "Solid State Lasers: a graduate text", Springer Verlag, New York, 2006.
4. K. P. R. Nair, "Atoms, Molecules and Lasers", Narosa Publishing House, 2009.
5. K. R. Nambiar, "Lasers: Principles Types and Applications", New Age International Publications, 2006.
6. A. Sennaroglu, "Solid-State Lasers and Applications", CRC Press, 2006.

21OPH04 BIO-PHOTONICS **3 0 0 3**

Course Objective:

- To understand the light-matter interaction in biological cells or tissues by using the principles of optics and lasers.
- To apply the properties of biological cells or tissues in biomedical applications by various optical imaging, sensing and activation techniques.
- To analyze the concepts of Modern optical measurement techniques and devices in early detection of disease and cure them.

Programme Outcomes (POs)

PO1.Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2.Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO9.Individual and Teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

Course Outcomes (COs)

1. Infer the laws of optics and lasers to interpret the biological cells and tissues.
2. Identify the properties of different optical instruments in biological systems to represent their behavior in structure and design of detection engineering instruments.
3. Use laser tweezers techniques to infer the activities of cells (tissues) and explain the single molecule detection processes in medical diagnosis.
4. Outline the properties of ultra-short laser pulses and tissue engineering to rectify the affecting factors in biological cells.
5. Compare the various types of bio-imaging methods to detect the infected cells and molecules in biological science.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2												
2	3	2												
3	3	2							3					
4	3	2							3					
5	3	2												

UNIT I **9 Hours**

INTRODUCTION TO BIOPHOTONICS

Light as Photon Particles – Coherence of light - lasers – classification of lasers – Mechanisms of Non-linear Optics (NLO) processes associated with Biophotonics - Light scattering mechanisms: Rayleigh scattering, Miescattering, Brillouin Scattering, Raman Scattering -Different light sources – Quantitative description of light: Radiometry

UNIT II **9 Hours**

PHOTOBIOLOGY

Interaction of light with cells and tissues – Light – Tissue Interaction Variables – Light –Tissue Interaction Theory: Radiative Transport Theory – Photo process in biopolymers – In Vivo Photoexcitation – photo-induced physical, chemical, thermal and mechanical effects in biological systems – Optical biopsy – Single molecule detection

UNIT III **9 Hours**

BIO-NANO-PHOTONICS

Laser Microtools, Semiconductor quantum dots for bioimaging, Metallic nanoparticles and nanorods for biosensing – Optical biosensors: Fibre-Optic, evanescent wave, surface Plasmon resonance (SPR) based biosensors – biomaterials for photonics – Principle and design of laser tweezers – laser trapping and dissection for biological manipulation.

UNIT IV **9 Hours**

TISSUE ENGINEERING WITH LIGHT

Basics of tissue optics: Light absorption and scattering in tissues, Wavelength effects and spectra– the therapeutic window, Light penetration in tissues – Absorbing agents in tissues and blood –Skin optics, response to the UV radiation, Optical parameters of tissues – tissue welding – tissue contouring – tissue regeneration – Femto laser surgery – low level light therapy and photo dynamic therapy

UNIT V **9 Hours**

BIO-IMAGING TECHNIQUES AND ITS APPLICATIONS

An overview of optical imaging – Fluorescence Microscopy – Scanning Microscopy – In vivo Confocal Microscopy – Multi photon Microscopy – Optical Coherence Tomography (OCT) – Fluorescence Resonance Energy Transfer (FRET) imaging – fluorescence lifetime imaging Microscopy (FLIM) – Nonlinear optical imaging – Coherent Anti-stokes Raman Scattering –Bioimaging Applications.

Total: 45 Hours

Reference(s)

1. Introduction to Biophotonics, Paras N. Prasad, Wiley Inter-science, A John Wiley & Sons, Inc., Publication (Class notes are developed mainly based on this book.)
2. Introduction to Biomedical Imaging, Andrew G. Webb, 2002, IEEE Press.
3. Biomedical Optics: Principles and Imaging, Lihong.V.Wang, Hsin.-I. Wu, 2007, Wiley Interscience 2007. & "An Introduction to Biomedical Optics", R. Splinter and B.A.Hooper, Taylor & Francis.
4. Bioimaging Current Concepts in Light and Electron Microscopy, Douglas E. Chandler & Robert W.Roberson, Jones and Bartlett publishers.
5. Optical Imaging and Microscopy: Techniques and Advanced Systems, Peter Török and Fu-JenKao, 2004, Springer.

21OPH05 PHYSICS OF SOFT MATTER 3 0 0 3

Course Objectives

- To recognize the properties of soft matter and hard matter.
- To understand the fundamental interactions of colloids and gels.
- To explain the structure and phase behaviour of liquid crystals and supramolecules.
- To summarize the soft matter properties of structures and components of life.

Programme Outcomes (POs)

PO1.Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2.Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

Course Outcomes (COs)

1. Identify the salient features of soft matter and hard matter.
2. Exemplify the fundamental interactions and stability of colloids and gels.
3. Illustrate the structure and properties of liquid crystals.
4. Outline the aggregation and phase behaviour of surfactants, polymers, copolymers and block copolymers.
5. Analyse the soft matter behaviour of nucleic acids, proteins, polysaccharides and membranes.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	1												
2	2	1												
3	2	2												
4	2	2												
5	2	2												

UNIT I **9 Hours**

CONDENSED MATTER

Intermolecular forces-Condensation and freezing-mechanical response: Hookean solid-Newtonian liquid-viscoelasticity. Glasses: relaxation time-viscosity- glass forming liquids. Soft matter: length scales-fluctuations and Brownian motion.

UNIT II **9 Hours**

COLLOIDAL DISPERSIONS & GELS

Forces between colloidal particles: Vander Waals forces-electrostatic double layer forces-steric hindrance-depletion interactions. Stability and phase behaviour: Crystallisation-strong colloids-weak colloids. Physical and chemical gels-classical theory of gelation-elasticity of gels.

UNIT III **9 Hours**

LIQUID CRYSTALS

Liquid crystal phases-distortions and topological defects-electrical and magnetic properties-polymer liquid crystals-Fredricks transition and liquid crystal displays.

UNIT IV **9 Hours**

SUPRAMOLECULAR SELF ASSEMBLY

Aggregation and phase separation-types of micelles- bilayers and vesicles. Phase behaviour of concentrated surfactant solutions-phase separation in polymers, copolymers and block copolymers.

UNIT V **9 Hours**

SOFT MATTER IN NATURE

Components and structures of life-Nucleic acids-proteins-interaction between proteins-Polysaccharides-membranes.

Total: 45 Hours

References

1. Richard A L Jones, Soft Condensed Matter, Oxford University Press, UK, 2002.
2. Masao Doi, Soft Matter Physics, Oxford University Press, UK, 2013.
3. Ian W. Hamley, Introduction to Soft Matter, John Wiley & Sons, 2007.
4. A. Fernandez-Nieves, A M Puertas, Fluids, Colloids and Soft materials: An Introduction to Soft Matter Physics, John Wiley & Sons, 2016.
5. Maurice Kleman, Oleg D. Lavrentovich, Soft Matter Physics: An Introduction, Springer-Verlag, New York, 2003.

21OCH01 CORROSION SCIENCE AND ENGINEERING

3 0 0 3

Course Objectives

- Analyse the loss incurred due to corrosion in different sectors and terminologies related to corrosion.
- Identify forms and types of corrosion with suitable mechanism.
- Apply various methods of corrosion control, corrosion testing and monitoring.

Programme Outcomes (POs)

PO1.Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2.Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO7.Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

Course Outcomes (COs)

1. Explain if corrosion can occur under specific operating conditions in a given equipment or construction and indicate regions of immunity, corrosion and passivity of a metal.
2. Compare different corrosion types on metals when exposed to air, water and at high temperatures (> 100 C).
3. Identify the corrosion mechanism on steel, iron, zinc and copper metal surfaces.
4. Calculate the rate of corrosion on metals using electrochemical methods of testing.
5. Propose the correct materials, design and operation conditions to reduce the likelihood of corrosion in new equipment and constructions.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	1												
2	2						1							
3	1	3												
4	2	2												
5	3	3					1							

UNIT I **9 Hours**

CORROSION

Importance of corrosion - spontaneity of corrosion - units of corrosion rate (MDD and MPY) - direct and indirect damage by corrosion - importance of corrosion prevention in industries - Pilling Bedworth ratio and its significance - passivation - area relationship in both active and passive states of metals - Pourbaix diagrams of Mg, Al and Fe and their advantages and disadvantages.

UNIT II **7 Hours**

TYPES OF CORROSION

Eight forms of corrosion: uniform, galvanic, crevice corrosion, pitting, intergranular corrosion, selective leaching, erosion corrosion and stress corrosion-Catastrophic oxidation corrosion.

UNIT III **9 Hours**

MECHANISM OF CORROSION

Hydrogen embrittlement - corrosion fatigue - filiform corrosion - fretting damage and microbes induced corrosion. Corrosion mechanism on steel, iron, zinc and copper metal surfaces.

UNIT IV **10 Hours**

CORROSION RATE AND ITS ESTIMATION

Rate of corrosion: Factors affecting corrosion. Electrochemical methods of polarization: Tafel extrapolation polarization and linear polarization. Weight loss method - testing for intergranular susceptibility and stress corrosion. Non-destructive testing methods: Visual testing - liquid penetrant testing - magnetic particle testing - Ultrasonic monitoring, and eddy current testing.

UNIT V **10 Hours**

CORROSION CONTROL METHODS

Fundamentals of cathodic protection - types of cathodic protection (sacrificial anodic and impressed current cathodic protection). Stray current corrosion, problems and its prevention. Protective coatings: Metal coatings: Hot dipping (galvanizing, tinning and metal cladding) - natural inhibitors. Selection of suitable design for corrosion control.

Total: 45 Hours

Reference(s)

1. Mouafak A. Zaher, "Introduction to Corrosion Engineering", CreateSpace Independent Publishing Platform, 2016.
2. E. McCafferty, "Introduction to Corrosion Science", Springer; 2010 Edition, January 2010.
3. R. Winstone Revie and Herbert H. Uhlig, "Corrosion and Corrosion Control: An Introduction to Corrosion Science and Engineering", 4th Edition, John Wiley & Science, 2008.
4. Mars G. Fontana, "Corrosion Engineering", Tata McGraw Hill, Singapore, 2008.
5. David E.J. Talbot (Author), James D.R. Talbot, "Corrosion Science and Technology", Second Edition (Materials Science & Technology), CRC Press; 2nd Edition, 2007.
6. http://corrosion-doctors.org/Corrosion-History/Eight.html.

21OCH02 POLYMER SCIENCE 3 0 0 3

Course Objectives

- Explain the properties of different polymers with its mechanism.
- Select the appropriate polymerization techniques to synthesize the polymers.
- Identify suitable polymers for various industrial applications.

Programme Outcomes (POs)

PO1.Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2.Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3.Design/ Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

Course Outcomes (COs)

1. Illustrate the types of mechanism of polymerization reactions and analyze the natural and synthetic polymers.
2. Identify the suitable polymerization techniques to synthesize the high-quality polymers.
3. Identify the structure, thermal, and mechanical properties of polymers for different applications.
4. Apply the polymer processing methods to design polymer products.
5. Analyze the polymers used in electronic and biomedical applications.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	1												
2	1	2												
3	2	2												
4	1	1	2											
5	1	3	2											

UNIT I **10 Hours**

POLYMERS AND ELASTOMERS

Classification of polymers - Mechanism: Addition polymerization - free radical, cationic, anionic and co-ordination (Ziegler-Natta) polymerization - copolymerization - condensation polymerization (nylon-6,6) -ring opening polymerization (nylon-6). Elastomers: Natural rubber and synthetic rubber: styrene -butadiene rubber (SBR), butyl, neoprene, thiocol rubbers. High performance polymers: polyethers, polyether ether ketone (PEEK), polysulphones and polyimides.

UNIT II **8 Hours**

POLYMERIZATION TECHNIQUES

Homogeneous and heterogeneous polymerization - bulk polymerization (PMMA, PVC) - solution polymerization - polyacrylic acid, suspension polymerization (ion-exchange resins) - emulsion polymerization (SBR) - advantages and disadvantages of bulk and emulsion polymerization. Melt solution and interfacial poly-condensation.

UNIT III **8 Hours**

CHARACTERIZATION AND TESTING

Characterization of polymers by Infrared Spectroscopy (IR) and Nuclear Magnetic Spectroscopy (NMR) - Thermal properties: TGA and DSC - Testing tensile strength - Izod impact - Compressive strength - Rockwell hardness - Vicot softening point - water absorption.

UNIT IV **9 Hours**

POLYMER PROCESSING

Moulding: Compression - injection - extrusion and blow mouldings. Film casting - calendaring. Thermoforming and vacuum formed polystyrene - foamed polyurethanes. Fibre spinning: melt, dry and wet spinning. Fibre reinforced plastics fabrication: hand-layup - filament winding and pultrusion

UNIT V **10 Hours**

SPECIALITY POLYMERS

Preparation and properties of heat resistant and flame-retardant polymers. Polymers for electronic applications: liquid crystalline, conducting and photosensitive polymers – E-waste management. Polymer for biomedical applications: artificial organs, controlled drug delivery, Scaffolds in tissue Engineering –waste management.

Total: 45 Hours

Reference(s)

1. V. R. Gowarikar, N. V. Viswanathan and Jayadev Sreedhar, "Polymer Science", New Age International (P) Ltd., New Delhi, 2021.
2. Joel R. Fried, "Polymer Science and Technology", Prentice Hall of India (P). Ltd., 2014.
3. F. W. Billmeyer,"Text Book of Polymer Science", John Wiley & Sons, New York, 2008.
4. Barbara H. Stuart, "Polymer Analysis", John Wiley & Sons, New York, 2008.
5. George Odian , "Principles of Polymerization", John Wiley & Sons, New York, 2004.
6. R. J. Young and P. A. Lovell, "Introduction to Polymers", CRC Press, New York, 2011.
7. Common Biocompatible Polymeric Materials for Tissue Engineering and Regenerative Medicine (2019), Materials Chemistry and Physics https://doi.org/10.1016/j.

21OCH03 ENERGY STORING DEVICES 3 0 0 3

Course Objectives

- Compare the energy density of commercialized primary and secondary batteries.
- Classify the fuel cells and compare their efficiency in different environmental conditions.
- Demonstrate the various energy storage devices and fuel cells.

Programme Outcomes (POs)

PO1.Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2.Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO7.Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

Course Outcomes (COs)

1. Find the parameters required for operation of a cell to evaluate the capacity of energy storage devices.
2. Identify the electrodes, electrolyte and cell reactions of different types of primary, secondary batteries and infer the selection criteria for commercial battery systems with respect to commercial applications.
3. Differentiate fuel cells based on its construction, production of current and applications.
4. Compare different methods of storing hydrogen fuel and its environmental applications.
5. Classify the solar cell based on the materials used in it.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	1												
2	2	3					1							
3	3	1												
4	2	2					1							
5	3	3					1							

UNIT I **6 Hours**

BASICS OF CELLS AND BATTERIES

Components - classification - operation of a cell - theoretical cell voltage - capacity - specific energy - energy density of lithium and lead acid battery - charge efficiency- charge rate - charge retention - closed circuit voltage - open circuit voltage current density - cycle life - discharge rate-over charge-over discharge.

UNIT II **10 Hours**

BATTERIES FOR PORTABLE DEVICES AND ELECTRIC VEHICLES

Primary batteries: zinc-carbon - magnesium, and mercuric oxide - recycling/safe disposal of used cells. Secondary batteries: lead acid - nickel-cadmium - lithium-ion batteries - rechargeable zinc alkaline battery. Reserve batteries: Zinc-silver oxide - lithium anode cell - photo galvanic cells. Battery specifications for cars and automobiles. Extraction of metals from battery materials.

UNIT III **10 Hours**

TYPES OF FUEL CELLS

Importance and classification of fuel cells: Description, working principle, components, applications and environmental aspects of the following types of fuel cells: alkaline fuel cells - phosphoric acid - solid oxide - molten carbonate and direct methanol fuel cells.

UNIT IV **10 Hours**

HYDROGEN AS A FUEL

Sources and production of hydrogen: Electrolysis and photocatalytic water splitting. Methods of hydrogen storage: High pressurized gas - liquid hydrogen type - metal hydride. Hydrogen as engine fuel - features, application of hydrogen technologies in the future – limitations.

UNIT V **9 Hours**

ENERGY AND ENVIRONMENT

Future prospects of renewable energy and efficiency of renewable fuels - economy of hydrogen energy. Solar Cells: First, second, third and fourth generation solar cell - photo biochemical conversion cell.

Total: 45 Hours

Reference(s)

1. N. Eliaz, E. Gileadi, Physical Electrochemistry, Fundamentals, Techniques and Applications, Wiley, 2019.
2. J. Garche, K. Brandt, Electrochemical Power sources: Fundamentals Systems and Applications, Elsevier, 2018.
3. S.P. Jiang, Q. Li, Introduction to Fuel Cells, Springer, 2021.
4. A. Iulianelli, A. Basile, Advances in Hydrogen Production, Storage and Distribution, Elsevier, 2016.
5. M.M. Eboch, The Future of Energy, From Solar Cells to Flying Wind Farms, Capstone, 2020.

21OMA01 GRAPH THEORY AND COMBINATORICS

3 0 0 3

Course Objectives

- This course comprehends the graphs as a modelling and analysis tool in computer science & Engineering.
- It introduces the structures such as graphs & trees and techniques of counting and combinations, which are needed in number theory-based computing and network security studies in Computer Science.

Programme Outcomes (POs)

PO1.Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2.Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

Course Outcomes (COs)

1. Recognize the basic ideas of Graph and its characteristics.
2. Assess the characteristics of trees and its properties.
3. Predict the colouring of graphs and its applications in the respective areas of engineering.
4. Compute the permutations and combinations in the engineering field.
5. Demonstrate the types of generating functions and their applications in engineering.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	1	2													
2	1	3													
3	2	3													
4	2	3													
5	3	3													

UNIT I **9 Hours**

INTRODUCTION

Graphs - Introduction - Isomorphism - Sub graphs - Walks, Paths, Circuits - Connectedness - Components - Euler graphs - Hamiltonian paths and circuits - Trees - Properties of trees - Distance and centers in tree - Rooted and binary trees.

UNIT II **9 Hours**

TREES, CONNECTIVITY

Spanning trees - Fundamental circuits - Spanning trees in a weighted graph - cut sets - Properties of cut set - All cut sets - Fundamental circuits and cut sets - Connectivity and separability - Network flows - 1-Isomorphism - 2-Isomorphism - Combinational and geometric graphs - Planer graphs - Different representation of a planer graph.

UNIT III **9 Hours**

MATRICES, COLOURING AND DIRECTED GRAPH

Chromatic number - Chromatic partitioning - Chromatic polynomial - Matching - Covering - Four colour problem - Directed graphs - Types of directed graphs - Digraphs and binary relations - Directed paths and connectedness - Euler graphs.

UNIT IV **9 Hours**

PERMUTATIONS

Fundamental principles of counting - Permutations and combinations - Binomial theorem - combinations with repetition - Combinatorial numbers - Principle of inclusion and exclusion - Derangements - Arrangements with forbidden positions.

UNIT V **9 Hours**

GENERATING FUNCTIONS

Generating functions - Partitions of integers - Exponential generating function - Summation operator - Recurrence relations - First order and second order - non-homogeneous recurrence relations - Method of generating functions.

Total: 45 Hours

Reference(s)

1. Narsingh Deo, Graph Theory: With Application to Engineering and Computer Science, Prentice Hall of India, 2003.
2. Grimaldi R.P., Discrete and Combinatorial Mathematics: An Applied Introduction, Addison Wesley, 1994.
3. Rosen K.H., Discrete Mathematics and Its Applications, McGraw Hill, 2007.
4. Clark J. & Holton D.A., A First Look at Graph Theory, Allied Publishers, 1995.
5. Mott J.L., Kandel A. & Baker T.P., Discrete Mathematics for Computer Scientists and Mathematicians, Prentice Hall of India, 1996.
6. Liu C.L., Elements of Discrete Mathematics, McGraw Hill, 1985.

21OGE01 PRINCIPLES OF MANAGEMENT 3 0 0 3

Course Objectives

- To develop cognizance about importance of management principles.
- Extract the functions and responsibilities of managers.
- To Study and understand the various HR related activities.
- Learn the application of the theories in an organization.
- Analyze the position of self and company goals towards business.

Programme Outcomes (POs)

PO9.Individual and Teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO11.Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

Course Outcomes (COs)

1. Students will be able to understand the basic concepts of Management.
2. Have some basic knowledge on planning process and its Tools & Techniques.
3. Ability to understand management concept of organizing and staffing.
4. Ability to understand management concept of directing.
5. Ability to understand management concept of controlling.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1									2		3				
2									2		2				
3									2		2				
4									3		2				
5									2		2				

UNIT I **9 Hours**

INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS

Definition of Management Science or Art Manager Vs Entrepreneur-types of managers - Managerial roles and skills Evolution of Management Scientific, Human Relations, System and Contingency approaches Types of Business organization - Sole proprietorship, partnership, Company - public and private sector enterprises - Organization culture and Environment Current Trends and issues in Management.

UNIT II **9 Hours**

PLANNING

Nature and purpose of planning - Planning process - Types of planning – Objectives - Setting objectives - Policies - Planning premises - Strategic Management - Planning Tools and Techniques - Decision making steps and process.

UNIT III **9 Hours**

ORGANISING

Nature and purpose – Formal and informal organization - Organization chart - Organization Structure Types - Line and staff authority - Departmentalization - Delegation of authority - Centralization and decentralization - Job Design - Human Resource - Management - HR Planning, Recruitment, Selection, Training and Development, Performance Management, Career planning and management.

UNIT IV **9 Hours**

DIRECTING

Foundations of individual and group behaviour - Motivation-Motivation theories - Motivational techniques - Job satisfaction - Job enrichment - Leadership-types and theories of leadership - Communication-Process of communication - Barrier in communication Effective Communication-Communication and IT.

UNIT V **9 Hours**

CONTROLLING

System and process of controlling - Budgetary and non-Budgetary control techniques - Use of Computers and IT in Management control - Productivity problems and management - Control and Performance-Direct and preventive control - Reporting.

Total: 45 Hours

Reference(s)

1. Robbins S, Management, (13th ed.), Pearson Education, New Delhi, 2017.
2. Stephen A. Robbins and David A. Decenzo and Mary Coulter, Fundamentals of Management, Pearson Education, 7th Edition, 2011.
3. Robert Kreitner and Mamata Mohapatra, Management, Biztantra, 2008.
4. L. M. Prasad, Principles and Practice of Management. 7th Edition, Sultan Chand & Sons,2007.
5. P. C. Tripathi and P. N. Reddy, Principles of Management, Fourth Edition, Tata McGraw Hill, 2008.

21OGE02 ENTREPRENEURSHIP DEVELOPMENT I 3 0 0 3

Course Objectives

- Learn the basics and scope of the Entrepreneurship.
- Understand the generation of ideas of the Entrepreneurship.
- Evolve the legal aspects of the business.
- Learn to analyze the various business finance.
- Learn the basics of the Operations Management.

Programme Outcomes (POs)

PO6.The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7.Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO9.Individual and Teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

Course Outcomes (COs)

1. Analyze the role of entrepreneurship in economic development.
2. Explain the types of ideas that to be used for entrepreneurship development.
3. Examine the legal aspects of business and its association.
4. Examine the sources of business and its analysis.
5. Analyse the different modes of operation management.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1						1	2		2						
2						1	2		2						
3						1	2		2						
4						1	2		2						
5						1	2		2						

UNIT I **9 Hours**

BASICS OF ENTREPRENEURSHIP

Nature, scope and types of Entrepreneurships, Entrepreneur Personality Characteristics, Entrepreneurship process. Role of entrepreneurship in economic development

UNIT II **9 Hours**

GENERATION OF IDEAS

Creativity and Innovation, Lateral Thinking, Generation of Alternatives, Fractional, Reversal Method, Brain Storming, Analogies.

UNIT III **9 Hours**

LEGAL ASPECTS OF BUSINESS

Contract act-Indian contract act, Essential elements of valid contract, classification of contracts, sale of goods act- Formation of contract of sale, negotiable instruments- promissory note, bills and cheques, partnership, limited liability partnership (LLP), companies act-kinds, formation, memorandum of association, articles of association.

UNIT IV **9 Hours**

BUSINESS FINANCE

Project evaluation and investment criteria (cases), sources of finance, financial statements, break even analysis, cash flow analysis.

UNIT V **9 Hours**

OPERATIONS MANAGEMENT

Importance – functions - deciding on the production system - facility decisions: plant location, plant layout (cases), capacity requirement planning - inventory management (cases) - lean manufacturing, Six sigma.

Total: 45 Hours

Reference(s)

1. Hisrich, Entrepreneurship, Tata McGraw Hill, New Delhi: 2005.
2. Prasanna Chandra, Projects Planning, Analysis, Selection, Implementation and Reviews, Tata McGraw-Hill Publishing Company Limited, New Delhi: 2000.
3. Akhileshwar Pathak, Legal Aspects of Business, Tata McGraw Hill: 2006.

21OGE03 ENTREPRENEURSHIP DEVELOPMENT II 3 0 0 3

Course Objectives

- Evolve the marketing mix for promotion the product / services.
- Handle the human resources and taxation.
- Learn to analyze the taxation.
- Understand the Government industrial policies and supports.
- Preparation of a business plan.

Programme Outcomes (POs)

PO6.The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7.Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO9.Individual and Teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

Course Outcomes (COs)

1. Examine the strategies and plans in marketing management.
2. Analyse the cases involved in human resource management.
3. Classify the direct and indirect taxes in business.
4. Analyze the supports given by government for improving the business.
5. Examine the various steps involved in preparing the business plan.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1						1	2		2						
2						1	2		2						
3						1	2		2						
4						1	2		2						
5						1	2		2						

UNIT I **9 Hours**

MARKETING MANAGEMENT

Marketing environment, Segmentation, Targeting and positioning, Formulating marketing strategies, Marketing research, marketing plan, marketing mix (cases).

UNIT II **9 Hours**

HUMAN RESOURCE MANAGEMENT

Human Resource Planning (Cases), Recruitment, Selection, Training and Development, HRIS, Factories Act 1948 (an over view).

UNIT III **9 Hours**

BUSINESS TAXATION

Direct taxation, Income tax, Corporate tax, MAT, Tax holidays, Wealth tax, Professional tax (Cases). Indirect taxation, Excise duty, Customs, Sales and Service tax, VAT, Octroi, GST (Cases).

UNIT IV **9 Hours**

GOVERNMENT SUPPORT

Industrial policy of Central and State Government, National Institute - NIESBUD, IIE, EDI. State Level Institutions - TIIC, CED, MSME, Financial Institutions.

UNIT V **9 Hours**

BUSINESS PLAN PREPARATION

Purpose of writing a business plan, Capital outlay, Technical feasibility, Production plan, HR plan, Market survey and Marketing plan, Financial plan and Viability, Government approvals, SWOT analysis.

Total: 45 Hours

Reference(s)

1. Hisrich, Entrepreneurship, Tata McGraw Hill, New Delhi: 2005.
2. Philip Kotler., Marketing Management, Prentice Hall of India, New Delhi: 2003.
3. Aswathappa K, Human Resource and Personnel Management - Text and Cases, Tata McGraw Hill: 2007.
4. Jain P C., Handbook for New Entrepreneurs, EDII, Oxford University Press, New Delhi: 2002.
5. Akhileshwar Pathak, Legal Aspects of Business, Tata McGraw Hill: 2006.
6. http://niesbud.nic.in/agencies.html.

21OGE04 NATION BUILDING, LEADERSHIP AND SOCIAL RESPONSIBILITY

3 0 0 3

Course Objectives

- To understand the importance of National Integration, Patriotism and Communal Harmony.
- To outline the basic awareness about the significance of soft skills in professional andinter-personal communications and facilitate an all-round development of personality.
- To analyse the different types of responsibility role of play for the improvement of society.

Programme Outcomes (POs)

PO1.Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO3.Design/ Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO7.Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO12.Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Course Outcomes (COs)

1. Understand religo-cultural diversity of the country and its impact on the lives of the people and their beliefs.
2. Acquire a sense of responsibility, smartness in appearance and improve self-confidence.
3. Develop the sense of self-less social service for better social & community life.
4. Apply the importance of Physical and Mental health and structure of communication organization and various mode of communication.
5. Acquire awareness about the various types of weapon systems in the Armed Forces.

Articulation Matrix

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2		1				1					3			
2	2		2				2					2			
3	2		1				1					2			
4	2		3				3					3			
5	2		1				1					2			

UNIT I **9 Hours**

NATIONAL INTEGRATION

Importance & Necessity, Factors Affecting National Integration, Unity in Diversity. Threats to National Security. Water Conservation and Rain Harvesting, Waste Management and Energy Conservation. Leadership Capsule-Traits-Indicators-Motivation-Moral Values-Honor Code-Case Studies: Shivaji, Jhansiki Rani, Case Studies–APJ Abdul kalam, Deepa Malik, Maharana Pratap, N Narayan Murthy Ratan Tata Rabindra Nath Tagore, role of NCC cadets in 1965 war.

UNIT II **9 Hours**

PERSONALITY DEVELOPMENT AND LEADERSHIP

Intra & Interpersonal skills - Self-Awareness- &Analysis, Empathy, Critical & creative thinking, Decision making and problem solving, Communication skills, Group Discussion – copping with stress and emotions, changing mindset, Public Speaking, Time Management, Social skills, Career counselling, SSB procedure and Interview skills.

UNIT III **9 Hours**

SOCIAL SERVICE, COMMUNITY DEVELOPMENT AND ENVIRONMENTAL AWARENESS

Basics of social service and its need, Types of social service activities, Objectives of rural development programs and its importance, NGO's and their contribution in social welfare, contribution of youth and NCC in Social welfare. Protection of children & women safety, Road/ Rail Travel Safety, New initiatives, Cyber and mobile security awareness. Disaster management Capsule-Organization-Types of Disasters-Essential Services-Assistance-Civil Defence Organization

UNIT IV **9 Hours**

HEALTH, HYGIENE AND COMMUNICATION

Sanitation, First Aid in Common Medical Emergencies. Health, Treatment and Care of Wounds. Yoga-Introduction, Definition, Purpose, Benefits. Asanas-Padamsana, Siddhasana, Gyan Mudra, Surya Namaskar, Shavasana, Vajrasana, Dhanurasana, Chakrasana, Sarvaangasana, Halasana etc.

Obstacle Training Contact: Obstacle training - Intro, Safety measures, Benefits, Straight balance, Clear Jump, Gate Vault, Zig Zag Balance, High Wall etc.

Communication: Basic Radio Telephony (RT) Procedure-Introduction, Advantages, Disadvantages, Need for standard- Procedures-Types of Radio Telephony Communication-Radio telephony procedure, Documentation.

UNIT V **9 Hours**

ARMED FORCES AND NCC GENERAL

Introduction to Digital Signal Processors- Basic Classification-Features TMS320C6713 Architecture-Functional Unit-Pipelining- Addressing Modes -Instruction set Simple Assembly Language Program.

Total: 45 Hours

Reference(s)

1. Director General NCC Website: https://indiancc.nic.in/ncc-general-elective-subject-course-design/.
2. Grooming Tomorrow's Leaders, published by DG, NCC. https://indiancc.nic.in/.
3. Youth in Action, published by DG, NCC. https://indiancc.nic.in/.
4. The Cadet, Annual Journal of the NCC. https://indiancc.nic.in/.
5. Précis Issued by respective Service Headquarters on specialized subject available to PI Staff as reference material. https://indiancc.nic.in/.