DEPARTMENT OF FOOD TECHNOLOGY

Degree: Branch - B. Tech. Food Technology

First Semester							
Code No.	**Course**	**Objectives & Outcomes**		**L**	**T**	**P**	**C**
		PEOs	**POs**				
15MA101	Matrices and Calculus*	I, II	1	3	2	0	4
15PH102	Engineering Physics*	I, II	1	2	0	2	3
15CH103	Environmental Science*	I	1, 4	2	0	2	3
	Language Elective I[#]	II	4, 5	3	0	0	3
15GE105	Basics of Electrical and Electronics Engineering[Δ]	I	1	2	0	2	3
15FD106	Food Biochemistry	I, II	1, 2, 5, 7	3	0	0	3
15GE107	Workshop Practice[Ω]	I	1	0	0	2	1
			Total	**15**	**2**	**8**	**20**
Second Semester							
Code No.	**Course**	**Objectives & Outcomes**		**L**	**T**	**P**	**C**
		PEOs	**POs**				
	Mathematics Elective	I,II	1	3	2	0	4
	Physics elective	I	1	3	0	2	4
	Chemistry Elective	I	1	3	0	2	4
	Language Elective II[#]	II	4, 5	3	0	0	3
15GE205	Basics of Civil and Mechanical Engineering[ξ]	I	1	3	0	0	3
15GE206	Computer Programming[Ψ]	I	1	3	0	2	4
15GE207	Engineering Graphics[◊]	I	1	0	0	4	2.0
			Total	**18**	**2**	**10**	**24**

[*]Common to all branches of B.E./B.Tech
[#]Common to all branches of B.E./B.Tech (Continuous Assessment)
[Δ] Common to AE,AG,AU,CE,ME,MTRS,BT,TT,FD (I Semester) and to CSE,FT,IT (II Semester)
[Ω]Common to AE, AG,AU,ME,MTRS, BT,FT,TT,FD (I Semester) and to CE,CSE,ECE,EEE,EIE,IT (II Semester)
[ξ] Common to CSE, ECE, EEE, EIE, FT, IT (I Semester) and to MTRS, BT, TT, FD (II Semester)

[Ψ] Common to CE (I Semester) and to AE, AG, AU, ME, MTRS, BT, FT, TT, FD (II Semester)
[◊] Common to CE,CSE,ECE,EEE,EIE,IT (I Semester) and to AE, AG,AU,ME,MTRS, BT,FT,TT (II Semester)

ELECTIVES							
Code No	**Course**	**Objectives & Outcomes**		**L**	**T**	**P**	**C**
		PEOs	**POs**				
First Semester							
Language Electives I							
15LE101	Basic English I	III	4	3	0	0	3
15LE102	Communicative English I	III	4	3	0	0	3
Second Semester							
Language Electives II							
15LE201	Basic English II	III	4	3	0	0	3
15LE202	Communicative English II	III	4	3	0	0	3
15LE203G	German	III	4	3	0	0	3
15LE203J	Japanese	III	4	3	0	0	3
15LE203C	Chinese	III	4	3	0	0	3
15LE203F	French	III	4	3	0	0	3
15LE203H	Hindi	III	4	3	0	0	3
Mathematics Electives							
15MA201	Vector Calculus and Complex Analysis	II	1	3	1	0	4
15MA202	Numerical methods	II	1	3	1	0	4
15MA203	Linear Algebra and Complex Variables	II	1	3	1	0	4
15MA204	Analytical geometry and complex analysis	II	1	3	1	0	4
15MA205	Vector Calculus and Complex Variables	II	1	3	1	0	4
Physics Electives							
15PH201	Physics of Materials	II	1, 5	2	0	2	3
15PH202	Applied physics	II	1, 5	2	0	2	3
15PH203	Materials Science	II	1,5	2	0	2	3
15PH204	Physics of Engineering Materials	II	1, 5	2	0	2	3
15PH205	Solid State Physics	II	1, 5	2	0	2	3
Chemistry Electives							
15CH201	Engineering chemistry	II	1	2	0	2	3
15CH202	Applied chemistry	II	1	2	0	2	3
15CH203	Applied electrochemistry	II	1	2	0	2	3
15CH204	Industrial chemistry	II	1	2	0	2	3
15CH205	Water Technology and green chemistry	II	1	2	0	2	3

15MA101 -Matrices, Differential Equations and Calculus
(Common to all Branches)

3 0 2 4

Course Objectives

- Acquire knowledge in matrix theory, a part of linear algebra, which has wider application in engineering.
- To equip students with adequate knowledge of Calculus that will enable them in formulating problems and solving problems analytically.

Course Outcomes (COs)

The student will be able to

1. Explore eigen values and eigenvectors and use them in diagonalisation problems and other applications.
2. Explore the knowledge in solving problems involving ordinary differential equations, partial derivatives and multiple integrals.
3. Analyze the process and form its corresponding mathematical model.

PREREQUISITES: FUNDAMENTALS OF MATRIX OPERATIONS, DIFFERENTIATION AND INTEGRATION.

Unit I

Matrices

Linear Transformation - Eigen values and Eigen vectors of a real matrix - Properties of Eigen values - Cayley–Hamilton theorem, Orthogonal matrices. Quadratic form: Orthogonal Transformation- Reduction of a quadratic form to a canonical form.

9 Hours

Unit II

Differential Equations of First Order

Linear differential equations: Bernoulli's Equation –Newton's law of cooling – Simple electric circuits – Simple harmonic motion .

9 Hours

Unit III

Differential Equations of Second and Higher Order

Linear differential equations of second and higher order with constant coefficients - Cauchy's and Legendre's linear differential equations - Method of variation of parameters.

9 Hours

Unit IV

Multivariable Calculus

Functions of two variables: Total differential - Derivative of implicit functions- Jacobians - Maxima and minima - Constrained maxima and minima by Lagrangian multiplier method.

9 Hours

Unit V

Multiple integrals

Double integration: Cartesian and polar Co-ordinates - Change of order of integration - Change of variables. Area and volume by multiple integrals - Applications to engineering problems.

9 Hours

Unit VI

Self-Study

Applications of Eigen value problems in stretching of an elastic membrane.

List of Experiments:

Using Mathematical software

Exp. No.	Title
1.	Finding the eigen values and eigen vectors for a given matrix.
2.	Diagonalizing the given matrix.
3.	Obtaining the solution for a second order differential equations of the form $y'' + ay = 0$.
4.	Finding the Maximum and Minimum values (Extreme values) for the given function f(x,y).
5.	Evaluation of double integrals.
6.	Evaluation of triple integrals.

TOTAL: 45+30 Hours

References

1. Erwin Kreyszig , Advanced Engineering Mathematics, Ninth Edition, Wiley India Private Limited, New Delhi 2011
2. Peter V. O' Neil, Advanced Engineering Mathematics, Seventh Edition, Cengage Learning India Private Limited, 2012
3. B.S. Grewal, Higher Engineering Mathematics, Forty Third Edition, Khanna Publications , New Delhi 2014
4. C. Ray Wylie and C Louis Barrett, Advanced Engineering Mathematics, Sixth Edition, Tata McGraw-Hill Publishing Company Ltd, 2003.
5. Glyn James, Advanced Engineering Mathematics, Third Edition, Wiley India, 2007
6. M.D. Greenberg, AdvancedEngineering Mathematics, Second Edition, Pearson Education, Inc. 2002.
7. T.Veerarajan, Engineering mathematics for First Year, Tata McGraw-Hill Publishing company Limited, New Delhi, 2014.
8. KantiB.Datta, Mathematical Methods of Science and Engineering Aided with MATLAB, Cengage Learning India Private Limited, 2013.

ASSESSMENT PATTERN

Unit No	Remember				Understand				Apply				Analyze				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
I	2					6					8			4											20
II	2					4				4					4				6						20
III		2									12								6						20
IV		2					6				6				6										20
V	2						4			6									8						20
																									100

F - Factual; C-Conceptual; P-Procedural; M-Meta cognitive

Remember :

1. State the definitions of eigenvalue and eigenvector.
2. State Cayley - Hamilton theorem.
3. State the condition for a quadratic form to be positive definite, positive semi-definite.
4. What is the solution of this ODE $\frac{dy}{dx} + Py = Q$.
5. Write Newton's Law of cooling as an ODE equation.
6. Write the general form of Euler's & Legendre linear differential equation.
7. Define Wronskian.
8. State the sufficient conditions for a function of two variables to have an extremum at a point.
9. Define Jacobian in two dimensions.
10. Write the properties of Jacobians.

Understand:

1. Do there exists square matrices without eigenvalues? Can 0 be an eigenvalue? Can a real matrix have complex eigenvalues?
2. Can a complex matrix have real eigenvalues? Real eigenvectors?
3. What do you know about the eigenvalues of the inverse of a matrix?
4. In which cases can we expect orthogonal eigenvectors?
5. If the sum of two eigenvalues of a 3 X 3 matrix is equal to the trace find the determinant value.
6. Using Cayley-Hamilton theorem, is it possible to find the inverse of all square matrices? Explain.
7. Check whether the matrix B = $\begin{pmatrix} \cos^{-} & \sin^{-} & 0 \\ -\sin^{-} & \cos^{-} & 0 \\ 0 & 0 & 1 \end{pmatrix}$ is orthogonal? Justify.
8. Find the index, signature and nature of the quadratic form $x_1^2 + 2x_2^2 - 3x_3^2$.
9. Write the matrix of the quadratic form $2x_1^2 - 2x_2^2 + 4x_3^2 + 2x_1x_2 - 6x_1x_3 + 6x_2x_3$.
10. Find the value of λ so that the quadratic form $\lambda(x_1^2 + x_2^2 + x_3^2) + 2x_1x_2 - 2x_2x_3 + 2x_3x_1$ may be positive definite.
11. Can $A = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ be diagonalized? Why?
12. Why do electric circuts lead to differential equations?
13. How many arbitrary constants does a general solution of a nonhomogeneous linear equation involve?
14. What do you know about existence and uniqueness of solutions?
15. Solve $\cos^2 x \frac{dy}{dx} + y = \tan x$
16. Solve $y(2xy + e^x)\,dx = e^x\,dy$.
17. Find the particular integral of $(D^2 + 4)y = \cos 2x$.
18. If $u = 2xy, v = x^2 - y^2, x = r\cos^{-}, y = r\sin^{-}$ *compute* $\frac{\partial(u,v)}{\partial(x,y)}$
19. If $u = f(\frac{y-x}{xy}, \frac{z-x}{xz})$ *showthat* $x^2\frac{\partial u}{\partial x} + y^2\frac{\partial u}{\partial y} + z^2\frac{\partial u}{\partial z} = 0$.

20. Transform the integral $\int_0^{\infty}\int_0^{y} f(x,y)dxdy$ to polar coordinates.

21. Change the order of integration in $\int_0^{2}\int_0^{x} f(x,y)dydx$.

Apply:

1. Give a few typical applications in which eigenvalue problem occurs.
2. Find the Eigen values and Eigen vectors of the matrix A = $\begin{pmatrix} 11 & -4 & -7 \\ 7 & -2 & -5 \\ 10 & -4 & -6 \end{pmatrix}$ and hence find the Eigen values of A^2, 5A and A^{-1} using properties.
3. One of the eigen value of $\begin{bmatrix} 7 & 4 & -4 \\ 4 & -8 & -1 \\ 4 & -1 & -8 \end{bmatrix}$ is -9. Find the other two eigen values.
4. Use Cayley Hamilton theorem to find inverse of A = $\begin{pmatrix} 1 & 3 & 7 \\ 4 & 2 & 3 \\ 1 & 2 & 1 \end{pmatrix}$.
5. A body originally at 80^0C cools down to 60^0C in 20 minutes, the temperature of the air being 40^0C. What will be the temperature of the body after 40 minutes from the original?
6. In the case of a stretched elastic horizontal string which has one end fixed and a particle of mass m attached to the other, find the the equation of motion of the particle given that l is the natural length of the string and e is its elongation due to weight mg. Also find the displacement s of particle when initially s = 0, v = 0.
7. A particle of mass m executes simple harmonic motion in the line joining the points A and B, on a smooth table and is connected with these points by elastic strings whose tensions in equillibrium are each T. If l and l' be the extensions of the strings beyond their natural lengths, find the tim of an oscillations.
8. If the temperature of a cake is 300^0F when it leaves the oven and is 200^0F 10 minutes later, when will it be practically equal to the room temperature of 60^0F, say, when will it be 61^0F? Use Newton's law of cooling.
9. Solve the equation $(D^3 - D)y = xe^x$
10. Solve the following initial value problem $y'' - 25y = 0$, y(-2) = y(2) = cosh 10.
11. Apply the method of variation of parameters to solve $(D^2 + 4)y = \cot 2x$
12. Transform the equation $x^2y'' + xy' = x$ into a linear differential equation with constant coefficients.
13. Transform the equation $(2x+3)^2\frac{d^2y}{dx^2} - 2(2x+3)\frac{dy}{dx} - 12y = 6x$ into a differential equation with constant coefficients.
14. Examine the function $u = x^4 + y^4 - 2x^2 + 4xy - 2y^2$ for extreme values.
15. Check if $u = \frac{x+y}{x-y}$, $v = \frac{xy}{(x-y)^2}$ are functionally dependent. If so find the relationship between them.
16. Find the area of the cardiod r = 4 (1+ cosθ) using double integral.

Analyze

1. If 3 and 5 are the two eigenvalues of $\mathbf{A} = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$, then find $|\mathbf{A}|$.
2. Two Eigen values of the matrix A = $\begin{pmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{pmatrix}$ are equal to 1 each. Find the Eigen values of A^{-1}.
3. Verify that the matrix $\mathbf{A} = \begin{bmatrix} 1 & 0 & 3 \\ 2 & 1 & -1 \\ 1 & -1 & 1 \end{bmatrix}$ satisfies its own characteristic equation. If so find $\mathbf{A^4}$.
4. State the nature of the quadratic form $2xy + 2yz + 2zx$.
5. Reduce the quadratic form $8x_1^2 + 7x_2^2 + 3x_3^2 - 12x_1x_2 - 8x_2x_3 + 4x_3x_1$ to canonical form by orthogonal transformation and find the rank, signature, index and the nature.
6. If the voltage in the RC circuit is $E = E_0\cos\omega t$, find the charge and the current at time t.
7. Solve the initial value problem. $y'' - y = 2\cos x$, y(0) = 0, $y'(0) =$ -0.2; y_p= -cos x.
8. Solve $(x^2D^2-2xD+2)y = (3x^2-6x+6)e^x$, y(1) = 2 +3e, $y'(1) =$3e:
9. In a circuit the resistance is 12Ω and the inductance is 4 H. The battery gives a constant voltage of 60 V and the switch is closed when t = 0, so the current starts with I(0) = 0. (a) Find I(t) (b) Find what happens to the current after a long time.(c) Find the current after 1 s.
10. Analyze whether the functions

$x = \frac{u}{v-w}, y = \frac{v}{w-u}, z = \frac{w}{u-v}$ are functionally dependent.

11 If $g(x,y) = \cdot(u,v)$ where $u = x^2 - y^2$, $v = 2xy$ prove that

$$\frac{\partial^2 g}{\partial x^2} + \frac{\partial^2 g}{\partial y^2} = 4(x^2 + y^2)\left(\frac{\partial^2 \cdot}{\partial u^2} + \frac{\partial^2 \cdot}{\partial v^2}\right).$$

12. Evaluate $\iint_R \frac{e^{-y}}{y} dxdy$ by choosing the order of integration suitably, given that R is the region bounded by the lines x=0, x=y and y = ∞.

Evaluate:

1. Use Cayley-Hamilton theorem to find $\mathbf{A^8 - 5A^7 + 7A^6 - 3A^5 + A^4 - 5A^3 + 8A^2 - 2A + I}$ if the matrix A = $\begin{pmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{pmatrix}$
2. Evaluate $\frac{dy}{dx} = \frac{x^2+y^2+1}{2xy}$
3. Evaluate $\sqrt{1-y^2}dx = (\sin^{-1}x - x)dy$.
4. Evaluate $\frac{dy}{dx} - \frac{\tan y}{1+x} = (1+x)e^x \sec y$

5. Evaluate the differential equation $\frac{d^2y}{dx^2}+\frac{1}{x}\frac{dy}{dx}=\frac{12\log x}{x^2}$
6. Solve the initial value problem. $y''+y'-6y=0$, y(0)=10 and $y'(0)=0$.
7. Solve $(x^2D^2-xD+4)y=x^2\sin(\log x)$
8. Evaluate the integration $\iiint xyzdxdydz$ taken throughout the volume for which $x, y, z \geq 0$ and $x^2+y^2+z^2 \leq 9$.
9. Evaluate the following integral by changing in to spherical coordinates
$$\int_0^1 \int_0^{\sqrt{1-x^2}} \int_0^{\sqrt{1-x^2-y^2}} \frac{dx\,dy\,dz}{\sqrt{1-x^2-y^2-z^2}}.$$
10. By transforming into cylindrical polar coordinates evaluate $\iiint \left(x^2+y^2+z^2\right)dxdydz$ taken over the region of space defined by $x^2+y^2 \leq 1$ and $0 \leq x \leq 1$.

15PH102 ENGINEERING PHYSICS
(Common to all Branches)

2 0 2 3

Course Objectives

- To impart knowledge in properties of matter, crystallography and ultrasonics
- To understand the applications of lasers and fiber optics
- To implement the principles of quantum physics in the respective engineering fields

Course Outcomes (COs)

The student will be able to

1. realize the concept of properties of matter and crystallography
2. learn the emerging trends in applied optics and ultrasonics
3. understand the efficacy of quantum equations in modern areas

Unit I

Properties of Matter

Elasticity: Elastic and plastic materials – Hooke's law – elastic behavior of a material – stress - strain diagram – factors affecting elasticity. Three moduli of elasticity – Poisson's ratio – torsional pendulum – twisting couple on a cylinder.Young's modulus - uniform bending – non-uniform bending. Viscosity: coefficient of viscosity – streamline and turbulent flow - experimental determination of viscosity of a liquid – Poiseuille's method.

8 Hours

Unit II

Applied Optics

Interference: Air wedge – theory – uses – testing of flat surfaces – thickness of a thin wire. Laser: Introduction – principle of laser - characteristics of lasers - types of lasers - CO_2 laser – semiconductor laser (homo junction). Fiberoptics: Principle of light transmission through fiber - expression for acceptance angle and numerical aperture - types of optical fibers (refractive index profile and mode) - fiber optic communication system (block diagram only)

6 Hours

Unit III

Ultrasonics

Ultrasonics: Introduction – generation of ultrasonic waves: Magnetostriction - piezo electric methods – detection of ultrasonic waves- properties of ultrasonic waves. Determination of velocity of

ultrasonic waves (acoustic grating). Applications of ultrasonic waves: SONAR – measurement of velocity of blood flow – study of movement of internal organs.

5 Hours

Unit IV

Crystallography

Crystal Physics: Lattice – Unit cell – crystal systems - Bravais lattices – Miller indices – 'd' spacing in cubic lattice – calculation of number of atoms per Unit cell, atomic radius, coordination number and packing density for SC, BCC, FCC and HCP structures - X-ray diffraction: Laue's method – powder crystal method.

5 Hours

Unit V

Quantum Mechanics

Quantum Physics: Development of quantum theory – de Broglie wavelength – Schrödinger's wave equation – time dependent and time independent wave equations – physical significance. Application: Particle in a box (1d) – degenerate and non-degenerate states. Photoelectric effect: Quantum theory of light work function – problems.

6 Hours

Unit VI

Neutrinos - neutrino observatory - European center for nuclear research.Expanding universe – dark matter in galaxies.

List of Experiments

1. Determine the moment of inertia of the disc and calculate the rigidity modulus of a given wire using torsion pendulum (symmetrical masses method).
2. Find the elevation of the given wooden beam at the midpoint by loading at the ends and hence calculate theYoung's modulus of the material.
3. Find the depression at the midpoint of the given wooden beam for 50g, 100 g, 150 g, 200 g and 250 g.
4. Determine the coefficient of viscosity of the given liquid by Poiseulle's method.
5. Form the interference fringes from the air wedge setup and calculate the thickness of the given wire.
6. By applying the principle of diffraction, determine (i) the wavelength of given laser and (ii) the average particle size of a lycopodium powder using laser light.
7. Determine (i) the wavelength of ultrasonics in a liquid medium, (ii) the velocity of ultrasonic waves in the given liquid and (iii) the compressibility of the given liquid using ultrasonic interferometer.

Total: 60 Hours

References

1. D. S. Mathur, *Elements of Properties of Matter*, 5th edition, S Chand & Company Ltd., New Delhi, 2012.
2. Charles Kittel, *Introduction to Solid State Physics*, 8th edition, Wiley India Pvt. Ltd., New Delhi, 2012.
3. ArthuBeiser, ShobhitMahajan and S RaiChoudhury, *Concepts of Modern Physics*, 6th Edition, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2010.
4. B. K. Pandey and S. Chaturvedi, *Engineering Physics*, 1st edition, Cengage Learning India Pvt. Ltd., New Delhi, 2012.
5. Halliday and Resnick, *Fundamentals of Physics*, John Wiley and Sons, Inc, 2011.
6. Ian Morison, *Introduction to Astronomy and Cosmology*, John wiley and sons, Ltd, 2013.
7. P. K. Palanisamy, *Engineering Physics*, Scitech Publications India Pvt. Ltd., Chennai, 2009.

Unit No	Remember				Understand				Apply				Analyze				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
I	2	2			2	4					6				4				4						24
II		2				2	6			2	4			4											20
III		4				2	4			4				4											18
IV	2	2				4					5			5											18
V	2	2				4	4			4					4										20
	6	12			2	16	14			10	15			13	8				4						100

ASSESSMENT PATTERN

Remember

1. State Hooke's law.
2. List the two applications of air wedge.
3. Define magnetostriction effect.
4. Write the Bragg's condition for X-ray diffraction in crystals.
5. Recall four physical significance of wave function.

Understand

1. Explain the determination of Young's modulus by non-uniform bending method.
2. Classify the fiber optics based on refractive index profile.
3. Identify the four applications of ultrasonic waves in day-today life.
4. Simple cubic structure is loosely packed. Justify.
5. Illustrate the significance of photoelectric effect.

Apply

1. Using torsional pendulum, determine the rigidity modulus of the wire.
2. Determine the thickness of a thin wire using air-wedge method.
3. Construct the piezo electric oscillator circuit and explain the generation of ultrasonic waves.
4. Show that the axial ratio for an ideal HCP structure is 1.633.
5. Assess the various energy levels of an electron enclosed in a one dimensional potential well of finite width 'a'.

Analyze

1. Differentiate uniform bending from non-uniform bending.
2. Straight lined fringes form only in flat glass plates. Justify.
3. Analyze the merits and demerits of magnetostriction oscillator method.
4. Five fold symmetry is not possible in crystal structures. Conclude.
5. Compare and contrast between degenerate state with non-degenerate state.

Evaluate

1. Determine the viscosity of a given liquid using Poiseuille's method (Given: water, burette, stop clock, capillary tube, stand and travelling microscope)

15CH103 ENVIRONMENTAL SCIENCE
(Common to all branches)

2 0 2 3

Course Objectives

- develop an understanding of the interdisciplinary and holistic nature of the environment
- to understand how natural resources and environment affect the quality of life and the quest for sustainable development
- recognize and evaluate the socio-economic, political and ethical issues in environmental science

Course Outcomes (COs)

At the end of the course, the students will be able to

1. comprehend the importance of environment, its purpose, design and exploitation of natural resources
2. apprehend the existing environmental challenges related to pollution and its management
3. design and evaluate strategies, technologies and methods for sustainable management of environmental systems

Unit I

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) - water logging - salinity -case studies. Energy resources: renewable(solar, wind, tidal, geothermal and hydroelectric power) - non renewable energy sources.

6 Hours

Unit II

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: forest ecosystem - desert ecosystem - ecological succession. Biodiversity - value of biodiversity - threats to biodiversity - endangered and endemic species - Conservation of biodiversity: *In-situ* and e*x-situ* conservation of biodiversity - field study**.**

6 Hours

Unit III

Environ mental Pollution

Pollution: Définition – causes - effects - control measures of air pollution - water pollution : (Sewage water treatment by activatedsludge and tricklingfilterprocess) - marine pollution - thermal pollution - noise pollution. Disaster management: causes - effects - control measures of floods – earthquake - cyclone - landslides.

6 Hours

Unit IV

Social Issues and Environment

Sustainable development : Definition - Unsustainable to sustainable development – urban problems related to energy. Environmental ethics - issues and possible solutions - solid waste management - causes - effects - 3R Principles (landfills, incineration, composting).Water conservation - rain water harvesting - watershed management. Climate change - global warming - acid rain - ozone layer depletion. Environment protection act: Air (Prevention and control of pollution) act - wildlife protection act

7 Hours

Unit V

Human Population and Environment

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

5 Hours

Unit VI

Human rights E - waste and biomedical waste Identification of adulterants in food materials

List of experiments

1. Estimation of chloride content in water by argent metric method
2. Determination of percentage of sodium carbonate in washing soda.
3. Estimation of calcium in limestone by complex metric method.
4. Estimation of copper content of the given solution by EDTA method.
5. Estimation of dissolved oxygen in water sample/sewage by Winkler's method.
6. Estimation of chromium in leather tannery effluents.
7. Determination of Prussian blue dye concentration by spectrophotometer.

Total: 60 Hours

References

1. AnubhaKaushik, C.P. Kaushik, *Environmental Science and Engineering*, 4th Multi ColourEdtion, New Age International Publishers, New Delhi, 2014.
2. A. Ravikrishnan, *Environmental Science and Engineering*, 5th revised Edition, Sri Krishna Hitech Publishing company (P) Ltd, Chennai, 2010.
3. T. G. Jr. Miller, S. Spoolman, *NewEnvironmental Science*, 14th Edition, Wadsworth Publishing Co, New Delhi, 2014.
4. E. Bharucha, *Textbook of Environmental studies*, second Edition,Universities Press Pvt. Ltd., New Delhi,2013.
5. A. K. De,*Environmental Chemistry*,7th Edition , New age international publishers, New Delhi, 2014.
6. http://www.ipcc.ch/index.html
7. http://unfccc.int/2860.php
8. https://www.osha.gov/about.html

ASSESSMENT PATTERN

Unit No	Remember				Understand				Apply				Analyze				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
I	3	2			4	5				1			1	3				1							20
II	4	1			4	7							1	2				1							20
III	3				4	6	2		1	4			2	2				1							25
IV	1	2			3	8	1			1			1	4											21
V	1	2			2	5				1				3											14
	12	7			17	31	3		1	7			5	14				1							100

F - Factual; C-Conceptual; P-Procedural; M-Meta cognitive

Remember

1. Define bio magnifications.
2. List any four major gaseous responsible for air pollution.
3. Name the gases responsible for greenhouse effect.
4. Mention the issues involved in enforcement of environmental legislation.
5. Write any two applications of GIS.

Understand

1. Differentiate between confined and unconfined aquifers.
2. Discuss the structural and functional attributes of an ecosystem.
3. With a flow chart explain the activated sludge process for waste water treatment.
4. Explain a method of rain water harvesting and discuss the various strategies adopted for water conservation.
5. Describe the salient features of Wildlife (protection) Act, 1972.

Apply

1. As an individual how can you conserve different natural resources?
2. Relate the concept of food chain and food web with tropic level and mention their three significances.
3. Explain the various steps to be taken to tackle a)Floods b)Landslides
4. Discuss with an example, how climate change affects human health.
5. Discuss the concept of value education with the help of suitable two examples.

Analyze

1. Predict the effects of excess usage of ground water.
2. Identify the major threats to biodiversity in your region.
3. Illustrate ecological pyramids with an appropriate an example for each type.
4. Give a comparative account of urban and industrial wastes in terms of their sources, characteristics, management and disposal methods.
5. Identify the disaster management techniques that can be implemented to manage a)Earthquake b)Tsunami

Evaluate

Find any one instance in India, where deforestation has social impacts similar to that of Brazil.

1. Mention the current threats to forest ecosystems and how can they be conserved?
2. Write any two renewable resources and describe the major problems associated with each of them.
3. Deterioration of environment affects human health. Justify
4. HIV/AIDS is the fourth largest cause of mortality – Discuss.

15GE105 BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING
(Common to all branches except ECE, EEE & EIE)

2 0 2 3

Course Objectives

- To understand the basic concepts of electric circuits and magnetic circuits
- To illustrate the construction and operation of various electrical machines and semiconductor devices
- To Learn the fundamentals of communication systems

Course Outcomes (COs)

The students will be able to

1. Understand the concepts of circuits.
2. Differentiate the electric circuits and magnetic circuits
3. Learn the fundamentals of DC and AC electrical machines.
4. Illustatrte the communication systems with block diagram approach.

Unit I

Electric Circuits

Definition of Voltage, Current, Electromotive force, Resistance, Power & Energy, Ohm's law and Kirchoff's Law & it's applications – Series and Parallel circuits - Voltage division and Current division techniques – Generation of alternating emf - RMS value, average value, peak factor and form factor- Definition of real, reactive and apparent power.

10 Hours

Unit II

DC Machines

Introduction of magnetic circuits - Law of Electromagnetic induction, Fleming's Right & Left hand rule – Types of induced emf – Definition of Self and Mutual Inductance - DC Motor – Contruction - Working Principle – Applications.

8 Hours

Unit III

AC Machines

SinglePhaseTransformer – Alternator - Three phase inductionmotor - Single phase inductionmotor - Contruction - Working Principle – Applications.

9 Hours

Unit IV

Electrical Drives

Speed control of dc shunt motor and series motor – Armature voltage control – Flux control – Construction and operation of DC servo motor – Construction and operation of DC servo motor stepper motor.

8 Hours

Unit V

Electron Devices and Communication

Characteristics of PN Junction diode and Zener diode - Half waveandFull waveRectifiers - Bipolar Junction Transistor – Operation of NPN and PNP transistors - Logic gates - Introduction to communication systems. **10 Hours**

Unit VI

Voltage Regulator – Stepper motor – Energy meter – SMPS, Satellite and Optical communication.

List of Experiments:

1. Analyze the VI characteristics of a fixed resistor and a lamp by varying its temperature.
2. Apply the voltage division and current division techniques for series and parallel connections of lamp loads.
3. Understand the concept of electromagnetic induction using copper coil.
4. Understand the construction and working principle of DC machines.
5. Determine the VI Characteristics of PN Junction diode and plot the input and output wave shapes of a half wave rectifier.
6. Realize the working of transistor as an electronic switch through experiments.
7. Lighting applications using logic gates principle.

Total: 60 Hours

References

1. T. K. Nagsarkar and M. S. Sukhija, *Basic of Electrical Engineering*, Oxford University Press, 2011
2. SmarjithGhosh, *Fundamentals of Electrical and Electronics Engineering*, Prentice Hall (India) Pvt. Ltd., 2010
3. A. Sudhakar, Shyammohan S Palli, *Circuits and Networks Analysis and Synthesis*, Tata McGraw Hill, 2010
4. R. S. Sedha, *A Textbook of Applied Electronics*, S.Chand& Company Ltd, 2013

ASSESSMENT PATTERN

Unit No	Remember				Understand				Apply				Analyze				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
I	2					2					6				4				6						20
II	4					4				2				6					4						20
III	2				10					4					4										20
IV	4					6				4					6										20
V	4					4				12															20
																									100

F - Factual; C-Conceptual; P-Procedural; M-Meta cognitive

Remember

1. State kirchoff's current law.
2. What is resistor? Give its symbol.
3. State Ohm's law.
4. State kirchoff's voltage law.
5. State Faraday's law of electromagnetic induction.
6. Give the properties of flux lines.
7. Define reluctance.
8. Define magnetic flux.
9. State the operating principle of a transformer.
10. State the operating principle of DC generator.
11. What is back emf?
12. State the operating principle of DC Motor.
13. State Fleming's Left hand rule.
14. State Fleming's Right hand rule.

15. Sketch the V-I characteristics of zener diode.
16. What is junction barrier?
17. What is BJT?
18. Attach the block diagram of communication system.
19. List the applications of optical fibre communication.
20. Define aspect ratio.

Understand

1. Define average value.
2. Compare series and parallel circuits.
3. Why are domestic appliances connected in parallel.
4. Classify the magnetic circuits.
5. Describe the concepts of self and mutually induced emf.
6. What is leakage coefficient?
7. Interpret the laws of electromagnetic induction.
8. Elucidate the working principle of a transformer.
9. What is DC generator?
10. List the applications of DC motors.
11. Illustrate the construction and working principle of three phase induction motor.
12. Outline the applications of DC generators.
13. Demonstrate the action of diode in forward and reverse biasing.
14. Explain the operation of NPN transistor.
15. Draw symbol of diode and zener diode.
16. Illustrate the input and output characteristics of CE configuration.
17. Exemplify the need for modulation.
18. Summarize the advantages of FM over AM.
19. State the need for modulation.
20. Discuss the principle of frequency modulation.

Apply

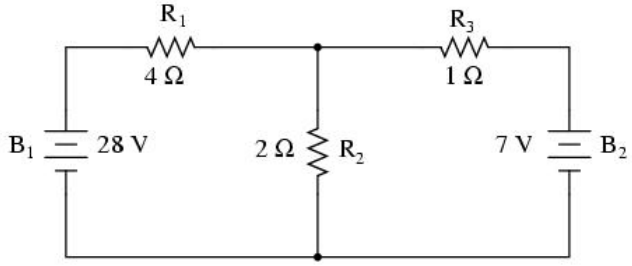
1. Three resistors are connected in series across a 12V battery. The first resistance has a value of 2 Ω, second has a voltage drop of 4V and third has power dissipation of 12 W. Calculate the value of the current in the circuit.
2. A 25 Ω resistor is connected in parallel with a 50 Ω resistor. The current in 50 Ω resistor is 8A. What is the value of third resistance to be added in parallel to make the total line current as 15A.
3. The self inductance of a coil of 500turns is 0.25H.If 60% of the flux is linked with a second coil of 10500 turns. Calculate a) the mutual inductance between the two coils and b) emf induced in the second coil when current in the first coil changes at the rate of 100A/sec.
4. An air cored toroidal coil has 480 turns, a mean length of 30cm and a cross-sectional area of 5 cm^2.Calculate a)the inductance i\of the coil and b) the average induced emf, if a current of 4 A is reversed in 60 milliseconds
5. A toroidal air cored coil with 2000 turns has a mean radius of 25cm, diameter of each turn being 6cm. If the current in the coil is 10A, find mmf, flux, reluctance, flux density and magnetizing force.
6. Construct the circuit of voltage regulator.
7. Outline the applications of DC motors.
8. Develop the block diagram of the television and explain each block.
9. Build the ciruit of full wave bridge rectifier.
10. Develop the block diagram of the optical fibre communication and explain each block.
11. Construct the circuit of half wave rectifier.

Analyze

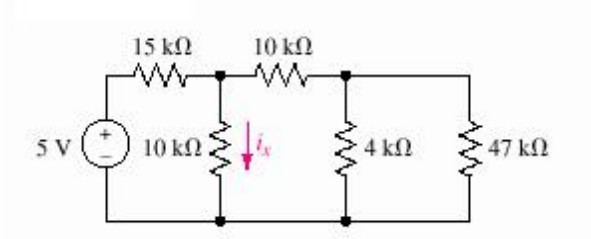
1. Analyze the voltage, current and power in a resistor supplied with an alternating voltage.
2. Obtain the equations for the equivalent star network resistances for a given delta network.
3. Derive the expression for RMS, average value, peak and form factor of sinusoidal voltage.
4. Analyze the voltage, current and power relationship in three phase star connected system.
5. Arrive the expressions for self inductance and mutual inductance.
6. Analyze the series and parallel magnetic circuit and derive the total mmf required.
7. Compare electric and magnetic circuits.
8. Derive the emf equation of DC Generator.
9. Obtain the expression for current amplification factor.
10. Derive the expression of ripple factor, efficiency of full wave bridge rectifier.

Evaluate

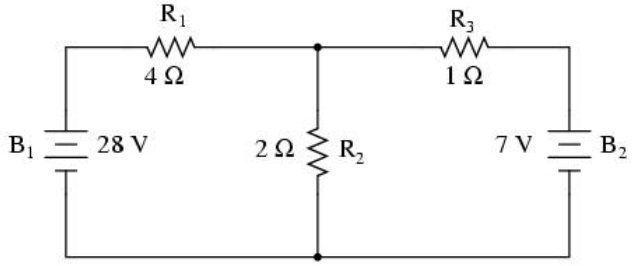
1. Estimate the value of meshcurrents inthefollowingnetwork.



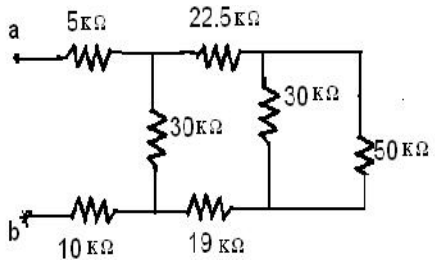
2. For the circuit in Fig. determinei_X,and compute the power dissipated by the 15-kΩ resistor.



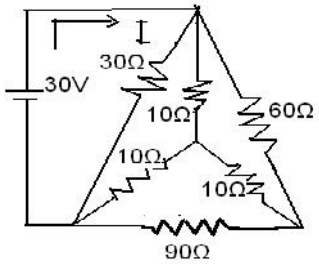
3. Estimate the value of node voltage inthefollowingnetwork.



4. An iron rod of 1cm radius is bent to a ring of mean diameter 30cm and wound with 250 turns of wire. Assume the relative permeability of iron as 800. An air gap of 0.1cm is cut across the bent ring. Calculate the current required to produce a useful flux of 20,000 lines if leakage is neglected.
5. Theeffectiveresistanceoftworesistorsconnectedinseriesis100 Ω. When connected in parallel, then effective value in 24 ohm's. Determinethevalueoftworesistors.
6. Determinetheequivalentresistanceofthefollowingcircuit



7. Calculate the total resistance R_T, and total current I in the following circuits using star delta transformationtechnique



15FD106 FOOD BIOCHEMISTRY

3 0 0 3

Course Objectives

- To develop the knowledge of students in the fundamental domain of food chemistry.
- To enhance the acquaintance of students with the properties and composition of food.
- To make the students understand and identify the nutrient and non-nutritive componentsof food, their proximate composition etc.

Course Outcomes (COs)

Students will get the desired abilities to appreciate

1. The concepts of food processing and technology subjects.
2. The similarities and complexities of the chemicalcomponents in foods.
3. The functional role of food components and their interaction in food products in terms of color, flavour, texture and nutrient composition etc.

UnitI

Introduction to Food Components and Water in Food

Importance of food, Scope of food chemistry - Introduction to different food groups: their classification and importance, Food as a source of energy, Consumer safety - Water -Structure of water molecule, types and properties of water, water activity and its importance, water quality for food processing - role of water in food preservation and shelf-life.
7 Hours

Unit II

Carbohydrates and Proteins in Food

Carbohydrates -Definition, classification, sources, chemical make-up, sensory properties-sweetness index, caramelization, Maillard reaction, nutritional and industrial importance, Sugar alcohols, Starches in food, thickening &gelatinization process, modified starch, Proteins - Sources, chemical make-up, properties, nutritional aspects– amino acids, amino essential acids, biological value, Protein Efficiency Ratio (PER).

10Hours

UnitIII

Fats and Oils in Food

Fats -Sources, chemical make-up, properties, nutritional aspects – essential fatty acids, Polyunsaturated Fatty Acids (PUFA), hydrogenation, rancidity, emulsification, shorten value of different fats - low fat and no fat food, fat replacements, industrial-importance of lipids.

8Hours

Unit IV

Importance of Vitamins and Minerals in Food

Minerals and Vitamins -Importance and sources of minerals and vitamins with special emphasis on calcium, iodine, zinc, iron, fluoride, fat soluble and water-soluble vitamins, effect of processing and storage on vitamins- stability & degradation in foods, deficiency disorders and requirements of different vitamins.

9 Hours

UnitV

Pigments, Flavor Components and Enzyme as Food Suppliments

Food Pigments – Importance, types and sources of pigments - their changes during processing and storage- Flavor and aroma components present in various crop products and fermented foods, synthetic colors and naturally similar /artificial flavors - stabilizers, preservatives, sweeteners - Enzymes -Definition, importance, sources, nomenclature, classification –application of enzymes in food processing.

11Hours

Unit VI

Other Aspects in Food and Nutrition (self study)

Biological role of dietary fibers, plasticizing properties of fats- enrobing fats, balanced diet, malnutrition,nutrient supplementation, factors affecting enzyme action- proximate composition of food, food composition database.

Total: 45 Hours

References

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2. Murray, Robert K. *etal.*, “Harper’s Illustrated Biochemistry” 27th Edition. McGraw-Hill,2006.
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4. Meyer, Lillian Hoagland “Food Chemistry”. CBS Publishers,1987.
5. DeMan, John M. “Principles of Food Chemistry”. 3rd Edition, Springer, 1999.
6. Berg, J.M. “Biochemistry” 6th Edition. W.H. Freeman, 2007
7. Vaclavik, V. A. and Christian E. W. “Essentials of Food Science”. 2nd Edition, Kluwer-Academic, Springer, 2003.
8. Essentials of Food and Nutrition by Swaminathan Vol. I and II
9. Hand book of Analysis of Fruits and Vegetables by S. Ranganna
10. Voet D, Voet G, Biochemistry, John Wiley and Sons, 2004

ASSESSMENT PATTERN

Unit No	Remember				Understand				Apply				Analyze				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
I	4				4	3				2	4			3											20
II	3	2			2	2	3			3			2	2			2								21
III	2	2			2	2				4				3			1	2			2				20
IV	3					3			2	2				3				2			2	2			19
V			2			2	3			3					2				4			2	2		20
																									100

F - Factual; C-Conceptual; P-Procedural; M-Meta cognitive

Remember

1) Name the different major food groups
2) Define caramalization
3) Importance of iodine in food
4) Features of fermented foods

Understand

1) Interpret the importance of water activity in food products.
2) State the important biological roles of dietary fibers
3) Hydrogenation of fats
4) How important are flavor and aroma components in food

Apply

1) Attribute the properties of food rich in proteins to the various chemical and physical properties of protein.
2) State and explain the significant properties of fats contributing to various quality processed foods.
3) How to prevent or minimize degeneration of nutrients during food processes
4) How to overcome the various deficiency disorders due to different vitamins

Analyze

1)Analyze the role of fat in food products in tandom with the various prominent structural features of fats.
2) Write on the significant factors contributing towards attaining customer satisfaction and balanced diet with reference to food products.
3)Analyze the role of minerals in human nutrition

Evaluate

1)Starches could be treated as important food additives – justify
2) Evaluate the importance of protein efficiency ratio in protein rich foods.

Create

1) Make a list of important supplementing agents used in food processing and identify the significant roles imparted by each of such food additives in a few specific food processes.
2)Explain the design & execution of the enzyme assisted food processing and the salient features of significance there.

15GE107 WORKSHOP PRACTICE
(Common to all branches)

0 0 2 1

Course Objectives

- To provide training to fabricate components using welding machine/ carpentry/ sheet metal/ plumping / fitting tools.
- To develop the skills to prepare green sand mould using foundry tools and to make simple electrical connections using suitable tools.
- To understand the procedure of dismantling and assembling of home appliances.

Course Outcomes (COs)

The student will be able to

1. Fabricate simple components using welding machine/ carpentry / sheet metal / plumping / fitting tools.
2. Prepare green sand mould and make simple electrical connections using suitable tools.
3. Dismantle and assemble the various home appliances.

List of Experiments

1. Forming of simple object using sheet metal tools and spot welding – [Dust Pan & Soap Box (Or) making simple objects (like Aluminum Cup) using Metal Spinning Machine].
2. Prepare 'V' (or) Half round joint from the given Mild Steel flat (Or) Preparation of key for the given shaft pulley assembly.
3. Fabrication of a simple component using thin and thick plates. [Example – Book rack].
4. Making a simple component using carpentry power tools. [Example – electrical switch box, Tool box, Letter box].
5. Making basic pipe line connections using PVC pipe, Tee joint , Elbow, Bend and Taps (with threads) (or) Making a Pipe connections of house application centrifugal pump using Pipes, Bend, Gate valve, Flanges and Foot valve.
6. Making electrical wire connections of house wiring using Indicator, one way switch with calling bell, two way switch with Lamp, one way switch with fan regulator, one way switch with socket/ Tube light.
7. Soldering Practice for simple Printed Circuit Board (PCB).
8. Prepare a green sand mould using solid pattern/split pattern.
    - Additionally, three more experiments will be conducted for respective undergraduate programme.

Total: 30 Hours

15MA201 - Vector Calculus and Complex Analysis
(Common to all Branches)

3 2 0 4

Course Objectives

By studying this course the students will be able to

- Understand the Vector Calculus, which extends the basic concepts of Differential Calculus to Vector functions, by introductory derivative of a vector function and new concepts of gradient, divergence and curl.
- Implement the Complex Analysis, an elegant method in the study of heat flow, fluid dynamics and electrostatics.
- Summarize and apply the methodologies involved in solving problems related to fundamental principles of Calculus viz: Differentiation, Integration and Vectors.

- Develop enough confidence to identify and model mathematical patterns in real world and offer appropriate solutions, using the skills learned in their interactive and supporting environment.

Program Outcomes (POs)

a) An ability to apply knowledge of mathematics, science and engineering.

Course Outcomes (COs)

On successful completion of the course, the students will be able to

1. Understand different engineering problems and provide solutions using Vector Calculus and Complex Integration.
2. Evaluate the complicatedcomplex integrals and understand the properties of analytic functions.

Unit I

Vector Calculus

Gradient - Divergence - Curl - Directional derivative- Solenoidal - Irrotational vector fields -Line Integral - Surface integrals.

10 Hours

Unit II

Integral Theorems of Vector Calculus

Green's theorem in a plane- Stoke's Theorem- Gauss divergence theorem - Applications involving cubes and parallelepiped.

9 Hours

UnitIII

Analytic Functions

Analytic Functions - Necessary and Sufficient conditions of Analytic Function - Properties of Analytic function - Determination of Analytic Function using Milne Thompson method -Applications to the problems of Potential Flow.

8 Hours

Unit IV

Mapping of Complex Functions

Physical interpretation of mapping - Application of transformation: translation, rotation, magnification and inversion of multi valued functions - Linear fractional Transformation (Bilinear transformation). **8 Hours**

Unit V

Integration of Complex Functions

Cauchy's Fundamental Theorem - Cauchy's Integral Formula - Taylor's and Laurent's series - Classification of Singularities - Cauchy's Residue Theorem.

10 Hours

Unit- VI *

Self Study

Applications to Electrostatic and Fluid Flow.

TOTAL:45+15(Tutorials)=60 Hours

References

1. C. Ray Wylie and C. Louis Barrett, *Advanced Engineering Mathematics*, Tata McGraw-HillPublishing Company Ltd, 2003
2. Erwin Kreyszig , Advanced Engineering Mathematics, Tenth Edition, Wiley India Private Limited,New Delhi 2015
3. J. A. Brown and R. V. Churchill, *Complex Variables and Applications* , Sixth Edition,

McGraw Hill,New Delhi, 1996
4. B. S. Grewal, *Higher Engineering Mathematics*, Forthy third Edition, Khanna Publications , New Delhi 2014
5. Peter V. O' Neil, *Advanced Engineering Mathematics,* Seventh Edition,Cengage Learning IndiaPrivate Limited, 2012
6. Glyn James, *AdvancedEngineering Mathematics,* Third Edition,Wiley India, 2007
7. M.D. Greenberg, *AdvancedEngineering Mathematics,* Second Edition, Pearson Education, Inc. 2002

ASSESSMENT PATTERN

Unit No	Remember				Understand				Apply				Analyze				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
I	2					6					8			4			2								22
II	2					4				4					4				6						20
III		2									10								6						18
IV		2					4				6				6										18
V	2						4			6				4					6						22
																									100

F - Factual; C-Conceptual; P-Procedural; M-Meta cognitive

Remember

1. Define gradient of a vector.(F)
2. Define irrotational of a vector.(F)
3. State Green's theorem.(F)
4. State Gauss divergence theorem.(F)
5. Check whether the function is $f(z)=z^3$ analytic?(C)
6. List the necessary condition for a function f(z) to be analytic. (F)
7. Define Bilinear transformation.(F)
8. State the condition for the transformation w = f(z) to be conformal at a point.(F)
9. State the formula for finding the residue of a double pole?(C)
10. State Cauchy's integral formula.(F)

Understand

1. If $\vec{F} = x^2\,\vec{i} + xy^2\,\vec{j}$ evaluate the line integral $\int \vec{F}.\vec{dr}$ from (0,0) to (1,1) along the path y=x.(C)
2. Identify the Unit normal vector to the surface $x^2 + xy + z^2 = 4$ at the point (1,-1,2).(F)
3. Use Stoke's theorem identify the value of $\nabla x \nabla \Phi$.(F)
4. Formulate the area of a circle of radius a using Green's theorem . (C)
5. List two properties of analytic function.(F)
6. Justify the analyticity of the function w = sin z.(C)
7. Identify fixed points of the transformation $w = z^2$. (F)
8. Identify the image of the triangular region in the z plane bounded by the lines x= 0, y = 0, and x + y = 1 under the transformation w = 2z (P)

9. Infer $\int_c \frac{dz}{(z-3)^2}$ where c is the circle $|z|=1$.(C)

10. Identify the residues of the function $f(z)=\frac{4}{z^3(z-2)}$ at its simple pole.(F)

Apply

1. Find $\int_c \overline{F}.dr$ where $\overline{F}=(2y+3)i+xzj+(yz-x)k$ along the line joining the points (0,0,0) to (2,1,1). (F)
2. If $\vec{F}=3xy\vec{i}-y^2\vec{j}$, find $\int_C \vec{F}\cdot d\vec{r}$ where C is the curve in the xy-plane $y=2x^2$ from (0,0) to (1, 0).(F)
3. Apply Green's theorem in the plane to Compute $\int_c (3x^2-8y^2)dx+(4y-6xy)dy$ where C is the boundary of the region defined by x=0, y=0 and x+y=1.(P)
4. Using Gauss divergence theorem,Compute $\iint_s \vec{F}\cdot\hat{n}ds \text{ where } \vec{F}=4xz\vec{i}-y^2\vec{j}+yz\vec{k}$ and S is the surface of the cube bounded by x=0,y=0,z=0,x=1,y=1,z=1.(P)
5. If ω=φ+iψ represent the complex potential for an electric field and $\cdot = x^2-y^2+\frac{x}{x^2+y^2}$, find the function φ.(P)
6. If $u=\log(x^2+y^2)$, find v and f (z) such that f (z) =u+iv is analytic. (P)
7. Find bilinear transformation which maps the points I,-1,I of the z plane into the Points 0,1,∞ of the w plane respectively.(P)
8. Find the image of the circle $|z-1|=1$ in the complex plane under the transformation w = $\frac{1}{z}$. (C)
9. Find Taylor's series f(z) = cos z about z = $\frac{®}{3}$. (P)
10. Find the nature of singularity $z\,e^{\left(\frac{1}{z}\right)^2}$. (C)

Analyze.

1. Conclude $div\,grad(r^n)=\nabla^2(r^n)=n(n+1)r^{n-2}$.(P)
2. Compare irrotational vector and solenoidal vector with an example.(C)
3. Justify stokes's theorem for $\overline{F}=-yi+2yzj+y^2k$, where S is the upper half of the sphere $x^2+y^2+z^2=1$.(P)
4. Justify Gauss divergence theorem for $\vec{F}=x^2\vec{i}+y^2\vec{j}+z^2\vec{k}$ where S is the surface of the cuboid formed by the planes x= 0, x= a, y = 0, y = b, z = 0 and z = c.(P)
5. The complex potential $f(z)=z^2$ describes a flow with constant equipotential lines and

streamlines ,Determine the velocity vector.(P)

6. Show that the function $u = x^3 + x^2 - 3xy^2 + 2xy - y^2$ is harmonic and find the corresponding analytic function. (P)

7.Find the image of the rectangle whose vertices are (0,0), (1,0), (1,2), (0,2) by means of linear transformation w = (1+i)z+2-i. Also compare the images.(P)

8. Generate $f(z) = \frac{z}{(z-1)(z-3)}$ as Laurent's series valid in the regions: $1 < |z| < 3$ and $0 < |z-1| < 2$ (P)

9. Use Cauchy's integral formula Compute $\int_C \frac{e^z\, dz}{(z+2)\,(z+1)^2}$ where C is the circle $|z| = 3$. (P)

10. Determine $\int_C \frac{z+4}{z^2+2z+5} dz$ where C is $|z+1+i| = 2$. (C)

Evaluate

1. Determine $\iint_s (xdydz + 2ydzdx + 3zdxdy)$,where s is the closed surface of the sphere $x^2 + y^2 + z^2 = a^2$. (P)

2. Prove that $curl(curl\vec{F}) = grad(div\vec{F}) - \nabla^2\vec{F}$.(C)

3. Check Stokes theorem for $\vec{F} = (x^2 + y^2)\vec{i} - 2xy\vec{j}$ taken around the rectangle bounded by x=±a,y=0 y=b.(P)

4. Check Green's theorem in the plane to determine $\int_c (3x^2 - 8y^2)dx + (4y - 6xy)\,dy$ where c is the boundary of the region defined by $(i)\, x = 0, y = 0, x + y = 1 (ii)\, y = \sqrt{x}\ and\ y = x^2$.(P)

5. Determine the analytic function f(z) = P + iQ, if Q = $\frac{\sin x \sinh y}{\cos 2x + \cosh 2y}$, if f(0) = 1.(C)

6. Determinef(z) and the conjugate harmonic v such that w = u + iv is an analytic function ofz given that u = $e^{x^2-y^2}\cos 2xy$.(C)

7. Determine the image of the infinite strip $\frac{1}{4} \le y \le \frac{1}{2}$ under the transformation w = $\frac{1}{z}$ (P)

8. Determine the Laurent's series expansion $f(z) = \frac{z-1}{(z+2)(z+3)}$ $for\ 2 < |z| < 3$.(P)

9. Determine $\int_C \frac{z+4}{z^2+2z+5} dz$ where C is $|z+1+i| = 2$ (P)

10 Using Cauchy's integral formula determine $\int_C \frac{e^z dz}{(z+2)(z+1)^2}$ where C is $|z| = 1$ (C)

15PH203 PHYSICS OF ENGINEERING MATERIALS
(Common to AG, BT, TT and FT)

3 0 0 3

Course Objectives

- To familiarize with the physical properties of materials
- To introduce fundamentals of bio and nanomaterials
- To provide theoretical knowledge and practical applications of modern spectroscopic and microscopic techniques

Course Outcomes (COs)

The student will be able to

1. realize the principles of different materials and their applications
2. differentiate biomaterials and nanomaterials based on their properties
3. understand the applications of spectroscopic and microscopic techniques

Unit I

Conducting and Semiconducting Properties

Quantum free electron theory - Fermi - Dirac distribution function – effect of temperature on Fermi function - density of energy states – calculation of density of electrons and Fermi energy at 0 K. Intrinsic semiconductors: density of electrons and holes - determination of intrinsic carrier concentration. Extrinsic semiconductors: carriner concentration in n-type and p-type semiconductors – variation of Fermi level with temperature and impurity concentration – problems.

7 Hours

Unit II

Dielectric Properties

Introduction: fundamental definitions in dielectrics - types of polarization: expressions for electronic and ionic polarization mechanisms – orientation polarization (qualitative) - Langevin-Debye equation – frequency and temperature effects on polarization – dielectric loss – dielectric breakdown mechanisms – active dielectric materials - applications of dielectric materials – problems.

6 Hours

Unit III

Optical and Magnetic properties

Optical properties: introduction – light interaction with solids – atomic and electronic interactions - optical properties of metals, semiconductors and insulators – reflection – refraction – absorption – transmission – luminescence and photoconductivity. Magnetic properties: introduction – origin of magnetic moment – properties of dia, para and ferro magnetic materials – domains and hysteresis – hard and soft magnetic materials.

5 Hours

Unit IV

Bio and Nano Materials

Biomaterials: introduction – classification of biomaterials – development of biomaterials and their applications – types of biomaterials. Nanomaterials: introduction – synthesis of nanomaterials – top-down approach: Ball milling technique – bottom-up approach: Chemical vapour deposition (CVD) – uses of nanomaterials. Carbon nanotubes (CNT): properties and applications.

6 Hours

Unit V

Spectroscopic and Microscopic techniques

Introduction: different types of spectroscopic techniques – basic principle of FTIR spectroscopy and X-ray photoelectron spectroscopy (XPS). Different types of microscopic techniques: basic principle

and working mechanisms of scanning electron microscope (SEM), transmission electron microscope (TEM) and atomic force microscope (AFM).

6 Hours

Unit VI

Nanotechnology in biomedical applications – Nanomedicine and novel drug delivery systems – Health and environmental impacts of nanotechnology.Crystal surfaces and their properties.

List of Experiments

1. Determine the V-I characteristics of Solar cell
2. Determine the energy band gap value of the given semiconductor diode. Based on the band gap value, identify the given semiconductor.
3. Calculate the coefficient of thermal conductivity of a bad conductor using Lee's disc apparatus
4. Determine the refractive index of a transparent solid material using traveling microscope
5. Calculate the charge carrier density of a semiconductor using Hall effect experiment
6. Determine the hysteresis loss of a ferro magnetic material using B-H curve.
7. Determine the wavelength of polychromatic source in the visible region.

Total: 60 Hours

References

1. William D. Callister, *Materials Science and Engineering An Introduction*, John Wiley and sons, Inc, 2010.
2. Halliday and Resnick, *Fundamentals of Physics*, John Wiley and Sons, Inc, 2011.
3. Jacob Milliman, Christos Halkias, Satyabrata JIT, *Electronic Devices and Circuits*, McGraw Hill Education (India) Private Limited, New Delhi, 2014.
4. S. O. Pillai, *Solid State Physics*,New Age International Publications, New Delhi, 2010.
5. Subbiah Pillai, *Nanobiotechnology*, MJP Publishers, 2010.
6. Yang Leng, *Materials Characterization: Introduction to Microscopic and Spectroscopic Methods*, Wiley-VCH, 2013.

ASSESSMENT PATTERN

Unit No	Remember				Understand				Apply				Analyze				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
I	1	4	2		2	5	2		2	2			1	1											22
II	2		2		2		2		5	3			4												20
III	2		1		3	3	2		3				2	2											18
IV	1	2	1		3	3			3	5			2												20
V	2	2			3	2	5		2				2	2											20
	8	8	6		13	13	11		15	10			11	5											100

F - Factual; C-Conceptual; P-Procedural; M-Meta cognitive

Remember

1. Recall the merits of quantum free electron theory over classical free electron theory.
2. List the four types of polarization mechanisms.
3. Define Bohr magneton.
4. Point out the four salient features of biomaterials.
5. State the working principle of FTIR spectroscopy.

Understand

1. Extrinsic semiconductors possess high electrical conductivity than intrinsic semiconductors. Justify.
2. Explain intrinsic and thermal breakdown mechanisms.

3. Illustrate the phenomenon of hysteresis based on domain theory.
4. Classify the biomaterials.
5. Represent the scanning electron microscope to determine the grain size of the nanomaterials.

Apply

1. Find the variation of Fermi level with temperature and impurity concentration in n-type semiconductors.
2. Compute the relationship between polarizability and electric flux density.
3. Assess the properties of dia, para and ferromagnetic materials.
4. Show that top down method is inferior to bottom up method.
5. Explain the principle and working mechanism of X – ray photoelectron spectroscopy (XPS).

Analyze

1. Identify the role of impurity concentration in the variation of Fermi level in the case of p-type semiconductors.
2. Compare polar dielectrics with non-polar dielectrics.
3. Analyse the features of hard and soft magnetic materials.
4. Differentiate top down approach from bottom up approach.
5. Select the four important features of TEM.

15CH202- APPLIED CHEMISTRY
(Common to AE, AG, AU, CE, ME, Mtrs, BT, TT & FT)

3 0 2 4

Course objectives

By enrolling and studying this course the students will be able to

- understand the necessity of water softening processes
- aware the causes and consequences of corrosion
- acquaint the applications of alloying and phase rule in metallurgy
- recognize the fundamentals and applications of fuels
- characterize the chemical compounds using analytical techniques.

Program outcomes (POs)

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

Course outcomes

At the end of the course, the students will be able to

- attribute the internal and external treatment methods for the removal of hardness in water for domestic and industrial applications
- exemplify the type of corrosion and its mechanism which will help to develop the corrosion control methods.
- implement the applications of alloying and phase rule in the field of metallurgy
- analyse the three types of fuels based on calorific value for selected applications
- execute the applications of analytical methods for the characterize the chemical compounds

Unit I

Water purification

Hardness of water - classification of hardness (temporary and permanent) - Units of hardness (ppm, mg/l, degree Clark, degree French) – expression of hardness interms of calcium carbonate equivalence - estimation of hardness by EDTA Method - Uses of water for industrial purpose – requirements of boiler feed water – disadvantages of using hard water in industrial boilers: scale – sludge – priming – foaming – caustic embrittlement. Removal of dissolved salts from hard water: Internal conditioning (phosphate, carbonate, calgon and colloidal methods) - external conditioning: ion exchange process, reverse osmosis, electrodialysis. Uses of water for domestic purpose -

municipal water purification (screening, aeration, coagulation, sedimentation, filtration and disinfection of water- break point chlorination).

10 Hours

Unit II

Corrosion science

Corrosion - chemical and electro chemical corrosion – pilling Bedworth rule – Mechanism (type of oxide layer, oxygen absorption – hydrogen evolution) - Galvanic series - types of electrochemical corrosion: galvanic corrosion - differential aeration corrosion (pitting, pipeline and waterline corrosion) - Factors influencing corrosion (nature of metal & environment). Corrosion control: sacrificial anode - impressed current method. Protective coatings – paints – constituents and functions.

8 Hours

Unit III

Alloys and Phase rule

Alloys**:** purpose of alloying – function and effects of alloying elements – properties of alloys – classification of alloys. Ferrous alloys: nichrome and stainless steel. Non-ferrous alloys: brass and bronze. Heat treatment of alloys (Annealing, hardening, tempering, normalising, carburizing and nitriding)

Phase rule:Phase - component - degree of freedom – phase rule – phase diagram - Applications – one component system (water system). Reduced phase rule – two component system (lead and silver system).

9 Hours

Unit IV

Fuels

Classification - characteristics– calorific value – solid fuel – coal – types – analysis of coal (proximate and ultimate analysis) – processing of coal to coke - carbonization– types (low temperature and high temperature carbonization) - manufacture of metallurgical coke (Otto Hoffmann method). Liquid fuels - petroleum – refining of crude oil - knocking – octane number – cetane number. Liquid fuel from coal (Bergius process). Gaseous fuels – natural gas (CNG) – coal gas – producer gas – syn gas - shale gas.

10 Hours

Unit V

Instrumental methods

Beer – Lambert's law.Principle, instrumentation (block diagram only) and applications: Ultra violet spectroscopy – Infrared spectroscopy - Atomic absorption spectroscopy - Colorimetry (estimation of transition metal) - Flame photometry (estimation of alkali metal).

8 Hours

***Unit VI**

Synthesis and applications of bio-fuels.

Total: 45 Hours

Reference(s)

1. A. Pahari and B.Chauhan, *Engineering Chemistry*, Infinity Science press LLC, New Delhi, 2010.
2. M. Munjal et.al., *Wiley Engineering Chemistry*, Second edition, Wiley India Pvt., Ltd, New Delhi, 2013.
3. Willard Merritt and Dean Settle, *Instrumental methods of analysis*, CBS publishers, Seventh edition, 2012.

List of Experiments

1. Water quality of BIT campus – River – Bore well water with respect to hardness, TDS and pH.
2. Conduct metric titration of mixture of acids.

3. Determination of strength of hydrochloric acid in a given solution using pH meter.
4. Determination of the strength of Fe^{2+} in the given sample by potentiometric method.
5. a. Measurement of rate of corrosion on mild steel in aerated, neutral, acidic and alkaline medium by Tafel polarization method.
   b. Determination rate of corrosion by weight loss method.
6. Estimation of copper content in brass by EDTA method.
7. Estimation of iron (thiocyanate method) in the given solution by spectrophotometric method.

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*Self Study/ Seminar Presentation

15GE205 BASICS OF CIVIL AND MECHANICAL ENGINEERING
(Common to All Braches except Civil and Mechanical Engg.)

3 0 0 3

Course Objectives

- To impart basic knowledge in the field of Civil Engineering
- Guide students to select the good building materials
- Create awareness on various types of water supply and transportation systems

Course Outcomes (COs)

The student will be able to

1. Understand the fundamental philosophy of Civil Engineering
2. Identify the nature of building components, functions, construction practices and material qualities
3. Understand the fundamental concepts of water supply and transportation systems
4. Recognize the various engineering materials and manufacturing processes.
5. Understand the working principles and operations Internal Combustion Engines, Refrigeration, Boiler and power plants.

Unit I

Introduction to Civil Engineering

History, development and scope of Civil Engineering – Functions of Civil Engineers. Construction Materials: Characteristics of good building materials such as Stones – Bricks -Cement - Aggregates and concrete. Surveying: Definition and purpose – Classification – Basic principles – Measurement of length by chains and tapes.

9 Hours

Unit II

General Features Relating to Buildings

Selection of site – Basic functions of buildings – Major components of buildings. Types of foundation – Bearing capacity of soils – General Principles of Brick masonry – Stone masonry – Beams – Lintels – Columns –Doors and windows –Introduction to Green Building and Interior Design

9 Hours

Unit III

Water Supply and Transportation Systems

Sources of water Supply – Methods of Rain Water Harvesting –Flow Diagram of Water treatment Process –Modes of Transportation Systems. Classification of Highways-Components of roads– Bituminous and cement concrete roads. Importance of railways - Gauges – Components of permanent way – Types of bridges.

9 Hours

Unit IV

Engineering Materials and Manufacturing Processes

Materials–classification, mechanical properties of cast iron, steel and high speed steel – Casting process-Introduction to green sand moulding, pattern, melting furnace – electric furnace – Introduction to metal forming process and types – Introduction to arc and gas welding – Centre lathe, Drilling and Milling machines – principal parts, operations.

9 Hours

Unit V

Internal Combustion Engines and Refrigeration

Internal Combustion (IC) – Classification, main components, working principle of a two and four stroke petrol and diesel engines, differences – Refrigeration– working principle of vapour compression and absorption system – Introduction to Air conditioning.

9 Hours

Unit VI

Energy, Boilers, Turbine and Power Plants

Energy-Solar, Wind, Tidal, Geothermal , Biomass and Ocean Thermal Energy Conversion (OTEC) – Boilers – classification, Babcock and Wilcox and La-Mont Boilers, differences between fire tube and water tube boiler – Steam turbines- working principle of single stage impulse and reaction turbines – Power plant – classification, Steam, Hydel, Diesel, and Nuclear power plants.

Total: 45 Hours

References

1. N. Arunachalam, Bascis of Civil Engineering, Pratheeba Publishers, 2000
2. M. S. Palanichamy, Basic Civil Engineering, TMH, 2009
3. G. Shanmugam and M. S. Palanichamy, Basic Civil and Mechanical Engineering, Tata McGraw Hill Publishing Co., New Delhi, 2009
4. Pravin Kumar, *Basic Mechanical Engineering*, Pearson Education India, Pearson, 2013.
5. G. Shanmugam and S. Ravindran, *Basic Mechanical Engineering*, Tata McGraw-Hill Publishing Company Limited, New Delhi, 2013.
6. S. R. J. Shantha Kumar, *Basic Mechanical Engineering*, Hi-tech Publications, Mayiladuthurai, 2015.
7. http://www.tutorvista.co.in/content/science/science-ii/sources-energy/sources-energyindex.php

ASSESSMENT PATTERN

Unit No	Remember				Understand				Apply				Analyze				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
I	7					10																			17
II	7					10																			17
III	4					6					6														16
IV																									
V																									
	18					26					6														50

F - Factual; C-Conceptual; P-Procedural; M-Meta cognitive

Remember

1. Writedown the scope of Civil Engineering.
2. Define surveying.
3. List the ingredients of concrete.
4. State the basic principles of survey.
5. What is meant by lintel?
6. Writedown the components of buildings.
7. Define gauges.

8. List the functions of foundation.
9. What is meant by bearing capacity of soil?
10. Name the components of permanent way.
11. State the importance of railway.
12. List out the types of bridge.
13. What are the factors to be considred in selection of site?
14. Writedown the classification of highway.
15. What do you meant by rain water harvesting
16. What are the factors to be considered in design of green building?
17. Classify Boiler.
18. What is turbine?
19. Define water tube boiler.
20. Define fire tube boiler.
21. Name the main parts of a turbine.
22. Classify power plants.
23. Define Energy.
24. Classify IC Engines.
25. List the various components of IC Engines.
26. Define Refrigeration.
27. What are the uses of high carbon steel?
28. Define welding.
29. Define soldering.
30. Define Brazing.
31. What do you mean by milling?
32. List out the part of the I.C. Engine.
33. Mention types of energy?
34. Mention any two nuclear fuels.

Understand

1. Describe the characteristics of good building stone.
2. Explain the various functions of Civil Engineer.
3. Differentiate the English and Flemish bonds brick masonry.
4. Discuss in detail about principles of surveying.
5. Distinguishbetween stone and brick masonry.
6. Describe the characteristics of cement and concrete.
7. Differentiate bituminous and cement concrete roads.
8. Elucidate the components of permanent way.
9. Distinguish between shallow and deep foundation.
10. Describe the cross section of bituminous pavement.
11. Discuss about any four super structure components.
12. Elucidate different sources of water supply.
13. What are the points to be observed in the construction of brick masonry?
14. How solar energy is generated?
15. Compare reaction and impulse turbines.
16. What is the difference between renewable and non-renewable sources of energy?
17. What is the function of a hydraulic turbine?
18. What is the function of a surge tank in Hydel power plant?
19. What is the function of a moderator in Nuclear power plant?
20. What are the functions of a control rod in Nuclear power plant?
21. List the function of condenser in steam power plant.
22. How to select the boiler?
23. Why air is pre-heated before enter into boiler?

24. List the function of economizer in boiler.
25. How does a fusible plug function in boiler?
26. What is the function of a spark plug in IC engine?
27. What is the function of a fuel injector in diesel engine?
28. Compare and contrast 4 stroke and 2 stroke engine.

Apply

1. Explain in detail about rain water harvesting.
2. Explain the process of water treatment.
3. Enumerate the procedure fort construction of water bound macadam road.

15GE206 COMPUTER PROGRAMMING
(Common to AE, AG, AU, CE, ME, MTRS, BT, FT & TT)

2 0 2 3

Course Objectives

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

Course Outcomes (COs)

The student will be able to

1. To understand the basic concepts of computers.
2. To write programs using operators and expressions.
3. To demonstrate the usage of control structures.
4. To create programs using Arrays and strings.
5. To understand the concepts of structures and functions.

Unit I

Introduction to Computers

Introduction to computers – Characteristics of Computers – Evolution of Computers – Computer Generations – Basic Computer Organization - Number System - Problem Solving Techniques - Features of a Good Programming Language.

7 Hours

Unit II

Introductionto‘C’Progr
amming

Overview of C– Structure ofCprogram– Keywords –Constants–Variables–Datatypes–Typeconversion **OperatorsandExpressions**:Arithmetic–Relational–Logical– Assignment - Increment and Decrement - Conditional-Bitwise–Precedence of operators - Managing I/O operations – Formatted I/O –Unformatted I/O.

9 Hours

UnitIII

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 – Nested for statement

Jump Statements: goto - break - continue - return statement

9 Hours

Unit IV

Arrays and Strings

Arrays: Introduction, one dimensional array, declaration - Initialization of one dimensional array, two-dimensional arrays, initializing two dimensional arrays, multi-dimensional arrays.
Strings: Declaring and initializing string variables- Reading strings from terminal - writing string to screen - String handling functions.

10 Hours

Unit V

Structures and Functions

Structures and Unions: Introduction - defining a structure - declaring structure variables - accessing structure members - structure initialization - Unions – 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 - Pre-processor directives and macros.

10 Hours

Unit VI

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

Listof Experiments

1. Programs to understand the operators and expressions.
2. Programs using control statements.
3. Programs to learn the concept of arrays.
4. Programs using strings.
5. Programs using structures and functions. **Total: 60 Hours**

References

1. Pradeep K. Sinha, Priti Sinha, Computer Fundamentals, BPB publications, 2008
2. Ashok.N.Kamthane, *Computer Programming*, Second Edition, Pearson Education, 2008
3. E.Balagurusamy, *Programming in ANSI C*, TMH, 2008
4. HerbertSchidt,*C-TheCompleteReference,*McGrawHill,2002
5. ByronS.Gottfried,*Schaum'sOutlineofProgrammingwithC,*McGrawHill,1996

ASSESSMENT PATTERN

Unit No	Remember				Understand				Apply				Analyze				Evaluate				Create				Total
	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	F	C	P	M	
I	6	4				4					6														20
II	6					2					12														20
III	2				2		4				6		6												20
IV	6				2		4		4		4														20
V	4				2		2				2						6				4				20
																									100

F - Factual; C-Conceptual; P-Procedural; M-Meta cognitive

Remember

1. What are all the characteristics of computer?
2. List the features for a good programming language.
3. What are the I/O functions in C?
4. What is a header file?
5. Define a ternary operator. Give example
6. What is an array and a pointer?

7. What is the significance of function?
8. Define a structure.
9. What are bit-wise operators?
10. What is the purpose of sizeof() operator?
11. Define increment and decrement operator.
12. What is nested for loop?
13. List the three constructs for performing loop operations.
14. List the different types of decision making statements.
15. Give the syntax for if else statement.
16. What is dangling else problem?

Understand

1. What are the advantages of using Macro?
2. Explain about the generation of computers.
3. Differentiate between Structure and Union in C.
4. How is memory managed in C?
5. How garbage collection is done in C?
6. Which statement transfers the control out of the switch statement?
7. Which operators are used to make decision?
8. What is the use of Break statement?
9. How to declare and initialize a string?
10. When a number is said to be palindrome?
11. Which function is used to return the number of characters in a string?
12. How to declare a function?
13. When a recursive function is used?
14. How to store a variable in Structures?
15. How is structure different from union?

Apply

1. Why C is called as structured programming?
2. Illustrate the use of integer arithmetic using a sample example.
3. Explain the difference between relational operators and logical operators.
4. Write a recursive function to calculate the factorial of number.
5. Write a C program to check whether the given string is palindrome or not
6. Write a program to check whether the given number is prime or not.
7. Write a C program to find the roots of quadratic equation ax2+bx+c=0.
8. Write a C program to find average of ‘n’ numbers.
9. Write a program to generate the pay slip of an employee using Structure.
10. Write a C program to search for a specified element in an array.
11. Write a program to compute Matrix Multiplication.
12. Write a C program to calculate the simple interest.
13. Write a C program to check whether the given number is Armstrong or not.
14. Write a C program to reverse the digits.
15. Write a C program to copy one array to another array.
16. Illustrate the one problem solving technique with an example.

Analyze

1. Explain the difference between while and do-while statements
2. Compare if-then and switch case.
3. Why we use return 0? Is return statement necessary?
4. Compare bitwise and logical operators.
5. Differentiate entry-controlled loop and exit-controlled loop.
6. Distinguish looping and decision making statements.

7. Distinguish between if else and else if statement.
8. Which statement transfers the control out of the switch statement?
9. Differentiate getchar() and gets() function
10. If you pass an array as an argument to a function, what actually gets passed?
11. Differentiate call by value and call by reference.

. **Evaluate**

1. Compare and contrast putchar() and printf() function.
2. Differentiate the keywords BREAK and CONTINUE.
3. Compare and contrast I/O mapped I/O with Memory mapped I/O.
4. Summarize the various built in String functions.
5. How an arithmetic expression x=a-b/3+c*2-1 can be evaluated?
6. How can we use the getchar() function to read multi character strings?
7. Compare arithmetic expression with conditional expression.
8. Identify unnecessary parentheses in the following arithmetic expression
   ((x-(y/5) +z) % 8) +25
9. Determine the value of the logical expression a>b && a<c, where a=5, b=10 and c=-6.
10. Find the output of the program

```
main()
{
int x=100, y=200;
printf("%d", (x>y)? x:y);
}
```

11. Analyze the various input and output operations used in C.
12. Compare and contrast relational expression with conditional expression.
13. How can we use the putchar() function to output multi character strings?
14. How does a control string in a printf() function differ from the control string in a scanf() function?
15. Find the output of this C code.

```
#include <stdio.h>
int main()
   {
int a = 10, b = 10;
if (a = 5)
b--;
printf("%d, %d", a, b--);
   }
```

16. What is the output of this C code?

```
#include <stdio.h>
int main()
{
intvar = 010;
printf("%d", var);
}
```

17. Distinguish structure data type with other data type variables

Create

1. Create a structure to store the following details: Rollno, Name, Mark1, Mark2, Mark3, Total, Average, Result and Class. Write a program to read Rollno, name and 3 subject marks. Find out the total, result and class as follows:
   a) Total is the addition of 3 subject marks.
   b) Result is "Pass" if all subject marks are greater than or equal to 50 else "Fail".
   c) Class will be awarded for students who have cleared 3 subjects

i. Class "Distinction" if average >=75
ii. Class "First" if average lies between 60 to 74 (both inclusive)
iii. Class "Second" if average lies between 50 & 59 (both inclusive)

d) Repeat the above program to manipulate 10 students' details and sort the structures as per rank obtained by them.

2. Write a program that will obtain the length and width of a rectangle from the user and compute its area and perimeter.
3. Write a program that determines whether a given integer is odd or even and displays the number and description on the same line.
4. Write a C Program to print all numbers between 1 to n divisible by 7
5. Write a C Program to find sum of 1 + 2 + 3 + ….. + n
6. Write a C Program to find sum of 2 + 4 + 6 + ….. + n
7. Write a C Program to find sum of 7 + 14 + 21 + ….. + n
8. Write a C Program to find sum of 1/1 + 1/2 + 1/3 + ….. + 1/n
9. Write a C Program to print 15 terms of 1 , 2 , 4, 7, 11, 16, …...
10. Write a C Program to print even and odd number from an array
11. Write a C Program to read character from keyboard and display message whether character is alphabet , digit or special symbol
12. Write a C Program to read a string and count number of vowels in it.
13. Write a C Program to print square of all numbers 1 to 20 and print sum squares
14. Write a C Program to check if given number is present in an array or not
15. Write a C Program to find the position of given number in array

15GE207 Engineering Graphics
(Common to all branches)

2 0 2 3

Course Objectives

- To learn conventions and use of drawing tools in making engineering drawings.
- To understand the engineering drawing methods and procedures to draw two dimensional drawings from three dimensional model and vice versa.
- To provide the practice for converting simple drawing into the computer aided drawing.

Course Outcomes (COs)

The student will be able to

1. Recognize the conventions and apply dimensioning concepts while drafting simple objects.
2. Develop the two dimensional drawings from three dimensional model and vice versa.
3. Utilize the visualization skill to convert simple drawing into the computer aided drawing.

Unit I

Conventions and Basic drawings

Importance - conventions - ISO and BIS - drawing tools and drawing sheets - lettering, numbering, dimensioning, lines and symbols-Conic sections-types-constructions –ellipse, parabola and hyperbola- eccentricity and parallelogram method.

12 Hours

Unit II

Projections

Principles-first and third angle projections - Points – first angle projection of points-Straight lines - parallel, perpendicular and inclined to one reference plane-Solid - cylinders, pyramids, prisms and cones-perspective projections.

14 Hours

Unit III

Orthographic Projections and Section of Solids

Orthographic Projections - concepts - front view, top view and side view of simple solids -Section of Solids-simple illustrations. **12 Hours**

Unit IV

Isometric projections and Development of surfaces

Importance- orthographic to isometric projection- simple and truncated solids.Development of surfaces - cylinders, pyramids, prisms, cones and simple truncated objects.

12 Hours

Unit V

Introduction to AUTOCAD

Basics commands of AutoCAD- two dimensional drawing, editing, layering and dimensioning - coordinate systems-Drawing practice - orthographic views of simple solids using AutoCAD.

10 Hours

Total: 60 Hours

References

1. K Venugpoal, *Engineering Drawing and Graphics*, 3rd edition, New Age International, 2005.
2. BasantAgrawal, *Mechanical drawing*, Tata McGraw-Hill Education, 2008.
3. *Engineering Drawing Practice for Schools & Colleges*, BUREAU OF INDIAN STANDARDS-SP46, 2008.
4. N. D. Bhatt and V. M. Panchal, *Engineering Drawing*, Charotar Publishing House Pvt. Limited, 2008.
5. K.V.Natarajan, *A Text Book of Engineering Graphics*, Dhanalakshmi Publishers, 2013.
6. George Omura, Brian C. Benton,*Mastering AutoCAD 2015 and AutoCAD LT 2015: Autodesk Official Press*, Wiley Publisher, 2015.
7. http://nptel.ac.in/courses/112103019/7.