



UNITED INSTITUTE OF TECHNOLOGY

(An Autonomous Institution)

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Periyanaickenpalayam, Coimbatore – 641020



DEPARTMENT OF SCIENCE AND HUMANITIES

QUESTION BANK

I YEAR

ODD SEMESTER

ACADEMIC YEAR 2024 – 2025

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HEAD OF THE DEPARTMENT

ACOE

PRINCIPAL

CHAIRMAN

24PHBS101
Material Science for Sensors and Devices

UNIT 1

OPTICS & FIBRE OPTICS

Reflection and refraction of light waves – total internal reflection -Interference - Air Wedge – Michelson's Interferometer – Wavelength Determination - Fiber optics: principle, numerical aperture, and acceptance angle - types of optical fibers (material, refractive index, and mode) - losses associated with optical fibers - fiber optic sensors: pressure and displacement.

Q. NO	QUESTION	CO	BTL	Marks
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PART – A

1	Outline the conditions necessary for total internal reflection to occur.	1	2	2
.				
2	What is interference of light waves?	1	1	2
3	State Snell's law of refraction.	1	1	2
.				
4	Define numerical aperture (NA) in fiber optics.	1	1	2
.				
5	Distinguish between single-mode and multi-mode fibers.	1	4	2
.				
6	What is the acceptance angle of an optical fiber?	1	1	2
.				
7	What is an air wedge?	1	1	2
.				
8	Outline two applications of fiber optic sensors.	1	2	2
.				

PART – B

1	Explain the working of Michelson's interferometer and derive the formula for wavelength determination.	1	2	16
.				
2	Illustrate the interference of light waves and explain the formation of fringes in an air wedge experiment.	1	2	16
.				
3	Explain the working principle and applications of fiber optic sensors in pressure and displacement measurement.	1	2	16
.				

4	Catagorize the types of optical fibers based on material, refractive index, and mode. Explain the losses associated with optical fibers.	1	4	16
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UNIT 2

LASERS

Theory of laser – characteristics – Spontaneous and Stimulated emission – Einstein's coefficients – population inversion – Resonant cavity - Optical amplification (qualitative) - Ruby Laser - Nd-YAG laser - CO2 laser - semiconductor laser (Homojunction and Heterojunction) – LASERS in industry: Drilling, cutting and welding. Lasers in medicine: Dermatology, cardiology, dentistry, and ophthalmology.

Q.NO	QUESTION	CO	BTL	Marks
PART – A				
1.	What is a laser?	2	1	2
2.	State any two characteristics of laser light.	2	1	2
3.	Differentiate between spontaneous emission and stimulated emission.	2	4	2
4.	What are Einstein's coefficients?	2	1	2
5.	Define population inversion.	2	1	2
6.	What is a resonant cavity in a laser system?	2	1	2
7.	What is optical amplification?	2	1	2
8.	Mention the active medium used in a ruby laser.	2	1	2
PART – B				
1.	Illustrate the working principle of Ruby laser with construction and applications.	2	2	16

2.	Explain the principle, construction, and working of Nd:YAG laser.	2	2	16
3.	Explain the applications of lasers in industry and medicine	2	2	16
4.	Explain population inversion and the concept of optical amplification.	2	2	16

UNIT 3

QUANTUM PHYSICS

Black body radiation - Planck's theory (qualitative) - Compton Effect: theory and experimental verification - wave-particle duality - the concept of the wave function and its physical significance - Schrödinger's wave equation: time-independent and time-dependent equations - particle in a one-dimensional box - tunnelling (qualitative) - scanning tunnelling microscope.

Q.NO	QUESTION	CO	BTL	Marks
PART – A				
1.	What is a black body?	3	1	2
2	State Wien's displacement law	3	1	2
3.	Explain the formula for Planck's radiation law.	3	2	2
4.	What is the Compton effect?	3	1	2
5.	What is wave-particle duality?	3	1	2
6.	What is quantum tunnelling?	3	1	2
7.	Mention one physical significance of the wave function.	3	1	2
8.	What is normalization of the wave function?	3	1	2
PART – B				
1.	Explain black body radiation and Planck's theory qualitatively.	3	2	16
2.	Discuss the Compton effect with theory and experimental verification.	3	2	16

3.	Derive the time-dependent and time-independent Schrödinger wave equations.	3	4	16
4	Explain the concept of quantum tunneling and its applications.	3	2	16

UNIT 4

QUANTUM COMPUTING AND COMMUNICATION

Global Perspectives – Quantum Bits – Quantum Computation – Quantum Algorithms – Experimental Quantum Information Processing – Quantum Information - Quantum Computing Models: NMR Quantum Computing, Spintronics and QED MODEL, Linear Optical MODEL, Future of Quantum computing.

Q.NO	QUESTION	CO	BTL	Marks
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PART – A

1.	What is quantum computing?	4	1	2
2	What is a qubits?	4	2	2
3.	What is superposition in quantum computing?	4	1	2
4.	Mention any two quantum gates.	4	4	2
5.	What is Grover's algorithm used for?	4	1	2
6.	What is the QED model in quantum computing?	4	1	2
7.	What is spintronics in quantum communication?	4	1	2
8.	What is entanglement in quantum mechanics?	4	1	2

PART – B

1.	Explain quantum algorithms with examples of Shor's and Grover's algorithms.	4	4	16
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2.	Explain the concept of quantum computing and its global perspectives.	4	2	16
3.	Describe quantum computing models: NMR, spintronics, QED, and linear optical model.	4	4	16
4.	Explain the concept of quantum bits (qubits) and their role in quantum computation.	4	2	16

UNIT 5

NANO ELECTRONICS

Introduction to Nano electronics – Moore’s law – Size-dependent Fermi energy – Quantum confinement – Quantum dot – Quantum wire – Quantum well – Density of energy states – Waves in electronics – Classical wave – Double slit experiment on electron – Two terminal quantum wire device – Working of FET – Molecular FET – FET Switching – Function of MOSFET – Applications

Q.NO	QUESTION	CO	BTL	Marks
PART – A				
1.	What is nanoelectronics?	5	1	2
2.	State Moore's law.	5	1	2
3.	What is size-dependent Fermi energy?	5	1	2
4.	Define quantum confinement.	5	2	2
5.	What is the density of energy states?	5	1	2
6.	What is a two-terminal quantum wire device?	5	1	2
7.	What did the double-slit experiment with electrons demonstrate?	5	1	2
8.	What is a two-terminal quantum wire device?	5	1	2
PART – B				
1.	Explain size-dependent Fermi energy and quantum confinement.	5	4	16
2.	Describe quantum dots, quantum wires, and quantum wells with their density of states.	5	2	16

- | | | | | |
|----|---|---|---|----|
| 3. | Explain the working of FET, molecular FET, and FET switching. | 5 | 2 | 16 |
| 4. | Explain the function of MOSFET and its applications. | 5 | 2 | 16 |

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24CHBS101
Applied Chemistry for Engineers

UNIT I

WATER AND ITS TREATMENT

Water - Introduction - Water quality parameters: Colour, turbidity, pH, hardness, alkalinity, TDS, COD and BOD. Municipal water treatment: primary treatment and sterilization - breakpoint chlorination. Desalination of brackish water: Reverse Osmosis. Boiler troubles: Scale and sludge, Boiler corrosion. Internal treatment - External treatment – Ion exchange process.

Q.No	Question	CO	BTL	Marks
PART A				
1.	Define Hardness.	1	1	2
2.	Justify -All the demineralised water is soft water but all soft are not demineralised water.	1	5	2
3.	Indicate the reasons for boiler corrosion.	1	2	2
4.	State the significance of Alkalinity.	1	1	2
5.	What do you mean by Desalination?	1	1	2
6.	Suggest-Why hydrazine is ideal when compared to sodium sulphite?	1	4	2
7.	List out the disadvantages of scale formation in boiler.	1	2	2
8.	Define BOD and COD.	1	1	2
PART B				
1.	(i)What is desalinisation? Describe the process involved in it with a neat sketch. (ii)Distinguish sludge and scale.	1	2	16
2.	Sketch out the stages in municipal water treatment with sterilisation methods. (i)Enumerate the reasons for the boiler corrosion. (ii)Illustrate Break point chlorination using graphical representation.	1	3	16
3.	Draw a suitable diagram and describe the ion exchange process for the Softening of hard water.	1	3	16
4.	Describe any 5 water quality parameters with its importance.	1	2	16

UNIT II

ELECTROCHEMISTRY AND STORAGE DEVICES

Electrochemical cells - redox reaction - EMF of a cell - electrode potential - single and standard electrode potential - Nernst equation - Electro chemical series-Applications. Batteries: Types of batteries - Lead acid battery and lithium-ion battery; Electric vehicles – working principles; Fuel cells: H₂-O₂ fuel cell. Super capacitors.

Q.No	Question	CO	BTL	Marks
PART A				
1.	Justify why a salt bridge is used in the construction of a cell.	2	5	2
2.	Define single electrode potential and the factors affecting it.	2	1	2
3.	Calculate the standard electrode potential of Zinc electrode in contact with a solution of 0.1M ZnSO ₄ ions at 25°C. ($E^\circ \text{ Zn/Zn}^{2+}$)=0.76 V	2	3	2
4.	What is meant by emf series?	2	1	2
5.	Construct the cell representation for Daniel cell.	2	6	2
6.	What are super capacitors?	2	1	2
7.	Give some applications of fuel cell.	2	2	2
8.	Mention the components of EV.	2	6	2
PART B				
1.	Explain the principle and working process of a lithium-ion battery with its advantages.	2	3	16
2.	Derive the Nernst equation and list the applications of the electrochemical series.	2	4	16
3.	Define electric vehicles and explain their working principle, along with their advantages and disadvantages.	2	2	16
4.	Explain how a Hydrogen-Oxygen fuel cell generates electricity.	2	3	16

UNIT III

FUELS AND COMBUSTION

Fuels: Introduction - Classification - Carbonization of coal - Manufacture of metallurgical coke. Petroleum - Refining of petroleum - Synthetic petrol (Bergius process)- Knocking -octane number and cetane number. Power alcohol and biodiesel. Combustion of fuels: Introduction - Calorific value-Theoretical calculation of calorific value; Ignition temperature: spontaneous ignition temperature. Flue gas analysis by Orsats method.

Q.No	Question	CO	BTL	Marks
PART A				
1.	Define refining of Petroleum.	3	1	2
2.	State Octane number and Cetane number.	3	1	2
3.	What is meant by combustion of fuel?	3	1	2
4.	Mention the properties of a Metallurgical coke?	3	6	2
5.	Define Knocking. How is it improved?	3	1	2
6.	What do you mean by Carbonisation? Write on its classification.	3	1	2
7.	How will Bio-diesel be prepared?	3	1	2
8.	Write Dulong's formula to calculate GCV and LCV.	3	1	2
PART B				
1.	Describe with a neat diagram, the manufacture of synthetic gasoline using Bergius Process.	3	4	16
2.	How is metallurgical coke manufactured by Otto-Hoffman's by-product oven method ?	3	2	16
3.	Explain in detail about ORSAT method, significance and precautions.	3	3	16
4.	Evaluate the gross and net calorific values of coal having the following composition, C=85%,H=8%,S=1%,N-2% and Ash=4%	3	5	16

UNIT IV

PHOTOCHEMISTRY AND SPECTROSCOPY

Photochemistry: Laws of photochemistry-Stark-Einstein law and Beer-Lambert law. Quantum efficiency-Photo processes-photosensitization-Internal conversion, Inter-system crossing, Fluorescence, Phosphorescence, Chemiluminescence. Spectroscopy: Electromagnetic spectrum- Absorption of radiation-Electronic, vibrational and rotational transitions. UV-visible and IR spectroscopy-principles, instrumentation and application

Q.No	Question	CO	BTL	Marks
PART A				
1.	State the types of photo physical process(Fluorescence and Phosphorescence).	4	1	2
2.	Define the terms (non-radiative transition) IC and ISC.	4	1	2
3.	State Stark-Einstein Law.	4	1	2
4.	What is Chemiluminescence?	4	1	2
5.	What are photosensitisers?	4	1	2
6.	State Lamberts law.	4	1	2
7.	What is Quantum Efficiency?	4	1	2
8.	What do you mean by photochemical reaction?	4	1	2
PART B				
1.	Describe UV-Visible spectroscopy principle, instrumentation and application.	4	2	16
2.	Describe IR-spectroscopy principle, instrumentation and its application.	4	2	16
3.	Distinguish between Phosphorescence and Fluorescence	4	4	16
4.	State Beer-Lambert's law and explain application and Limitations of the law in detail.	4	3	16

UNIT V
NANOCHEMISTRY

Introduction- Nanomaterials and bulk materials; Size-dependent properties (optical, electrical, mechanical and magnetic); Types of nanomaterials – Carbon nanotubes – Synthesis of nanomaterials- sol-gel, solvo thermal and chemical vapour deposition. Applications of nanomaterials in medicine, agriculture, energy and electronics.

Q.No	Question	CO	BTL	Marks
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PART A

1.	Define the term Nano rods.	5	1	2
2.	What is Magic Number?	5	1	2
3.	Calculate the number of vibration for CO ₂ and H ₂ O molecule.	5	3	2
4.	List out important categories of Nano Materials.	5	2	2
5.	What do you mean by Carbon Nano Tube?	5	1	2
6.	What are Nano wires?	5	1	2
7.	State Nanoparticles and bulk materials.	5	1	2
8.	What are Nano wires?	5	1	2

PART B

1.	Elaborate the synthesis of nanomaterials using sol-gel method.	5	4	16
2.	Discuss any four properties of Nano-materials and applications of Nano materials.	5	5	16
3.	Explain the chemical vapour deposition method for the synthesis of Nano materials.	5	3	16
4.	Discuss the Synthesizing of nano particles using Solvo-Thermal method	5	5	16

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24MABS101
Matrices and Calculus

UNIT 1 MATRICES

Eigen values and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors – Statement and applications of Cayley-Hamilton Theorem – Diagonalization of matrices – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms.

Q.No	Question	CO	BTL	Marks
PART A				
1.	Find the characteristic polynomial of $\begin{pmatrix} 1 & 4 \\ 2 & 3 \end{pmatrix}$.	1	1	2
2.	The product of two Eigenvalues of the matrix $A = \begin{pmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{pmatrix}$ is 16. Find the third Eigenvalue.	1	1	2
3.	If $A = \begin{bmatrix} 3 & 1 & 4 \\ 0 & 2 & 6 \\ 0 & 0 & 5 \end{bmatrix}$ then find the eigen values of A^{-1} .	1	1	2
4.	If 2 and 3 are the eigenvalues of $A = \begin{pmatrix} 3 & 10 & 5 \\ -2 & -3 & -4 \\ 3 & 5 & 7 \end{pmatrix}$. Find the eigenvalues of A^{-1} and A^3 .	1	1	2
5.	State Cayley – Hamilton Theorem.	1	1	2
6.	Write down the matrix for the following quadratic form: $2x_1^2 - 2x_2^2 + 4x_3^2 + 2x_1x_3 - 6x_1x_3 + 6x_2x_3$	1	1	2
7.	Prove that $x^2 - y^2 + 4z^2 + 4xy + 2yz + 6xz$ is indefinite.	1	1	2
8.	Discuss the nature of the Q.F. $2x^2 + 6y^2 + 2z^2 + 8xz$ without reducing them to Canonical form.	1	1	2

PART B

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|----|---|---|---|----|
| 1. | (i) Find the Eigen values and Eigen vectors of the following matrices
$\begin{pmatrix} 7 & -2 & 0 \\ -2 & 6 & -2 \\ 0 & -2 & 5 \end{pmatrix}$ | 1 | 5 | 8 |
| | (ii) Using Cayley -Hamilton theorem, find A^{-1} if $A = \begin{pmatrix} 1 & 3 & 7 \\ 4 & 2 & 3 \\ 1 & 2 & 1 \end{pmatrix}$ | 1 | 3 | 8 |
| 2. | (i) Find the Eigen values and Eigen vectors of the following matrices
$\begin{pmatrix} 2 & 0 & 1 \\ 0 & 2 & 0 \\ 1 & 0 & 2 \end{pmatrix}$ | 1 | 5 | 8 |
| | (ii) Using Cayley-Hamilton theorem for $A = \begin{pmatrix} 2 & -1 & 2 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{pmatrix}$. Hence find its
inverse. | 1 | 3 | 8 |
| 3. | Diagonalize the matrix $A = \begin{pmatrix} 2 & 2 & 0 \\ 0 & 1 & 0 \\ 0 & 1 & 2 \end{pmatrix}$ by orthogonal transformation. | 1 | 5 | 16 |
| 4 | Reduce the quadratic form $x_1^2 + 5x_2^2 + x_3^2 + 2x_1x_2 + 2x_2x_3 + 6x_3x_1$ to the
canonical form through orthogonal transformation and find its nature. | 1 | 5 | 16 |
| 5 | Reduce the quadratic form $8x^2 + 7y^2 + 3z^2 - 12xy - 8yz + 4zx$ to the canonical
form by an orthogonal transformation. Also find its rank, index, signature and
nature of the quadratic form. | 1 | 5 | 16 |

UNIT 2

DIFFERENTIAL CALCULUS

Limits, Continuity- Differentiability of functions- Differentiation rules (Sum, Product, Quotient, Chain rule)- Mean value theorem- Rolle's theorem- Lagrange's mean value theorem- Taylor's and Maclaurin's series- Stationary points.

Q.NO	QUESTION	CO	BTL	Marks
PART – A				

1. Define odd and even functions with examples.	2	1	2
2. Define limit of a function.	2	1	2
3. Evaluate $\lim_{x \rightarrow 4} \frac{x^2 - 4x}{x^2 - 3x - 4}$, if it exists.	2	5	2
4. Sketch the graph of the function $f(x) = \begin{cases} x^2; & \text{if } -2 \leq x \leq 0 \\ 2 - x; & \text{if } 0 < x \leq 2 \end{cases}$	2	1	2
5. Find $\frac{dy}{dx}$, if $y = xe^x \sin x$.	2	5	2
6. Find $\frac{dy}{dx}$, if $y = \frac{x^2 - 1}{x^2 + 1}$.	2	5	2
7. Find the domain of the function $f(x) = \sqrt{5x + 10}$.	2	5	2
8. Define Rolle's theorems	2	1	2

PART B

1. (i) For what value of the constant c is the function f continuous at $(-\infty, \infty)$ $f(x) = \begin{cases} cx^2 + 2x; & x < 2 \\ x^3 - cx; & x \geq 2 \end{cases}$	2	3	8
(ii) Evaluate the limit $\lim_{t \rightarrow 1} \frac{t^4 - 1}{t^3 - 1}$.	2	5	8
2. (i) For what value of the constant c is the function f continuous at $(-\infty, \infty)$ $f(x) = \begin{cases} cx^2 + 2x; & x < 2 \\ x^3 - cx; & x \geq 2 \end{cases}$	2	3	8
(ii) Evaluate the limit $\lim_{t \rightarrow 1} \frac{t^4 - 1}{t^3 - 1}$.	2	5	8

3.	If $f(x) = 2x^3 + 3x^2 - 36x$, then (i) find the critical points of f? (ii) On what interval is f increasing or decreasing? (iii) At what points, if any, does f assume local maximum and minimum values? (iv) Find intervals of concavity and the inflection points.	2	5	16
4	If $f(x) = x^4 - 2x^2 + 3$, then (i) find the critical points of f? (ii) On what interval is f increasing or decreasing? (iii) At what points, if any, does f assume local maximum and minimum values? (iv) Find intervals of concavity and the inflection points.	2	5	16
5	Find the maximum and minimum values of $2x^3 - 3x^2 - 36x + 10$.	2	5	16

UNIT 3

APPLICATIONS OF DIFFERENTIAL CALCULUS

Curvature in Cartesian co-ordinates – Centre and radius of curvature – Circle of curvature – Evolutes – Envelopes - Evolute as envelope of normals.

Q.NO	QUESTION	CO	BTL	Marks
PART – A				
1.	What is the radius of curvature of the curve $y=e^x$ at (0,1)	3	1	2
2	Find the radius of curvature at (0,c) on the curve $y = c \cosh\left(\frac{x}{c}\right)$.	3	1	2
3.	Find the Centre of curvature of $y = x^2$ at the origin.	3	1	2
4.	Find the curvature of curve of $x^2 + y^2 - 6x + 4y + 5 = 0$ at any point.	3	1	2
5.	Find the radius of curvature at any point (x,y) on the curve $y = c \log \sec\left(\frac{x}{a}\right)$.	3	1	2
6.	Find the envelope of the family of lines $\frac{x}{t} + yt = 2c$, t being the parameter.	3	1	2
7.	Find the envelope of family of straight line $y = mx + \frac{a}{m}$, m being the parameter.	3	1	2
8.	Find the envelope of family of straight line $y = mx + am^2$, m being the parameter.	3	1	2

PART – B

1.	(i) Find the radius of curvature of the curve $xy = c^2$ in (c, c) (ii) Find the circle of curvature of the curve $\sqrt{x} + \sqrt{y} = \sqrt{a}$ at $\left(\frac{a}{4}, \frac{a}{4}\right)$	3	5	8
2.	Find the evolute of the parabola $y^2 = 4ax$.	3	5	8
3.	Find the evolute of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$.	3	5	16
4.	Find the envelope of the lines $\frac{x}{a} + \frac{y}{b} = 1$ where a and b are connected by the relation $a^n + b^n = c^n$.	3	5	16
5.	Find the envelope of the family of straight lines $\frac{x}{a} + \frac{y}{b} = 1$ where a and b are connected by the relation (i) $a + b = c$, (ii) $ab = c^2$ where c is a constant.	3	5	16

UNIT 4

DIFFERENTIAL CALCULUS OF SEVERAL VARIABLES

Partial derivatives – Total derivative – Differentiation of implicit functions – Jacobians and Properties – Taylor's series for functions of two variables – Maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers.

Q.NO	QUESTION	CO	BTL	Marks
PART – A				
1.	Write the sufficient conditions for $f(x, y)$ to have a maximum value at (a, b) .	4	1	2
2.	If $u = \frac{y^2}{x}$, $v = \frac{x^2}{y}$, find $\frac{\partial(x, y)}{\partial(u, v)}$	4	1	2
3.	If $x = r \cos \theta$, $y = r \sin \theta$, find $\frac{\partial(x, y)}{\partial(r, \theta)}$ and $\frac{\partial(r, \theta)}{\partial(x, y)}$.	4	1	2
4.	If $u = x^2 + y^2$ and $x = at^2$, $y = 2at$. Find $\frac{du}{dt}$	4	1	2
5.	Prove that $\frac{\partial^2 f}{\partial x \partial y} = \frac{\partial^2 f}{\partial y \partial x}$ if $f = x^3 + y^3 + z^3 + 3xyz$.	4	1	2

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| 6. Prove that $\frac{\partial^2 f}{\partial x \partial y} = \frac{\partial^2 f}{\partial y \partial x}$ if $f = x^3 + y^3 + z^3 + 3xyz$. | 4 | 1 | 2 |
| 7. If $u = (x - y)(y - z)(z - x)$ then show that $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = 0$. | 4 | 1 | 2 |
| 8. Find the stationary points of the function $f(x, y) = x^3 + y^3 - 3x - 12y + 20$. | 4 | 1 | 2 |

PART – B

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|---|---|---|----|
| 1. (i) If $u = x^2 + y^2 + z^2$ and $x = e^t$, $y = e^t \sin t$, $z = e^t \cos t$, then find $\frac{du}{dt}$ without actual substitution. | 4 | 5 | 8 |
| (ii) If $x + y + z = u$, $y + z = uv$, $z = uvw$ prove that $\frac{\partial(x, y, z)}{\partial(u, v, w)} = u^2 v$. | 4 | 3 | 8 |
| 2. (i) If $\frac{yz}{x}$, $v = \frac{zx}{y}$, $w = \frac{xy}{z}$, show that $\frac{\partial(u, v, w)}{\partial(x, y, z)} = 4$. | 4 | 3 | 8 |
| (ii) If $g(x, y) = \psi(u, v)$, where $u = x^2 - y^2$, $v = 2xy$, prove that $\frac{\partial^2 g}{\partial x^2} + \frac{\partial^2 g}{\partial y^2} = 4(x^2 + y^2) \left(\frac{\partial^2 \psi}{\partial u^2} + \frac{\partial^2 \psi}{\partial v^2} \right)$. | 4 | 5 | 16 |
| 3. (i) Expand $e^x \cos y$ at $(0, \pi/2)$ up to the third term using Taylor's series | 4 | 3 | 8 |
| (ii) If $z = f(x, y)$, where $x = u^2 - v^2$, $y = 2uv$, prove that $\frac{\partial^2 z}{\partial u^2} + \frac{\partial^2 z}{\partial v^2} = 4(u^2 + v^2) \left(\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial y^2} \right)$ | 4 | 5 | 8 |
| 4. (i) Find the extreme value of the function $f(x, y) = x^4 + y^4 - 2x^2 + 4xy - 2y^2$. | 4 | 5 | 8 |
| (ii) A rectangular box, open at the top, is to have a volume of 32cc. Find the dimensions of the box that requires the least materials for its construction. | 4 | 5 | 16 |

UNIT 5 INTEGRAL CALCULUS

Definite and Indefinite Integrals- Integration by Parts- Integration by Partial fraction method- Double integrals in Cartesian coordinates – Area enclosed by plane curves – Area of a curved surface - Triple integrals – Volume of Solids.

Q.NO	QUESTION	CO	BTL	Marks
PART – A				

1.	Evaluate $\int x \sin x dx$ by using integration by parts.	5	1	2
2.	Evaluate $\int_1^a \int_2^b \frac{1}{xy} dx dy$.	5	1	2
3.	Evaluate $\int_0^5 \int_0^2 (x^2 + y^2) dx dy$.	5	1	2
4.	Evaluate $\int_1^2 \int_1^3 xy^2 dx dy$.	5	1	2
5.	Evaluate $\int_0^1 \int_0^2 \int_0^3 xyz dx dy dz$.	5	1	2
6.	Evaluate $\int_0^1 \int_0^2 \int_0^3 dx dy dz$.	5	1	2
7.	Evaluate $\int_0^a \int_0^b \int_0^c e^{x+y+z} dx dy dz$.	5	1	2
8.	Evaluate $\int_0^2 \int_1^3 \int_1^2 x y^2 z dx dy dz$.	5	1	2

PART – B

1.	(i) Use partial fraction technique, evaluate $\int \frac{1+6x}{(4x-3)(2x+5)} dx$ (ii) Evaluate $\int x^3 \sin 2x dx$ using integration by parts.	5	5	16
2.	Using double integral find the area bounded by the parabolas $y^2 = 4ax$ and $x^2 = 4ay$.	5	5	8
3.	Using double integral find the area bounded by $y = x$ and $y = x^2$.	5	3	8
4.	Find the volume of the sphere $x^2 + y^2 + z^2 = a^2$ using triple integration	5	5	16
5.	Find the volume of the tetrahedron bounded by the coordinate planes and $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1$.	5	5	16

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24GEES101
Programming in C

UNIT I

INTRODUCTION TO C PROGRAMMING

Arrays: Single-Dimension Arrays, generating a Pointer to an Array, Passing SingleDimension Arrays to Functions, Two-Dimensional Array, Multidimensional Arrays, Array Initialization. Strings: Strings, Indexing Pointers, Initializing and accessing String

Q.No	Question	CO	BTL	Marks
PART A				
1.	Give two examples for assignment statements.	1	1	2
2.	What are keywords? Give an example.	1	1	2
3.	What do you mean by variables in 'C'?	1	1	2
4.	Identify the use of ternary or conditional operator.	1	4	2
5.	Define C tokens.	1	2	2
6.	What are the rules to declare variable?	2	1	2
7.	How to create enumeration constants?	2	4	2
8.	What are the types of storage classes in C?	2	1	2
PART B				
1.	Describe the structure of a C program with an example.	1	1	16
2.	Summarize the various types of operators in 'C' language along with its priority.	1	2	16
3.	Explain about the various decision making statements	2	1	16
4.	Write short notes on the following: 'for'loop 'while'loop 'do...while'loop	2	1	16
5.	Write a C program for the following To check whether a given year is leap or not. (4) To find the number is Armstrong number or not. (8) To convert the temperature given in Fahrenheit to Celsius (4)	2	4	16

UNIT 2

ARRAYS AND STRINGS

Arrays: Single-Dimension Arrays, generating a Pointer to an Array, Passing SingleDimension Arrays to Functions, Two-Dimensional Array, Multidimensional Arrays, Array Initialization. Strings: Strings, Indexing Pointers, Initializing and accessing String

Q.No	Question	CO	BTL	Marks
PART A				
1.	List out the features of Arrays.	1	1	2
2.	Define Array and Write the types of an array.	1	1	2
3.	Define a float array of size 5 and assign 5values to it.	1	1	2
4.	How to create a two-dimensional array?	2	2	2
5.	Distinguish between one dimensional and two-dimensional arrays.	2	4	2
6.	What is the role of strrev()?	2	3	2
7.	Discover the meaning of a String.	3	3	2
8.	How to initialize a string? Give an example.	3	6	2
PART B				
1.	Write a C program to perform the following matrix operations: (i) Addition(5) (ii) subtraction(5) (iii)Transpose(6)	2	4	16
2.	(i) Write a C program to search an element in the array and display its position in array. (8) (ii) Write a C program to find maximum element in the array (8)	2	5	16
3.	Describe the following functions with examples.(4+4+4+4) (i)strlen()(ii)strcpy()(iii)strcat()(iv)strcmp()	3	1	16

- | | | | |
|--|---|---|----|
| 4. (i) Write a C program to find whether the given string is palindrome or not without using string functions. (8) | 3 | 3 | 16 |
| (ii) Using String functions identify the string is palindrome or not (8) | | | |

UNIT 3

FUNCTIONS AND POINTERS

Functions: Function Prototype, Scope and Function Arguments. Return Statement, Recursion. Pointers: Introduction to Pointers: Pointer Variables, Pointer Operators, Pointer Expressions, Pointer Assignments, Pointer Conversions, Pointer Arithmetic, Pointer Comparisons, Pointers and Arrays, Arrays of Pointers, Dynamic Allocation Functions-Calloc& Malloc

Q.No	Question	CO	BTL	Marks
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PART A

1.	Define pointer. How will you declare it?	1	1	2
2.	What is a pointer to a pointer?	1	1	2
3.	Differentiate between address operator and indirection operator?	2	4	2
4.	Identify the use of Pointer.	2	1	2
5.	What are the types of function? Give examples.	3	4	2
6.	Write the syntax for function declaration.	3	3	2
7.	What is a functioncall? Give an example of a functioncall	3	3	2
8.	List out the types of parameters.	3	6	2
9.	What is are cursive function?	3	2	2
10.	Difference between pass by value and pass by reference.	3	2	2

PART B

Q.No	Question	CO	BTL	Marks
1	Write a C program to show the difference between call by value and call by	2	1	16

	reference			
2	What is an array of pointers and what is pointer to an array? Explain in detail with example	2	4	16
3	Discuss about the classification of functions depending upon the inputs and output(parameters)	3	2	16
4	Discuss about passing arrays to function and perform arithmetic operation using pointers.	3	2	16
5	Explain in detail about recursive function with (i) a code to find factorial of a number using recursion (ii) a code to print Fibonacci series using recursion	3	5	16

UNIT 4

STRUCTURES AND UNIONS

Structures: Accessing Structure Members, Structure Assignments, Arrays of Structures, Passing Structures to Functions, Structure Pointers, Arrays and Structures within structure, Unions.

PART A

Q.No	Question	CO	BTL	Marks
1.	What is structure? Write the syntax for structure.	3	1	2
2.	How the members of structure object is accessed?	3	2	2
3.	What is a nested structure?	3	1	2
4.	How type def is used in structure?	3	4	2
5.	Interpret the term Union in C.	4	2	2
6.	Point out the meaning of Dynamic memory allocation.	4	4	2
7.	Show the difference between Structure from Array.	4	3	2
8.	Discriminate between malloc and calloc.	4	5	2

PART B

Q.No	Question	CO	BTL	Marks
1	Explain about the structures and its operations.	3	2	16
2	Write a C program using structures to prepare the employee pay roll of a company with inputs as empid, Name, address, department, gross pay, total salary	3	2	16
3	Discuss about the following: (i) Create a student database using union concept	4	4	16

	(ii) Create employee database with empid, empname, salary, department, grosspay using union concept			
4	Illustrate a C program to store the employee information using structure and search a particular employee details.	4	1	16

UNIT 5

FILES AND DIRECTIVES

Files: File System Basic, File Types and Modes, access of file, File Functions, Sequential and Random File Access. Preprocessor Directives.

PART A

Q.No	Question	CO	BTL	Marks
1.	Define file.	4	1	2
2.	Distinguish between Sequential access and Random access.	4	2	2
3.	List out the various file handling function.	4	1	2
4.	Compare f seek () and f tell ()function.	4	4	2
5.	How to create a file in C?	5	6	2
6.	Identify the various file operation modes and their usage.	5	1	2
7.	How to read and write the file?	5	4	2
8.	Examine the following: (i)getc() and getchar() (ii) scanf and fscanf()	5	3	2

PART B

Q.No	Question	CO	BTL	Marks
1	Describe the Application of Three-Variable Contingency Tables?	5	1	16
2	Explain the construction and interpretation of three-variable contingency tables?	5	2	16
3	Illustrate the Steps of Time Series Analysis?	5	1	16
4	Illustrate the Importance of Resampling in Time Series Analysis?	5	4	16

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24ENHS202
PROFESSIONAL ENGLISH FOR ENGINEERS -I

UNIT I EFFECTIVE SPEAKING STRATEGIES

- ❖ **Reading:** Explore different reading materials (technical and nontechnical).
- ❖ **Writing:** Understand clear writing principles. Complete sentences effectively. Explore word formation and expansion (root words and etymology). Develop hints for reading comprehension exercises.
- ❖ **Grammar:** parts of speech, articles, and different question types (WH, yes/no, and tag questions).

Q.No	Question	CO	BTL	Marks
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PART A

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|----|--|---|---|---|
| 1. | Fill in the blanks with the correct adjectives.
(a) <i>He is the ____player on the team. (good / best / better)</i>
(b) <i>This is the ____solution to the problem. (correct / more correct / most correct)</i> | 1 | 1 | 2 |
| 2. | Fill in the blanks with suitable articles (a, an, the)
a) <i>I saw ____eagle flying in ____sky</i>
b) <i>She found ____umbrella near ____riverbank.</i> | 1 | 1 | 2 |
| 3. | Correct the usage of articles in the sentence
(a) <i>He bought a apples and an orange.</i>
(b) <i>I bought an book and the apple yesterday.</i> | 1 | 1 | 2 |
| 4. | Frame a WH-question for the following answer
(a) <i>I went to the mall yesterday.</i>
(b) <i>My sister is reading a novel.</i> | 1 | 2 | 2 |
| 5. | Convert the following sentence into a Yes/No question
(a) <i>They are coming to the party tomorrow.</i>
(b) <i>She completed her homework before dinner.</i> | 1 | 1 | 2 |
| 6. | Add a tag question to the following sentence
(a) <i>You finished your assignment, ____?</i>
(b) <i>She loves chocolate, ____?</i> | 1 | 1 | 2 |
| 7. | Use a conjunction to join these two sentences
(a) <i>The weather was bad. They decided to stay indoors.</i>
(b) <i>I was tired. I went to bed early.</i> | 1 | 2 | 2 |

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|----|--|---|---|---|
| 8. | Choose the correct adjective
(a) <i>She has a ____ attitude towards challenges. (positive / more positive / most positive)</i>
(b) <i>They left the house at 7:00 AM.</i> | 1 | 1 | 2 |
|----|--|---|---|---|

PART B

- | | | | | |
|----|---|---|---|----|
| 11 | Read the passage and answer the following questions suitably. | 1 | 4 | 16 |
|----|---|---|---|----|

THE RISE OF RENEWABLE ENERGY IN MODERN ENGINEERING

Renewable energy is transforming the way engineering approaches sustainability and innovation. It refers to energy derived from sources that are naturally replenished, such as solar, wind, and hydroelectric power. The integration of renewable energy in engineering spans various sectors, including construction, transportation, and energy management.

One of the key advantages of renewable energy in engineering is its contribution to reducing carbon emissions. For instance, solar panels on buildings can generate clean energy, minimizing reliance on fossil fuels and reducing environmental impact.

Renewable energy also drives advancements in transportation engineering. Electric vehicles powered by renewable energy sources are becoming increasingly common, reducing air pollution and promoting eco-friendly mobility. In the aerospace sector, engineers are exploring hybrid and fully electric aircraft designs to reduce fuel consumption and emissions.

Furthermore, renewable energy enhances resilience in energy systems. Smart grids incorporating wind and solar energy ensure a consistent and reliable power supply, even during adverse weather conditions. Civil engineers use renewable energy solutions like geothermal systems in

building designs to improve energy efficiency and sustainability.

Despite its benefits, renewable energy presents challenges, such as intermittent energy supply and high initial costs. Engineers are addressing these challenges by developing storage technologies, such as advanced batteries, and optimizing renewable energy systems for efficiency.

Questions:

1. What is renewable energy?
2. How does renewable energy reduce environmental impact?
3. What role does renewable energy play in transportation engineering?
4. How are engineers using renewable energy in aerospace advancements?
5. What is the importance of smart grids in renewable energy systems?
6. How can renewable energy be integrated into building designs?
7. What challenges are associated with renewable energy in engineering?
8. Provide an example of how renewable energy improves energy efficiency.

12. **Develop a story from the hints.** 1 4 16

Lion - sleeping in a forest - mouse - playing on it - angry lion - threatened to kill the mouse - mouse asked to forgive - promised to save him one day - lion laughed - let him off - another day - lion caught by hunter - in net - mouse heard the lion roar - mouse cut the net with his teeth - lion escaped - thanked the mouse.

13. **Develop a story from the hints.** 1 2 16

A rich farmer - lot of land - cattle and servants - two sons - happy life - After some years younger son unhappy - asked for his share of the property - wouldn't listen to father's advice got his share - sold them all - went away to another country fell into bad ways - soon all money gone - poor - no one to help him - understood his mistake.

- | | | | | |
|-----|--|---|---|----|
| 14. | Write a story about someone who unexpectedly ends up in a life-changing situation. | 1 | 2 | 16 |
| 15. | A young person discovers a hidden diary with shocking truths about their family. | 1 | 2 | 16 |

UNIT II

READING SKILLS

- ❖ Reading: Utilize different reading strategies, including skimming, scanning, predicting, pre-reading, and post-reading techniques.
- ❖ Writing: Learn biographical writing (about places and people), descriptions, Instructions, recommendations, and single-sentence definitions.
- ❖ Grammar: Types of sentences, use of imperatives, prepositions, and modal verbs.

Q.No	Question	CO	BTL	Marks
PART A				
1.	Identify the type of sentence (a) <i>Why are you late for the meeting?</i> <i>Please complete the task on time.</i>	2	1	2
2.	(a) Rewrite the following sentence into an exclamatory sentence: <i>He drives fast.</i> Rewrite the following sentence into a declarative sentence: <i>What a beautiful painting!</i>	2	2	2
3.	(a) Frame an imperative sentence to instruct someone to switch off their phone. Change the following imperative into a polite command: <i>Don't talk during the presentation.</i>	2	1	2
4.	Fill in the blank with the correct preposition (a) <i>She is sitting ____ the bench. (on / in / at)</i> <i>The keys are _the drawer. (under / between / in)</i>	2	1	2
5.	Identify the preposition in the sentence: (a) <i>He walked across the bridge.</i> (b) <i>The cat is hiding behind the curtain.</i>	2	2	2

- | | | | | |
|----|--|---|---|---|
| 6. | Rewrite the sentence using a modal verb | 2 | 1 | 2 |
| | (a) <i>It is necessary for students to submit their assignments on time.</i> | | | |
| | <i>It is possible for her to win the competition.</i> | | | |
| 7. | Choose the correct modal verb | 2 | 1 | 2 |
| | (a) <i>You ____ (should / can / will) listen to your teacher's advice.</i> | | | |
| | (b) <i>He ____ (might / must / could) be the person in charge.</i> | | | |
| 8. | Classify the following sentence | 2 | 1 | 2 |
| | a) <i>Bring me the book immediately.</i> | | | |
| | <i>Did you complete the assignment on time?</i> | | | |

PART B

1 Read the passage and answer the following questions

2 4 16

USING CELL PHONES AND COMPUTERS TO TRANSMIT INFORMATION

Modern technology can do some pretty incredible things. It's possible, with current technological capabilities, to transmit digital information over long distances using coding and decoding processes without losing the contents of the original information. The best part is we don't have to do anything besides send the message and wait for it to be received. Consider, for instance, the cellular phone. It wasn't until the early 1980s that this mobile variation on the standard telephone was even available for people to use. Now, it seems like everyone has a cellphone, sending and receiving information in speedy ways invisible to the human eye. There's so much going on below the surface of what we can see when we use our cellphones. One difference between a mobile phone and a traditional landline telephone is that you can move the cellphone just about anywhere geographically and still talk to others. No matter how far the other person is, you can still understand each other's voices over the phone, thanks to radio waves and something called a cellular network. It took many evolutions in phone technology to get where we are today, but the current cellphone wirelessly transmits information by connecting to a cellular network. Mobile phone operators provide these cellular networks, which function with the help of cellphone towers, and then calls are made over what is known as a radio link. Through this process, information—in this case, voice input—is broken down and reassembled over the radio link, so the person on the other end instantaneously hears what is said phone without any distortion.

The process of transmitting digital information is not exclusive to telephones. Computers are another instrument that can receive, decode, and convert information, though typically this information is not a person's voice, but written content. The first computer showed up around 1941, but it was much more limited in

its capabilities than computers now. In fact, computers are everywhere—sometimes they are so small we do not think of them as computers at all, though they serve the same function as the computers we have at home, the office, or school.

Much like cellular telephones, computers were actually first used to transmit sensitive information across geographical spaces by the military at a point when government officials worried it would be possible to knock out a country's entire telephone grid. Computer engineers began finding ways to link their computers together in order to share information among them. This linking began with just a couple of computers and grew to the millions which connect regularly today. Ultimately, that's how what we know as the Internet was developed. Wireless computer networking is also similar to cellular phone use in that computers use the same networks our mobile phones use. While you speak into the telephone using your voice, you typically insert data into your computer by typing on the keyboard. You may decide to share information through an email or access information on a website by typing in or visiting what is known as a hyperlink.

When you use the Internet to share and access information, you connect to the relevant network. You can send a message from your computer to another computer anywhere in the world and it will arrive almost immediately, going through many different networks in the process. Still, the information you send does not travel in a single piece; instead, it is broken down into smaller digital information. As with a cellphone, the information you send is fragmented into tiny pieces and then reconstructed once it has reached its destination. Along with your message comes other information, for instance about ordering, or how the message should be restructured to make sense to the reader. Your message will also include more basic data about where it came from and where it is supposed to go. Computers and the Internet require many high-tech and complicated pieces to run properly, but something known as a router is a key instrument that keeps information being sent from one computer to another going along the correct pathway. The Internet also relies on telephone wires and satellite links for wireless information sharing. It's important to note that for the Internet to work as it does, many companies have to agree to work with one another. The Internet is really a collection of networks working together toward a common goal of allowing information to be shared

1. Explain how cell phones transmit voice information over long distances.
 2. Describe the role of a cellular network in mobile communication.
 3. How did the use of computers evolve from their initial purpose to modern-day applications?
 4. What similarities exist between wireless computer networking and cellular phone use?
 5. Discuss the importance of routers in Internet communication
 6. What role do cell phone towers play in mobile communication.
 7. How is digital information transmitted without losing its contents?
 8. Explain the concept of the Internet as a collection of networks
-
- | | | | | |
|-----|---|---|---|----|
| 12. | Write recommendations to save water. | 2 | 4 | 16 |
| | | | | |
| 13. | Write a detailed biography on any sports man who is popular around the world. | 2 | 2 | 16 |
| | | | | |
| 14. | Write a list of 8 instructions for maintaining a houses in good condition. | 2 | 2 | 16 |
| | | | | |
| 15 | Recommend to your friend some important points to be considered for nanomaterial storage. | 2 | 3 | 16 |

UNIT III

INTERACTIVE SKILLS

- ❖ Reading: **Analyse longer technical texts and identify transitions within them.**
- ❖ Writing: **Develop paragraph writing skills. Focus on cohesion and coherence. Practice writing formal letters. Explore different word forms and usages.**
- ❖ Grammar: **synonyms, antonyms, Tenses, Adjectives, Cause and Effect expressions.**

Q.No	Question	CO	BTL	Marks
PART A				
1.	Choose the correct synonym for the word a) happy: (<i>sad / cheerful / angry</i>) b) large: (<i>tiny / huge / small</i>)	3	1	2
2.	Choose the correct antonym for the word (a) difficult: (<i>easy / hard / tough</i>) (b) fast: (<i>quick / slow / rapid</i>)	3	1	2
3.	Fill in the blank with the correct tense (a) She ____ (<i>is reading / reads / read</i>) a book right now. (b) They ____ (<i>played / play / will play</i>) cricket yesterday.	3	1	2
4.	Identify the adjective in the sentence (a) He has a beautiful garden in his house. (b) She bought an expensive dress for the party.	3	2	2
5.	Match the cause to its effect (a) Cause: The power went out. Effect: _____. (<i>She lit a candle / She watched TV</i>) (b) Cause: He worked hard for the exam. Effect: _____. (<i>He failed / He passed</i>)	3	1	2
6.	Complete the cause-and-effect sentence (a) It rained heavily, so _____. (b) She was late to the station because _____.	3	1	2
7.	7.Choose the correct synonym for the word (a) intelligent: (<i>bright/dull/silly</i>) (b) strong: (<i>weak / powerful /solid</i>)	3	2	2
8.	Rewrite the following sentence using the correct tense (a) She (<i>finish</i>) the project before the deadline. (Use present perfect tense.) (b) He (<i>go</i>) to the park every evening. (Use simple present tense.)	3	1	2

PART B

11.	Write an essay on Nature's Terror -Global warming and the ways to handle it.	3	4	16
12.	Write an essay on Indian achievements in science and technology.	3	4	16
13.	Draft a letter to a company requesting a quotation for office furniture.	3	2	16
14.	Write a letter to the Editor of a newspaper regarding the increasing noise pollution in your locality.	3	2	16
15.	Write a letter applying for the post of a Software Engineer in a reputed IT company.	3	2	16

UNIT IV

CREATIVE WRITING

- ❖ Reading: Identify relationships between characters, facts, and ideas. Compare facts and figures.
- ❖ Writing: Focus on email etiquette, summarization, and paragraphing. Use single-word substitutes. Practice free writing on various topics (e.g., favourite place, hobbies, school life).
- ❖ Grammar:) Adverbs, and phrasal verbs.

Q.No	Question	CO	BTL	Marks
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PART A

- | | | | | |
|----|--|---|---|---|
| 1. | Identify the adverb in the sentence:
a) <i>She speaks very fluently in English.</i>
b) <i>He completed the task quickly.</i> | 4 | 1 | 2 |
|----|--|---|---|---|

- | | | | | |
|----|--|---|---|---|
| 2. | Fill in the blank with the correct adverb: | 4 | 1 | 2 |
| | a) <i>She danced ____ (gracefully / graceful).</i> | | | |
| | b) <i>They worked ____ (hardly / hard) to achieve success.</i> | | | |
| 3. | (a) Rewrite the sentence by replacing the adjective with an adverb: <i>He is a quick learner.</i> | 4 | 1 | 2 |
| | (b) Rewrite the sentence by adding an adverb: <i>She sings a song.</i> | | | |
| 4. | Match the phrasal verb to its meaning: | 4 | 2 | 2 |
| | (a) Turn down → (accept/reject) | | | |
| | (b) Give up → (continue/stop trying) | | | |
| 5. | Use the phrasal verb in a sentence. | 4 | 1 | 2 |
| | (a) look after | | | |
| | (b) run out | | | |
| 6. | Fill in the blank with a suitable phrasal verb | 4 | 1 | 2 |
| | a) He ____ (gave up / gave in) on solving the puzzle after several attempts. | | | |
| | b) We ____ (ran out of / ran over) milk, so we went to buy more. | | | |
| 7. | Identify the phrasal verb in the sentence | 4 | 2 | 2 |
| | a) She turned down the job offer due to personal reasons. | | | |
| | b) set off early in the morning to reach the destination. | | | |
| 8. | (a) Choose the correct adverb: He runs ____ (fast / faster) than his classmates. | 4 | 1 | 2 |
| | (b) Choose the correct phrasal verb: We need to ____ (put up with / put down) the noise for a while. | | | |

PART B

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|-----|---|---|---|----|
| 11. | Write an email to the programme officer, National Service Scheme requesting him to arrange a ten-day eye care camp in your village. | 4 | 4 | 16 |
|-----|---|---|---|----|

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|-----|---|---|---|----|
| 12. | Write a email to the principal of your college requesting him to give permission to arrange a charitable show to help the blind and deaf people through college student committee. | 4 | 4 | 16 |
| 13. | Write a free-form essay on the topic on the Influence of Globalization on Traditional Cultural Practices. | 4 | 2 | 16 |
| 14 | Write a free-form essay on The Benefits and Drawbacks of Multiculturalism in Modern Cities. | 4 | 2 | 16 |
| 15 | <p>Read and summarize the following passage in your own words.</p> <p>The Role of Renewable Energy in a Sustainable Future</p> <p>Renewable energy technologies have revolutionized the way we utilize natural resources, presenting a critical pathway to address pressing global concerns such as climate change and the depletion of fossil fuels. Solar, wind, hydro, and geothermal energy have emerged as sustainable alternatives that significantly reduce greenhouse gas emissions. By harnessing these sources, nations can achieve energy independence, fostering economic stability and growth. Despite their numerous advantages, the transition to renewable energy is not without challenges. High initial investment costs, intermittent energy supply, and the need for large-scale infrastructure development often pose obstacles to widespread adoption. For example, solar and wind energy depend on weather conditions, which can lead to inconsistent output. Developing energy storage technologies, such as advanced batteries, is key to overcoming these hurdles and ensuring reliability. Moreover, government policies and incentives play a crucial role in accelerating the shift to renewables.</p> | 4 | 2 | 16 |

Subsidies, tax benefits, and research funding can mitigate financial barriers, making these technologies more accessible to businesses and consumers. International collaboration is also vital, enabling countries to share resources, expertise, and innovative solutions to drive progress. Ultimately, the long-term benefits of renewable energy—reduced environmental impact, sustainable resource utilization, and enhanced energy security—far outweigh the short-term challenges. Embracing renewable energy is essential for creating a cleaner and greener future. By investing in innovation and fostering global cooperation, humanity can pave the way for a sustainable world powered by renewables.

UNIT V

COMPREHENSIVE SKILL

- ❖ Reading: **Understand specific meanings in texts. Take notes and extend vocabulary. Practice cloze reading.**
- ❖ Writing: **Explore different types of essays and story writing. Practice dialogue writing. Use abbreviations and acronyms.**
- ❖ Grammar: **Collocations, and fixed/semi-fixed expressions.**

Q.No	Question	CO	BTL	Marks
PART A				
1.	Match the verbs with the appropriate nouns to form common collocations: (a) Make – a decision, an effort, an appointment (b) Give – advice, a presentation, permission	5	1	2
2.	Fill in the blank with the correct adverb a) <i>She danced ____ (gracefully / graceful).</i> b) <i>They worked ____ (hardly / hard) to achieve success.</i>	5	1	2

- | | | | | |
|----|--|---|---|---|
| 3. | Complete the semi fixed sentences with suitable words | 5 | 1 | 2 |
| | c) It is time | | | |
| | d) Would you mind | | | |
| 4. | Match the phrasal verb to its meaning | 5 | 2 | 2 |
| | a) <i>Turn down</i> → (accept/reject) | | | |
| | b) <i>Give up</i> → (continue/stop trying) | | | |
| 5. | (a) Use the phrasal verb <i>look after</i> in a sentence. | 5 | 1 | 2 |
| | (b) Use the phrasal verb <i>run out of</i> in a sentence. | | | |
| 6. | Fill in the blank with a suitable phrasal verb | 5 | 1 | 2 |
| | a) He ____ (gave up / gave in) on solving the puzzle after several attempts. | | | |
| | b) We ____ (ran out of / ran over) milk, so we went to buy more. | | | |
| 7. | Write sentences for the following fixed expression | 5 | 2 | 2 |
| | e) Once in a blue moon | | | |
| | f) The ball is in your court | | | |
| 8. | (a) Choose the correct adverb: He runs (fast / faster) than his classmates. | 5 | 1 | 2 |
| | (b) Choose the correct phrasal verb: We need to (put up with / put down) the noise for a while | | | |

PART B

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|-----|--|---|---|----|
| 11. | Write a story about a young inventor who changes the world with their creation. | 5 | 4 | 16 |
| 12. | Write an essay on Discuss the role of technology in transforming education systems. | 5 | 4 | 16 |
| 13. | Draft a speech for a university sports event inauguration, highlighting the role of sports in character building, teamwork, and maintaining a healthy lifestyle. | 5 | 2 | 16 |
| 14. | Create a speech for the International Day celebration at the university, discussing the value of cultural exchange, global unity, and respecting diversity. | 5 | 2 | 16 |

15 Discuss the importance of mental health awareness in modern society.

5

2

16

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24TAHS202
Tamils and Technology

அலகு - I : மொழி மற்றும் இலக்கியம்
UNIT-I : LANGUAGE AND LITERATURE

இந்திய மொழிக் குடும்பங்கள் - திராவிட மொழிகள் - தமிழ் ஒரு செம்மொழி - தமிழ் செவ்விலக்கியங்கள் - சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை - சங்க இலக்கியத்தில் பகிர்தல் அறம் - திருக்குறளில் மேலாண்மைக் கருத்துக்கள் - தமிழ்க் காப்பியங்கள், தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் - பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் - சிற்றிலக்கியங்கள் - தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி - தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

Language Families in India – Dravidian Languages – Tamil as a Classical Language - Classical Literature in Tamil - Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature – Management Principles in Thirukural – Tamil Epics and Impact of Buddhism & Jainism in Tamil Land – Bakthi Literature Azhwars and Nayanmars – Forms of minor Poetry – Development of Modern literature in Tamil – Contribution of Bharathiyar and Bharathidhasan.

PART – A

Q.NO	QUESTION	CO	BTL	Marks
1.	தமிழ் மொழி எந்த மொழிக்குடும்பத்தைச் சேர்ந்தது? Which family of languages does Tamil belong to?	1	1	2
2.	திராவிடமொழிகள் மொத்தம் எத்தனை? How many Dravidian – Languages are there?	1	1	2
3.	செவ்வியல் என்றால் என்ன? What is meant by Classical?	1	2	2
4.	சிற்றிலக்கியங்களின் பெயரை முதலில் கூறிய நூல் எது? Which book mentioned the names of Sitrilakiyam first?	1	2	2
5.	தென் – திராவிடமொழிகள் யாவை? Which are called South – Dravidian languages?	1	3	2
6.	செம்மொழி என்றால் என்ன? What is meant by classical language?	1	3	2
7.	தமிழில் தோன்றிய முதல் காப்பியம் எது? Which was the first kaapiyam to appear in Tamil?	1	1	2

8.	ஐம்பெருங்காப்பியங்கள் என்ற தொடரை முதன் முதலில் கூறியவர் யார்? Who coined the term AimperumKappiyangal?	1	1	2
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PART – B

1.	திருக்குறளில் மேலாண்மைக் கருத்துக்கள் பற்றி எழுதுக? Management concept in Thirukural?	1	1	16
2.	செம்மொழிக்கான தகுதிப்பாட்டை விளக்குக? Explain the Qualification for Classical Language?	1	1	16
3.	தமிழ் இலக்கிய வளர்ச்சியில் பாரதியாரின் பங்களிப்பு? Bharatiyar's contribution to the Development of Tamil Literature?	1	1	16
4.	செவ்வியல் இலக்கியங்களின் தனி சிறப்புகளை விளக்குக. Explain the characteristics of classical literatures	1	2	16