



GOVERNEMENT COLLEGE (A), RAJAHMUNDRY
DEPARTMENT OF PHYSICS
2025-26
IB.Sc-(PHYSICS)-(H)



COURSE-I : INTRODUCTION TO MATHEMATICAL PHYSICS

QUESTION BANK

UNIT-1 : Vector Calculus

Essay Questions

Sl. No.	Question	BT	CLO	PLO	PI
1	State and prove the divergence of a vector field.	BT4	CLO2	PLO1, PLO2	1.1.2, 2.2.1
2	State and prove the curl of a vector field.	BT4	CLO2	PLO1, PLO2	1.1.2, 2.2.1
3	State and prove Stokes' theorem of vector calculus.	BT5	CLO3	PLO1, PLO3	2.3.1, 3.3.4
4	State and prove Gauss theorem of vector calculus.	BT5	CLO3	PLO1, PLO3	2.3.1, 3.3.4

Short Answer Questions

5	Write the physical significance of gradient of a scalar field.	BT2	CLO1	PLO1	1.1.1
6	Find the value of constant (c) for which the vector $A=(x+3y) i+(y-3z) j+(x+cz) k$ is solenoidal.	BT3	CLO2	PLO2	1.3.2, 2.1.2
7	Show that $A= e^{-x} [-yz i + z j + y k]$ is irrotational.	BT3	CLO2	PLO2	1.3.2, 2.3.1
8	Write a short note on scalar field and vector field with examples.	BT2	CLO1	PLO1	1.1.1, 1.2.1
9	Write the physical significance of divergence of a vector field.	BT2	CLO1	PLO1	1.1.2
1	Write the physical significance of curl of a vector field.	BT2	CLO1	PLO1	1.1.2

UNIT-2 : Linear Algebra
Essay Questions

Sl. No	Question	BT	CLO	PLO	PI
11	Determine the Eigen values and Eigen vectors of the matrix $A = [4 \ 2 \ 1 \ 3]$	BT4	CLO2	PLO2	2.2.1, 2.3.1
12	Determine the Eigen values and Eigen vectors of the matrix $A = (4 \ 1 \ 1 \ 1 \ 4 \ 1 \ 1 \ 1 \ 4)$	BT4	CLO3	PLO2, PLO3	2.2.1, 3.3.3
13	Solve the linear equations using matrices: $2x+3y=8, 4x+y=10$	BT3	CLO2	PLO2	1.3.2, 2.1.2
14	By using Matrices, Find tension force in ropes, where mass hangs with ropes in equilibrium. Rope 1: makes an angle 30° with horizontal. Rope 2: makes an angle 45° with horizontal. Weight of the object is 100N	BT4	CLO3	PLO2, PLO3	2.2.1, 3.3.1

Short Answer Questions

Sl. No.	Question	BT	CLO	PLO	PI
15	Check whether the given matrix is orthogonal or not. $A = \begin{pmatrix} \frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} & 0 & \frac{-1}{\sqrt{2}} & \frac{1}{\sqrt{2}} & 0 & 0 & 0 & 1 \end{pmatrix}$	BT3	CLO2	PLO2	1.3.2
16	Check whether the given matrix is Hermitian or not. $A = (4 \ 6 + 8i \ 2 - 7i \ 6 - 8i \ 1 \ 5 + i \ 2 + 6i \ 5 - i \ 3)$	BT3	CLO2	PLO2	1.3.2
17	Find the inverse of the given matrix. $A = (1 \ 3 \ 3 \ 1 \ 4 \ 3 \ 1 \ 3 \ 4)$	BT3	CLO2	PLO2	1.3.2

UNIT-3 : Complex Numbers
Essay Questions

Sl. No	Question	BT	CLO	PLO	PI
18	Derive the expression for impedance of a series LCR circuit using phasor concept.	BT4	CLO3	PLO1, PLO2	1.1.2, 2.2.

Sl. No	Question	BT	CLO	PLO	PI
19	Explain the concepts “modulus” and “argument” of a complex number with an example.	BT2	CLO1	PLO1	1.1.1

Short Answer Questions

Sl. No	Question	BT	CLO	PLO	PI
20	Simplify $Z = \frac{6+8i}{2-3i}$	BT3	CLO2	PLO2	1.3.2
21	Represent the complex number $Z = 1 + i/\sqrt{3}$ in polar form.	BT3	CLO2	PLO2	1.3.2
22	Represent the complex number $Z=-1-i$ in polar form.	BT3	CLO2	PLO2	1.3.2
23	If Voltage $V=4+3i$ and current $I=2-i$, find power (P).	BT3	CLO2	PLO2	1.3.2, 2.3.1

UNIT-4 : Probability Essay Questions

Sl. No.	Question	BT Level	CLO	PLO	PI
24	State Bayes’ Theorem. Solve the following problem using Bayes’ Theorem: In 2025 there will be three candidates for the position of Principal – Dr. Chatterji, Dr. Ayangar and Dr. Singh, whose chances of appointment are in the ratio 4:2:3 respectively. The probability that Dr. Chatterji, if selected, would introduce co-education in the college is 0.3. The corresponding probabilities for Dr. Ayangar and Dr. Singh are 0.5 and 0.8 respectively. (i) What is the probability that there will be co-education in the college? (ii) If there is co-education in the college in 2025, what is the probability that Dr. Ayangar is the Principal?	BT4	CLO3	PLO2, PLO3	2.2.1, 2.3.1
25	State Binomial Distribution. Solve the following problem using Binomial Distribution: A and B play a game in which their chances of winning are in the ratio 3:2. Find A’s chance of winning at least three games out of the five games played.	BT4	CLO3	PLO2, PLO3	2.2.1, 2.3.1
26	State Poisson Distribution. Solve the following problem using Poisson Distribution: An insurance company insures 4,000 people against loss of both eyes in a car accident. Based on previous data, it is assumed that on an average 10 persons in 1,00,000 meet with such accidents per year. Find the probability that more than 3 of the insured will collect on their policy in a given year.	BT4	CLO3	PLO2, PLO3	2.2.1, 2.3.1

Short Answer Questions

Sl. No	Question	BT Level	CLO	PLO	PI
27	Write a short note on sample space and event of probability theory.	BT2	CLO1	PLO1	1.1.1
28	Write a short note on discrete and continuous random	BT2	CLO1	PLO1	1.1.1

Government College (Autonomous), Rajahmundry
Department of Physics
B.Sc (Honours) Physics w.e.f., 2025–26 batch
Course 2: Mechanics and Properties of Matter

QUESTION BANK

UNIT I – Mechanics of Particles (CLO1)

Short Questions (3 Marks Each)

Q.No	Question	Type	Marks	BT	CLO	PLO	PI Code(s)
1	State Newton's laws of motion.	Short	3	BT1	CLO1	PLO1	1.1.1
2	Write a short note on impact parameter.	Short	3	BT2	CLO1	PLO1	1.2.1
3	Write a short note on scattering cross section.	Short	3	BT2	CLO1	PLO1	1.2.1

Essay Questions (7 Marks Each)

Q.No	Question	Type	Marks	BT	CLO	PLO	PI Code(s)
6	State Newton's second law. Derive an expression for equation of motion of a variable mass system.	Essay	7	BT4	CLO1	PLO3	3.2.1
7	Explain variable mass system and obtain an expression for motion of a rocket.	Essay	7	BT4	CLO1	PLO3	3.2.1
8	Derive an expression for Rutherford's scattering formula.	Essay	7	BT4	CLO1	PLO3	3.2.1

UNIT II – Central Forces (CLO2)

Short Questions (3 Marks Each)

Q.No	Question	Type	Marks	BT	CLO	PLO	PI Code(s)
9	Define central force and give examples for central force.	Short	3	BT1	CLO2	PLO1	1.1.1
10	Define Central force and state characteristics of central force.	Short	3	BT2	CLO2	PLO1	1.2.1
11	State Kepler's laws.	Short	3	BT1	CLO2	PLO1	1.1.1
12	Write a note on motion of Satellites.	Short	3	BT2	CLO2	PLO1	1.2.1
13	What are Geo-stationary satellites and give their	Short	3	BT2	CLO2	PLO1	1.2.1

14	applications? Show that central force is a conservative force.	Short	3	BT4	CLO2	PLO2	2.1.1
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Essay Questions (7 Marks Each)

Q.No	Question	Type	Marks	BT	CLO	PLO	PI Code(s)
15	State and prove Kepler's second and third laws	Essay	7	BT4	CLO2	PLO2	2.1.1
16	State and prove Kepler's First law.	Essay	7	BT4	CLO2	PLO2	2.1.1
18	Derive an expression for equation of motion of a body under central force.	Essay	7	BT4	CLO2	PLO3	3.2.1
19	Define Central force and show that central force is the negative gradient of Potential energy.	Essay	7	BT4	CLO2	PLO3	3.2.1

UNIT III – Elasticity and Bending of Beams (CLO3)

Short Questions (3 Marks Each)

Q.No	Question	Type	Marks	BT	CLO	PLO	PI Code(s)
20	Define stress and strain?	Short	3	BT1	CLO3	PLO1	1.1.1
21	Define Hooke's law and Poisson's ratio?	Short	3	BT1	CLO3	PLO1	1.1.1
22	Write different types of beams?	Short	3	BT1	CLO3	PLO1	1.1.1
23	Write different types of loads?	Short	3	BT1	CLO3	PLO1	1.1.1
24	Explain different types of bending?	Short	3	BT2	CLO3	PLO1	1.2.1

Essay Questions (7 Marks Each)

Q.No	Question	Type	Marks	BT	CLO	PLO	PI Code(s)
25	Derive the relation between Young's modulus and Bulk modulus?	Essay	7	BT4	CLO3	PLO3	3.2.1
26	Derive the relation between Elastic constants?	Essay	7	BT4	CLO3	PLO3	3.2.1
27	Explain Different types of loads and different types of Bending?	Essay	7	BT3	CLO3	PLO1	1.4.1
28	Explain construction and working of Torsional pendulum?	Essay	7	BT2	CLO3	PLO1	1.2.1

UNIT IV – Fluid Mechanics (CLO4)

Short Questions (3 Marks Each)

Q.No	Question	Type	Marks	BT	CLO	PLO	PI Code(s)
29	Write properties and classification of fluids?	Short	3	BT1	CLO4	PLO1	1.1.1
30	Write the differences between streamline and turbulent flow?	Short	3	BT2	CLO4	PLO1	1.2.1
31	What is Reynold's number and explain its importance?	Short	3	BT2	CLO4	PLO1	1.2.1
32	Explain Airplane lift using Bernoulli's theorem?	Essay	3	BT2	CLO4	PLO1	1.2.1

Essay Questions (7 Marks Each)

Q.No	Question	Type	Marks	BT	CLO	PLO	PI Code(s)
33	State and prove Bernoulli's theorem?	Essay	7	BT4	CLO4	PLO3	3.2.1
34	Explain working of Venturimeter and Airplane lift?	Essay	7	BT3	CLO4	PLO2	2.1.1
35	State Poiseuille's law and give a qualitative explanation. Also write about surface tension with examples.	Essay	7	BT2	CLO4	PLO1	1.2.1

UNIT V — Special Theory of Relativity (CLO5)**Short Questions (3 Marks Each)**

Q.No	Question	Type	Marks	BT	CLO	PLO	PI Code(s)
38	Write Galilean transformations?	Short	3	BT1	CLO5	PLO1	1.1.1
39	Write postulates of special theory of relativity?	Short	3	BT1	CLO5	PLO1	1.1.1
40	What is length contraction?	Short	3	BT1	CLO5	PLO1	1.1.1
41	Write the relativistic addition of velocities formula?	Short	3	BT2	CLO5	PLO1	1.2.1

Essay Questions (7 Marks Each)

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

(Accredited by NAAC “A+” Grade)

DEPARTMENT OF COMPUTER SCIENCE

I B.Sc\B.Com\B.A Honours

Semester-I

FUNDAMENTALS OF ARTIFICIAL INTELIGENCE

CIE- I Question Bank

UNIT – I:

Essay Questions (7 Marks Each)

Q.No	Question	BT	CLO	PLO	PI Code(s)
1	Describe the history of artificial intelligence	BT2	CLO1	PLO1	1.2.1
2	Differentiate between narrow AI, general AI, and super AI, with examples	BT4	CLO2	PLO2	2.1.1
3	Discuss how artificial intelligence works, including its components (data, algorithms, learning) and the process of machine learning	BT2	CLO2	PLO1	1.2.1
4	Explain the types of learning in AI (supervised, unsupervised, reinforcement) with real-life examples and advantages/limitations	BT3	CLO3	PLO2	2.1.1

Multiple Choice Questions

1. What is a key characteristic of intelligent behavior?
 - a) Repeating tasks without change
 - b) Learning from experience
 - c) Ignoring patterns
 - d) Memorizing facts
2. Which period marks the birth of artificial intelligence?
 - a) 16th–19th Century
 - b) Early 20th Century
 - c) 2000s–Present
 - d) 1950s–1960s
3. Narrow AI is also known as:
 - a) Artificial General Intelligence
 - b) Artificial Superintelligence
 - c) Artificial Human Intelligence
 - d) Artificial Narrow Intelligence
4. In AI, data is comparable to:

- a) Tools in a kitchen
 - b) The chef
 - c) Instructions in a recipe
 - d) Ingredients in a recipe
5. Supervised learning is like:
- a) Learning by exploring without guidance
 - b) Learning without data
 - c) Learning by trial and error
 - d) Learning from a teacher with labeled examples
6. Which industry uses AI for personalized shopping experiences?
- a) Healthcare
 - b) Finance
 - c) Agriculture
 - d) Retail
7. Knowledge engineering involves:
- a) Generating images
 - b) Building robots
 - c) Collecting and structuring knowledge for AI
 - d) Processing natural language
8. Machine learning is a subset of:
- a) Robotics
 - b) Natural language processing
 - c) Artificial intelligence
 - d) Computer vision
9. Deep learning is inspired by:
- a) Chemical reactions
 - b) Human brain's neural networks
 - c) Mechanical gears
 - d) Animal behavior
10. NLP stands for:
- a) Natural Learning Process
 - b) Network Language Protocol
 - c) Neural Language Processing
 - d) Natural Language Processing

UNIT – II :

Essay Questions (7 Marks Each)

Q.No	Question	BT	CLO	PLO	PI Code(s)
1	Discuss the applications of AI in healthcare	BT2	CLO2	PLO1	1.2.1
2	Explain how AI is used in finance for fraud detection, personalized banking, algorithmic trading, and credit scoring, with benefits and challenges	BT3	CLO3	PLO2	2.1.1
3	Describe AI applications in retail	BT2	CLO2	PLO1	1.2.1

Q.No	Question	BT	CLO	PLO	PI Code(s)
4	Discuss AI in agriculture	BT2	CLO2	PLO1	1.2.1

Multiple Choice Questions

1. AI in healthcare is used for:
 - a) Building houses
 - b) Cooking recipes
 - c) Playing music
 - d) Early disease detection
2. Fraud detection in finance uses AI to:
 - a) Design cards
 - b) Count coins
 - c) Print money
 - d) Analyze transaction patterns
3. Personalized shopping in retail involves:
 - a) AI recommendations based on user behavior
 - b) No suggestions
 - c) Manual suggestions
 - d) Random items
4. AI in education supports:
 - a) No learning
 - b) Personalized learning plans
 - c) Fixed plans
 - d) Only group learning
5. Precision farming in agriculture uses AI for:
 - a) Manual labor
 - b) Ignoring data
 - c) Wasting resources
 - d) Optimizing resource use
6. Predictive maintenance in manufacturing:
 - a) Prevents breakdowns using data
 - b) Replaces machines
 - c) Causes breakdowns
 - d) Ignores data
7. Autonomous vehicles use AI for:
 - a) Self-driving and navigation
 - b) Swimming
 - c) Manual driving
 - d) Flying
8. A challenge of AI in healthcare is:
 - a) Too cheap
 - b) Always accurate
 - c) Ethical considerations like privacy
 - d) No challenges

9. Dynamic pricing in retail adjusts:

- a) No prices
- b) Random prices
- c) Prices based on demand
- d) Fixed prices

10. AI in transportation helps with:

- a) No management
- b) Traffic management in smart cities
- c) Increasing traffic
- d) Ignoring traffic

Model Blue print for the question paper setter (SEE)

Blue Print				
S.No.	UNIT-	Essay 6 M	MCQ's 1 M	Weightage
1	I	2	4	20%
2	II	2	4	20%
3	III	2	4	20%
4	IV	2	4	20%
5	V	2	4	20%
		10	20	100%

Semester II Course: Major 3
WAVA AND OPTICS - Question Bank

UNIT-I: SIMPLE HARMONIC, DAMPED & FORCED OSCILLATIONS

LONG ANSWER (ESSAY) QUESTIONS

Q.No	Question	CLO	PLO	BTL	PI Code
1	Derive the differential equation of a simple harmonic oscillator and obtain its solution. Discuss its physical characteristics.	CLO2	PLO1	BTL-2	1.1.2
2	Explain damped harmonic oscillations. Derive expressions for logarithmic decrement, relaxation time, and quality factor.	CLO3	PLO2	BTL-3	2.2.1
3	Obtain the solution of the differential equation for forced oscillations and discuss resonance.	CLO4	PLO3	BTL-4	3.3.3

SHORT ANSWER QUESTIONS

Q.No	Question	CLO	PLO	BTL	PI Code
1	Define simple harmonic motion with examples.	CLO1	PLO1	BTL-1	1.1.1
2	What is logarithmic decrement?	CLO2	PLO1	BTL-1	1.1.1
3	Define quality factor of an oscillator.	CLO2	PLO2	BTL-2	2.1.1
4	What is resonance in forced oscillations?	CLO3	PLO2	BTL-2	2.2.1

UNIT-II: VIBRATING STRINGS AND BARS

LONG ANSWER (ESSAY) QUESTIONS

Q.No	Question	CLO	PLO	BTL	PI Code
1	Derive the equation for transverse waves on a stretched string and obtain its solution.	CLO3	PLO1	BTL-3	1.3.2
2	Discuss longitudinal vibrations in bars and obtain solutions.	CLO3	PLO2	BTL-3	2.2.1
3	Explain the working principle of a tuning fork with necessary theory.	CLO4	PLO3	BTL-	3.3.1

SHORT ANSWER QUESTIONS

Q.No	Question	CLO	PLO	BTL	PI Code
1	What is a stationary wave?	CLO1	PLO1	BTL-1	1.1.1
2	Write the wave equation for longitudinal vibrations.	CLO2	PLO1	BTL-2	1.1.2
3	Mention the boundary conditions for a bar fixed at both ends.	CLO4	PLO2	BTL-3	2.2.1
4	State any three applications of vibrating strings.	CLO5	PLO1	BTL-1	1.2.1

UNIT-III: INTERFERENCE

LONG ANSWER (ESSAY) QUESTIONS

Q.No	Question	CLO	PLO	BTL	PI Code
1	Explain the principle of superposition and conditions for interference of light.	CLO2	PLO1	BTL-2	1.1.2
2	Describe Fresnel's biprism experiment and explain how wavelength of light is determined.	CLO3	PLO2	BTL-3	2.2.1
3	Explain Newton's rings experiment and derive the expression for wavelength determination.	CLO4	PLO3	BTL-4	3.3.4

SHORT ANSWER QUESTIONS – FULL MAPPING

Q.No	Question	CLO	PLO	BTL	PI Code
1	What is coherence?	CLO1	PLO1	BTL-1	1.1.1
2	What causes colors in thin films?	CLO2	PLO2	BTL-2	2.1.1
3	Define fringe width.	CLO2	PLO1	BTL-2	1.1.2
4	Write the applications of interference.	CLO5	PLO1	BTL-1	1.2.1

UNIT-IV: DIFFRACTION

LONG ANSWER (ESSAY) QUESTIONS – FULL MAPPING

Q.No	Question	CLO	PLO	BTL	PI Code
1	Define resolving power and obtain an expression for resolving power of grating?	CLO4	PLO3	BTL-4	3.3.3

2	Explain Fraunhofer diffraction due to a single slit with necessary theory.	CLO3	PLO2	BTL-3	2.2.1
3	Explain the construction and working of a zone plate.	CLO4	PLO3	BTL-4	3.3.4

SHORT ANSWER QUESTIONS

Q.No	Question	CLO	PLO	BTL	PI Code
1	What is diffraction?	CLO1	PLO1	BTL-1	1.1.1
2	Define half period zone.	CLO2	PLO1	BTL-2	1.1.2
3	What is a zone plate?	CLO2	PLO2	BTL-2	2.1.1
4	State one difference between interference and diffraction.	CLO4	PLO3	BTL-4	3.3.3

UNIT-V: POLARIZATION

LONG ANSWER (ESSAY) QUESTIONS

Q.No	Question	CLO	PLO	BTL	PI Code
1	Explain various methods of polarization of light.	CLO2	PLO1	BTL-2	1.1.2
2	Describe the construction and working of Nicol prism with suitable diagrams.	CLO3	PLO2	BTL-3	2.2.1
3	Describe Nicol prism as a polarizer and analyzer.	CLO4	PLO3	BTL-4	3.3.4

SHORT ANSWER QUESTIONS

Q.No	Question	CLO	PLO	BTL	PI Code
1	State Malus law.	CLO2	PLO1	BTL-2	1.1.2
2	What is a quarter wave plate?	CLO2	PLO1	BTL-2	1.1.2
3	Explain Brewster's law and its significance.	CLO3	PLO2	BTL-3	2.2.1
4	Mention the applications of polarized light.	CLO5	PLO1	BTL-1	1.2.1

GOVERNMENT COLLEGE (A) RAJAHMUNDRY
DEPARTMENT OF PHYSICS
UG – Physics | II Semester Major-4: Heat and Thermodynamics
Question Bank

UNIT – I

Essays

Q.No	Question	BT	CLO	PLO	PI
1	Derive an expression for Maxwell's law of distribution of molecular speeds in a gas?	BT4	CLO3	PLO2	2.2.1
2	State coefficient of viscosity and derive its expression using kinetic theory of gases	BT4	CLO3	PLO2	2.2.1
3	State coefficient of thermal conductivity and derive its expression using kinetic theory of gases	BT4	CLO3	PLO2	2.2.1

Short Answer Questions

4	State the principle of equipartition of energy	BT	CLO1	PLO1	1.1.1
5	Write a short note on mean free path	BT	CLO1	PLO1	1.1.2
6	Write a short note on Lammert's toothed wheel experiment to verify the Maxwell's speed distribution law?	BT	CLO1	PLO1	1.1.2
7	At what temperature will RMS speed of oxygen be double at 27 °C	BT	CLO2	PLO2	1.3.2
8	Find the C_{avg} , C_{rms} , C_p for molecule of a gas with density 0.3g/Lt at a pressure of 300mm of mercury?	BT	CLO2	PLO2	1.3.2

UNIT – II

Essays

Q.No	Question	BT	CLO	PLO	PI
9	Describe Carnot engine and derive efficiency	BT	CLO3	PLO2	2.2.1
10	State and prove Carnot theorem? Indicate how it leads to an absolute scale of temperature?	BT	CLO4	PLO3	3.3.4
11	Define entropy? Explain the change in entropy in reversible and irreversible processes?	BT4	CLO3	PLO2	2.3.1

Short Answer Questions

12	State and explain second law of thermodynamics?	BT2	CLO1	PLO1	1.1.2
13	Write a short note on physical significance of entropy?	BT4	CLO4	PLO3	3.3.4

Q.No	Question	BT	CLO	PLO	PI
14	What is T-S diagram and mention its uses?	BT2	CLO1	PLO1	1.1.2
15	Calculate the change in entropy when 1 kg of ice at 0°C is converted into water at the same temperature? Given that L of ice = $0.336 \times 10^6 \text{ JKg}^{-1}$	BT3	CLO2	PLO2	1.3.2

UNIT – III

Essays

Q.No	Question	BT	CLO	PLO	PI
16	Derive Maxwell's thermodynamic relations using thermodynamic potentials?	BT4	CLO3	PLO2	2.2.1
17	State and explain Joule-Kelvin effect? Obtain an expression for joule-kelvin coefficient?	BT4	CLO3	PLO2	2.2.1
18	Derive Clausius-Clayperon's equation and explain its physical significance? Short Answer questions	BT5	CLO4	PLO3	3.3.4
19	Write a short note Gibbs free energy and Helmholtz free energy?	BT2	CLO1	PLO1	1.1.2
20	Explain Joule –kelvin effect on perfect gas?	BT2	CLO1	PLO1	1.1.2
21	Explain Joule –kelvin effect on vanderwaals gas?	BT4	CLO3	PLO2	2.3.1
22	Write a short note on thermodynamic potentials?	BT2	CLO1	PLO1	1.1.2

UNIT – IV

Q.No	Question	BT	CLO	PLO	PI
23	Describe Joule-Kelvin porous plug experiment? What are the important inferences from this experiment?	BT4	CLO3	PLO2	2.3.1
24	What is Joule-Thomson effect? Obtain an expression for the cooling produce in this method?	BT4	CLO3	PLO2	2.2.1
25	Explain adiabatic demagnetisation method to produce low temperatures?	BT5	CLO5	PLO3	3.3.4
Short Answer Questions					
26	Write a short note on inversion temperature?	BT2	CLO1	PLO1	1.1.2
27	Distinction between adiabatic and joule Thomson expansion?	BT4	CLO4	PLO3	3.3.3
28	Write a short note on vapour compression machine?	BT2	CLO1	PLO1	1.1.2

UNIT – V

Essays

Q.No	Question	BT	CLO	PLO	PI
29	State and derive Planck's radiation law? Deduce Wien's displacement law from it?	BT5	CLO5	PLO3	3.3.4
30	State and derive Planck's radiation law? Deduce Rayleigh-Jeans law from it?	BT5	CLO5	PLO3	3.3.4
31	State Solar constant? Determine solar constant using Angstrom pyro heliometer?	BT4	CLO3	PLO2	2.2.1
Short Answer Questions					
32	Write a short note on ferris's black body?	BT2	CLO1	PLO1	1.1.2
33	How surface temperature of a sun is determined?	BT3	CLO2	PLO2	1.3.1
34	What is black body? What are the salient features of black body radiation?	BT1	CLO1	PLO1	1.1.1
35	Determine the temperature of the Sun with the help of Wien's displacement law, given that $b = 2.92 \times 10^{-3} \text{mK}$. Maximum wavelength is $4,900 \text{\AA}$	BT3	CLO2	PLO2	1.3.2

GOVERNMENT COLLEGE (A) RAJAHMUNDRY

QUESTION BANK FOR SEMESTER -III

PHYSICS-WAVE OPTICS(MajorR) 2024-25

CHAPTER-I : ABERRATIONS

Long Answer Questions (7 Marks)

Q.No	Full Question	BTL	CLO	PLO	PI Cod
1	What is Chromatic Aberration? Obtain an expression for the Chromatic Aberration of a lens.	BL1	CLO1	PLO1	1.1.1
2	What is Chromatic Aberration? Derive the condition for achromatism when two lenses are in contact and separated by a distance.	BL1	CLO2	PLO1	1.1.2
3	What is spherical aberration in a lens? Discuss various methods to minimize it.	BL2	CLO2	PLO2	2.2.1
4	What is spherical aberration in a lens? Explain how the spherical aberration can be minimized when two thin lenses separated by a distance. Obtain condition for it.	BL1	CLO3	PLO2	2.1.1

Short Answer Questions (3 Marks)

Q.No	Question	BTL	CLO	PLO	PI Cod
1	What is coma? How it can be minimized?	BL2	CLO2	PLO2	2.2.1
2	What is Astigmatism? What are the conditions for astigmatism?	BL2	CLO2	PLO1	1.1.2
3	Explain curvature and distortion.	BL2	CLO2	PLO2	2.1.1

CHAPTER-II : INTERFERENCE

Long Answer Questions (7 Marks)

Q.No	Full Question	BTL	CLO	PLO	PI Code
1	What is wedge shaped film? Describe the fringes observed when a wedge shaped film is illuminated by light. Calculate the separation between two consecutive bright and dark bands.	BL2	CLO3	PLO2	2.2.1
2	Describe how the wavelength of sodium light can be determined using Newton rings. Derive the formula used for it.	BL2	CLO3	PLO2	2.3.1
3	Describe Newton rings method for measuring the wavelength of monochromatic light. Give the necessary theory.	BL1	CLO2	PLO1	1.1.2
4	Describe the principle, construction and working of a Michelson Interferometer. Explain how the wavelength of light is determined with it.	BL2	CLO4	PLO2	2.2.1
5	Explain the working of Fresnel biprism.	BL2	CLO3	PLO2	2.1.1

Short Answer Questions (3 Marks)

Q.No	Question	BTL	CLO	PLO	PI Code
1	What are the conditions of interference?	BL1	CLO1	PLO1	1.1.1

Q.No	Question	BTI	CLO	PLO	PI Code
2	Explain the cosine law.	BL1	CLO1	PLO1	1.1.2
3	Explain the formation of colors in thin films.	BL3	CLO4	PLO3	3.3.3
4	Write a note on interference fringes by wedge shaped films.	BL3	CLO4	PLO3	3.3.4

CHAPTER–III : DIFFRACTION

Long Answer Questions (7 Marks)

Q.No	Full Question	BTL	CLO	PLO	PI Code
1	Describe the Fraunhofer diffraction due to a single slit and deduce the positions of maxima and minima.	BL1	CLO2	PLO1	1.1.2
2	Describe the Fraunhofer diffraction due to a single slit. Draw the respective graph of the intensity distribution.	BL1	CLO2	PLO1	1.1.2
3	What is Fresnel's half period zones? Give the theory of Fresnel diffraction of light and explain the intensity distribution in diffraction pattern.	BL1	CLO2	PLO1	1.1.2
4	Explain Fresnel's half period zones. Derive an expression for the amplitude due to nth zone.	BL2	CLO3	PLO2	2.2.1
5	What is a zone plate? How is it constructed? Show that it acts as a convex lens of different focal lengths.	BL2	CLO4	PLO2	2.3.1

Short Answer Questions (3 Marks)

Q.No	Question	BTL	CLO	PLO	PI Code
1	Give the differences between Fraunhofer and Fresnel diffraction.	BL1	CLO2	PLO1	1.1.1
2	Distinguish between interference and diffraction.	BL1	CLO2	PLO1	1.1.2
3	Compare zone plate and convex lens.	BL3	CLO4	PLO3	3.3.3

CHAPTER–IV : POLARIZATION

Long Answer Questions (7 Marks)

Q.No	Full Question	BTL	CLO	PLO	PI Code
1	Explain the construction and working of Nicol prism.	BL2	CLO2	PLO2	2.2.1
2	What is a Nicol prism? Explain how it works as analyzer and polarizer.	BL3	CLO4	PLO3	3.3.3
3	What is optical activity? Describe how the specific rotation of sugar solution is determined experimentally.	BL1	CLO3	PLO1	1.3.1
4	Define specific rotation. Describe the construction and working of Laurent's half shade polarimeter.	BL2	CLO3	PLO2	2.1.1
5	Define specific rotation. Explain how you would use it to determine the specific rotation of sugar solution.	BL2	CLO4	PLO2	2.3.1

Short Answer Questions (3 Marks)

Q.No	Question	BTL	CLO	PLO	PI Code
1	State and explain Malus law.	BL1	CLO1	PLO1	1.1.1
2	Explain the phenomenon of double refraction.	BL1	CLO1	PLO1	1.1.2
3	Explain what is meant by half wave plate.	BL2	CLO2	PLO2	2.1.1
4	Explain what is meant by quarter wave plate.	BL2	CLO2	PLO2	2.1.1

CHAPTER-V : LASERS AND HOLOGRAPHY

Long Answer Questions (7 Marks)

Q.No	Full Question	BTL	CLO	PLO	PI Code
1	Describe the construction and working of Ruby laser.	BL2	CLO3	PLO2	2.2.1
2	Describe the construction and working of Helium–Neon laser.	BL2	CLO3	PLO2	2.2.1
3	Explain the basics of holography and discuss the application of holography.	BL3	CLO5	PLO4	4.1.3

Short Answer Questions (3 Marks)

Q.No	Question	BTL	CLO	PLO	PI Code
1	What are the applications of lasers?	BL4	CLO5	PLO4	4.1.3
2	Define spontaneous and stimulated emission.	BL1	CLO1	PLO1	1.1.1
3	Distinguish between spontaneous and stimulated emission.	BL1	CLO2	PLO1	1.1.2
4	What is holography?	BL3	CLO4	PLO3	3.3.3
5	Explain population inversion and metastable state.	BL1	CLO1	PLO1	1.1.2

Question Bank:
Long Answer Questions (SECTION –A)

UNIT – I : KINETIC THEORY OF GASES

Q.No	Full Question	BTL	CLO	PLO	PI Code
1	What are Maxwell's assumptions in deriving the Maxwell's law of distribution of velocities? Obtain Maxwell's distribution of molecular speed in a gas.	BL1, BL2, BL3	CLO3	PLO2	2.2.1
2	On the basis of kinetic theory of gases, derive an expression for the viscosity of a gas and discuss the dependence on temperature and pressure.	BL1, BL2, BL3	CLO3	PLO2	2.3.1
3	On the basis of kinetic theory of gases, derive an expression for the coefficient of thermal conductivity of a gas and discuss the dependence on temperature and pressure.	BL1, BL2, BL3	CLO3	PLO2	2.3.1

UNIT – II : THERMODYNAMICS

Q.No	Full Question	BTL	CLO	PLO	PI Code
1	What are reversible and irreversible processes? How does the entropy change in each of these processes?	BL1, BL2, BL3	CLO4	PLO2	2.2.1
2	Describe the working of Carnot's engine and derive an expression for its efficiency.	BL2, BL3	CLO3	PLO2	2.3.1
3	What is temperature–entropy diagram? Obtain the efficiency of Carnot's engine from T–S diagram.	BL1, BL3	CLO4	PLO3	3.3.3
4	State and explain Carnot's theorem. Give two statements of second law of thermodynamics. Describe the development of Kelvin scale of temperature.	BL1, BL2, BL3	CLO2	PLO1	1.1.2

Question	BTL	CLO	PLO	PI
Helmholtz, Enthalpy, Gibbs functions	BL2	CLO2	PLO1	1.1.2

UNIT – IV : LOW TEMPERATURE PHYSICS

Question	BTL	CLO	PLO	PI
Joule's expansion	BL2	CLO2	PLO1	1.1.2
Adiabatic vs Joule–Kelvin expansion	BL2	CLO4	PLO3	3.3.3
Low-temperature properties & numericals	BL2, BL3	CLO3	PLO2	2.3.1

UNIT – V : QUANTUM THEORY OF RADIATION

Question	BTL	CLO	PLO	PI
Black body radiation curve	BL2	CLO2	PLO1	1.1.2
Wien's & Rayleigh–Jeans laws	BL1, BL3	CLO3	PLO2	2.3.1
Solar constant & temperature numericals	BL1–BL3	CLO3	PLO2	2.3.1

GOVERNMENT COLLEGE (A), RAJAHMUNDRY
DEPARTMENT OF PHYSICS
QUESTION BANK FOR III - SEMESTER END EXAMINATION
COURSE 7: ELECTRONIC DEVICES AND CIRCUITS

ESSAY QUESTIONS

◆ UNIT – I (Diodes)

Question	BTL	CLO	PLO	PI Code
What is PN junction diode? Explain the V–I characteristics of PN junction diode.	BL1, BL2	CLO2	PLO1	1.1.2
With a neat diagram explain the working of a Zener diode in forward and reverse bias. Draw its V–I characteristics.	BL2, BL3	CLO3	PLO2	2.2.1
What is tunnel diode? Explain the working principle of a tunnel diode. Write its applications.	BL1, BL2, BL3	CLO5	PLO1	1.2.1

UNIT – II (Transistors)

Question	BTL	CLO	PLO	PI Code
Define transistor. Explain different types of transistors. Explain CE configuration.	BL1, BL2	CLO2	PLO1	1.1.2
Draw and explain the input and output characteristics of a transistor in CE configuration.	BL2, BL3	CLO3	PLO2	2.3.1
Draw and explain the input and output characteristics of a transistor in CB configuration.	BL2, BL3	CLO3	PLO2	2.3.1

UNIT – III (FETs & Thyristors)

Question	BTL	CLO	PLO	PI
Explain the construction and working of JFET.	BL2	CLO2	PLO1	1.1.2
With a neat diagram describe the working principle and characteristics of UJT.	BL2, BL3	CLO3	PLO2	2.2.1

Question	BTL	CLO	PLO	PI
Applications of Zener diode	BL1	CLO5	PLO1	1.2.1
Applications of tunnel diode	BL1	CLO5	PLO1	1.2.1

UNIT – II

Question	BTL	CLO	PLO	PI
Differences between CE and CB configurations	BL2	CLO3	PLO2	2.2.1
Active, Cutoff and Saturation regions	BL2	CLO3	PLO2	2.2.1
Need of stability factor in BJT	BL2	CLO4	PLO2	2.3.1

UNIT – III

Question	BTL	CLO	PLO	PI
Structure of N-channel enhancement MOSFET	BL1, BL2	CLO2	PLO1	1.1.2
Difference between JFET and BJT	BL2	CLO3	PLO2	2.2.1
Depletion type MOSFET	BL2	CLO2	PLO1	1.1.2
Importance of voltage divider biasing in JFET	BL3	CLO4	PLO2	2.3.1

UNIT – IV

Question	BTL	CLO	PLO	PI
Short note on phototransistor	BL2	CLO2	PLO1	1.1.2
Applications of LED	BL1	CLO5	PLO1	1.2.1
Applications of phototransistor	BL1	CLO5	PLO1	1.2.1
Difference between LDR and photodiode	BL2	CLO3	PLO2	2.2.1

UNIT – V

Question	BTL	CLO	PLO	PI
Zener diode as voltage regulator	BL2, BL3	CLO4	PLO2	2.3.1
L-section filter	BL2	CLO4	PLO2	2.2.1
π -section filter	BL2	CLO4	PLO2	2.2.1

Government College (A) Rajahmundry
II B.Sc Physics (Hon)
Major-4 : Analog and Digital Electronics
QUESTION BANK
UNIT – I: OPERATIONAL AMPLIFIERS

Essay Questions

Question (Full Form)	BTL	CLO	PLO	PI
Explain operational amplifier configurations with block diagrams and discuss the advantages and disadvantages of negative feedback.	BL2, BL3	CLO1	PLO1	PI1, PI2
Derive the expression for output voltage with feedback for inverting and non-inverting operational amplifiers.	BL3	CLO2	PLO2	PI2, PI3
List and explain five characteristics of an operational amplifier modified by negative feedback.	BL2	CLO1	PLO1	PI1

Short Questions

Question	BTL	CLO	PLO	PI
Define input offset voltage, output offset voltage, and bandwidth of an operational amplifier.	BL1	CLO1	PLO1	PI1
Describe the block diagram and equivalent circuit of an operational amplifier.	BL2	CLO1	PLO1	PI1
Explain CMRR and slew rate of an ideal operational amplifier.	BL2	CLO1	PLO1	PI1
Define the ideal voltage transfer curve of an operational amplifier and state its importance.	BL2	CLO1	PLO1	PI1
Differentiate between inverting and non-inverting operational amplifiers in open-loop configuration.	BL2	CLO2	PLO2	PI2
Calculate the output voltage of a non-inverting amplifier for given circuit parameters.	BL3	CLO4	PLO3	PI3

UNIT – II: PRACTICAL OPERATIONAL AMPLIFIERS & APPLICATIONS

Essay Questions

Question	BTL	CLO	PLO	PI
Draw and explain the circuit of a voltage shunt feedback amplifier.	BL2	CLO2	PLO2	PI2
Draw and explain the circuit of a voltage series feedback amplifier.	BL2	CLO2	PLO2	PI2
Explain the working of summing amplifier and differential amplifier using operational amplifiers.	BL3	CLO3	PLO2	PI2
Draw and explain the circuits of operational amplifier integrator and differentiator.	BL3	CLO3	PLO2	PI2

Short Questions

Question	BTL	CLO	PLO	PI
Explain the concept of virtual ground in operational amplifiers.	BL2	CLO1	PLO1	PI1
Explain the voltage follower circuit using operational amplifier.	BL2	CLO2	PLO2	PI2
Explain the working of a subtracting amplifier using operational amplifier.	BL3	CLO3	PLO2	PI2
Compare square-wave responses of integrator and differentiator circuits.	BL3	CLO3	PLO2	PI3

UNIT – III: NUMBER SYSTEMS, CODES & LOGIC GATES

Essay Questions

Question	BTL	CLO	PLO	PI
Describe different number systems with suitable examples.	BL2	CLO1	PLO1	PI1
Prove that NAND and NOR gates are universal gates.	BL3	CLO3	PLO2	PI3
State and explain De Morgan's theorems and verify using truth tables.	BL3	CLO3	PLO2	PI2

Question	BTL	CLO	PLO	PI
Explain BCD and Gray code conversions and their applications in digital systems.	BL3	CLO4	PLO3	PI3
Describe construction and truth tables of basic logic gates.	BL2	CLO1	PLO1	PI1

Short Questions

Question	BTL	CLO	PLO	PI
Convert a given decimal number into binary form.	BL3	CLO4	PLO3	PI3
State and prove De Morgan's laws.	BL3	CLO3	PLO2	PI3
Explain XOR and XNOR gates with truth tables.	BL2	CLO1	PLO1	PI1
Simplify Boolean expressions using Boolean laws.	BL3	CLO4	PLO3	PI3
Perform binary subtraction using 1's and 2's complement methods.	BL3	CLO4	PLO3	PI3

UNIT – IV: ARITHMETIC & DATA PROCESSING CIRCUITS

Essay Questions

Question	BTL	CLO	PLO	PI
Explain the construction and working of a 4-bit binary adder and subtractor.	BL3	CLO3	PLO2	PI2
Explain 2:1 multiplexer and 1:4 demultiplexer with diagrams.	BL2	CLO2	PLO2	PI2
Explain half subtractor and full subtractor using truth tables.	BL3	CLO3	PLO2	PI2
Explain multiplexers and demultiplexers and their applications.	BL2	CLO2	PLO1	PI1

Short Questions

Question	BTL	CLO	PLO	PI
Design a full adder using two half adders.	BL3	CLO4	PLO3	PI3
Explain half subtractor.	BL2	CLO3	PLO2	PI2
List applications of multiplexers and demultiplexers.	BL2	CLO2	PLO1	PI1
Define decoder and explain its types.	BL2	CLO2	PLO1	PI1
List applications of encoders and decoders.	BL2	CLO2	PLO1	PI1

UNIT – V: SEQUENTIAL LOGIC CIRCUITS & CODE CONVERTERS

Essay Questions

Question	BTL	CLO	PLO	PI
Define flip-flop and explain the working of clocked SR flip-flop.	BL2	CLO2	PLO1	PI1
Explain working and applications of JK and Master–Slave flip-flops.	BL3	CLO3	PLO2	PI2
Explain BCD to decimal and BCD to Gray code converters.	BL3	CLO4	PLO3	PI3

Short Questions

Question	BTL	CLO	PLO	PI
Differentiate between combinational and sequential logic circuits.	BL2	CLO1	PLO1	PI1
Differentiate NAND latch and NOR latch.	BL2	CLO1	PLO1	PI1
Define clocked SR flip-flop and explain its significance.	BL2	CLO2	PLO1	PI1
List applications of flip-flops.	BL2	CLO2	PLO1	PI1

GOVERNMENT COLLEGE (A) RAJAHMUNDRY

QUESTION BANK FOR SEMESTER -III

PHYSICS- OPTICS (MINOR) 2024-25

CHAPTER – I: ABERRATIONS

Long Answer Questions (7 Marks)

Question (Full Form)	BTL	CLO	PLO	PI
What is chromatic aberration? Obtain an expression for chromatic aberration of a lens.	BL1	CLO1	PLO1	PI1
What is chromatic aberration? Derive the condition for achromatism when two lenses are in contact and separated by a distance.	BL1	CLO1	PLO1	PI1
What is spherical aberration in a lens? Discuss various methods to minimize spherical aberration.	BL2	CLO2	PLO2	PI2
What is spherical aberration in a lens? Explain how it can be minimized using two thin lenses separated by a distance and obtain the condition.	BL1	CLO2	PLO2	PI2

Short Answer Questions (3 Marks)

Question	BTL	CLO	PLO	PI
What is coma and how can it be minimized?	BL2	CLO2	PLO2	PI2
What is astigmatism? What are the conditions for astigmatism?	BL2	CLO2	PLO2	PI2
Explain curvature of field and distortion.	BL2	CLO2	PLO2	PI2

CHAPTER – II: INTERFERENCE

Long Answer Questions (7 Marks)

Question	BTL	CLO	PLO	PI
What is a wedge-shaped film? Describe the fringes observed and calculate the separation between consecutive bright and dark	BL2	CLO3	PLO2	PI2

Question	BTL	CLO	PLO	PI
Describe the construction and working of ruby laser.	BL2	CLO3	PLO2	PI2
Describe the construction and working of helium–neon laser.	BL2	CLO3	PLO2	PI2
Explain the basic principle of holography and discuss its applications.	BL3	CLO4	PLO3	PI3

Short Answer Questions (3 Marks)

Question	BTL	CLO	PLO	PI
List the applications of lasers.	BL4	CLO4	PLO3	PI3
Define spontaneous and stimulated emission.	BL1	CLO1	PLO1	PI1
Distinguish between spontaneous and stimulated emission.	BL1	CLO1	PLO1	PI1
What is holography?	BL3	CLO4	PLO3	PI3
Explain population inversion and metastable state.	BL1	CLO2	PLO1	PI1

ELECTRICITY AND MAGNETISM
Question Bank

U	Question	BL	CLO	PLO	PI Code
Section-A: Essay Questions					
1	State and prove Gauss's law in Electrostatics?	2	CLO1	PLO1	1.1.2
2	Expression for electric potential due to uniformly charged sphere?	2	CLO2	PLO1	1.1.2
3	Define D, E and P and derive the relation between them.	1, 2	CLO1	PLO1	1.1.1
4	Apply Kirchhoff's Laws to Wheatstone bridge...	3	CLO3	PLO1	1.3.2
5	State and Prove Maximum power transfer theorem?	2	CLO1	PLO1	1.1.2
6	State and Prove Thevenin's Theorem?	2	CLO1	PLO1	1.1.2
7	State and Prove Norton's Theorem?	2	CLO1	PLO1	1.1.2
8	State Biot-Savart's law and derive expression for circular loop.	2	CLO1	PLO1	1.1.2
9	Explain Hall effect and derive Hall coefficient.	2	CLO2	PLO1	1.2.2
10	Derive expression for self-inductance of a long solenoid?	2	CLO1	PLO1	1.1.2
11	Derive Maxwell's equations in differential form.	2	CLO1	PLO1	1.1.2
12	Derive plane electromagnetic wave equation in free space.	2	CLO2	PLO1	1.1.2
13	Define Poynting vector, derive expression and significance.	1, 2	CLO1	PLO1	1.1.1
14	Derive equations for growth and decay in CR circuit?	3	CLO3	PLO1	1.3.2
15	Derive equations for growth and decay in LR circuit?	3	CLO3	PLO1	1.3.2
16	Explain resonance in series LCR circuit and resonant frequency.	2	CLO2	PLO1	1.1.2
Section-B: Short Answer Questions					
1	Explain about equipotential surfaces?	2	CLO2	PLO1	1.1.2
2	What are dielectrics? (Polar and non-polar)	1	CLO1	PLO1	1.1.1
3	Problem: Calculate refractive index and velocity (Water).	3	CLO3	PLO1	1.3.2
4	Define drift velocity and obtain expression.	1, 2	CLO1	PLO1	1.1.1

U	Question	BL	CLO	PLO	PI Code
5	State Ohm's law and mention limitations.	1	CLO1	PLO1	1.1.1
6	State Ampere's Circuital Law and conditions.	1	CLO1	PLO1	1.1.1
7	State Faraday's laws and Lenz's law.	1	CLO1	PLO1	1.1.1
8	Write Maxwell's equations (Integral/Differential).	1	CLO1	PLO1	1.1.1
9	Explain Q-factor and Power factor?	2	CLO2	PLO1	1.1.2
10	Phase difference in Pure R, L, and C circuits?	2	CLO2	PLO1	1.1.2
11	Problem: Calculate resonant frequency (L, C, R values).	3	CLO3	PLO1	1.3.2

Question Bank: Modern Physics

Government College (Autonomous)

Rajahmundry

MODERN PHYSICS (MAJOR)

Unit-I: Introduction to Atomic Structure and Spectroscopy

Q. No	Question	BTL	CLO	PLO	PI Code
E1	Explain the Quantum Numbers associated with Vector Atom model.	2	2	PLO-1	1.1.2
E2	Describe the Stern and Gerlach experiment and indicate the importance of the results obtained.	2	4	PLO-1	1.4.1
E3	Explain the experimental arrangement of Zeeman effect.	2	4	PLO-1	1.4.1
S4	Explain L–S Coupling Scheme.	2	2	PLO-1	1.1.2
S5	Explain j–j Coupling Scheme.	2	2	PLO-1	1.1.2
S9	What is Zeeman Effect?	1	1	PLO-1	1.1.1
S10	Postulates of the Bohr's model of atom.	1	1	PLO-1	1.1.1

Unit-II: Molecular Structure and Spectroscopy

Q. No	Question	BTL	CLO	PLO	PI Code
E1	What is Raman Effect? Explain the formation of Stoke's and Anti Stoke's lines on the basis of quantum theory.	2	2	PLO-1	1.1.2
E2	Explain the experimental arrangement of Raman effect.	2	4	PLO-1	1.4.1
S1	Mention any four applications of Raman Effect.	1	1	PLO-1	1.2.1
S2	Calculate the Raman shift (Excitation: 4358 Å, Observation: 4447 Å).	3	3	PLO-1	1.3.2
S3	Find the wavelength of anti-stokes line (Excitation: 5460 Å, Stokes: 5520 Å).	3	3	PLO-1	1.3.2

Unit-III: Matter Waves and Uncertainty Principle

Q. No	Question	BTL	CLO	PLO	PI Code
E1	Describe the Davisson and Germer experiment to demonstrate the wave character of electrons.	2	4	PLO-1	1.4.1

Q. No	Question	BTL	CLO	PLO	PI Code
E2	What are matter waves? Derive an expression for de-Broglie wavelength.	2	3	PLO-1	1.3.2
E3	State and Explain Heisenberg's uncertainty principle; extend it to Energy and Time.	2	2	PLO-1	1.1.2
S4	Write the properties of matter waves.	1	1	PLO-1	1.1.1
S6	Calculate the de-Broglie wavelength associated with a proton ($v = 1/20 c$).	3	3	PLO-1	1.3.2
S9	Illustrate uncertainty principle using diffraction by a single slit.	2	2	PLO-1	1.1.2

Unit-IV: Quantum Mechanics

Q. No	Question	BTL	CLO	PLO	PI Code
E1	Derive Schrodinger time dependent wave equation.	3	3	PLO-1	1.3.2
E2	Derive Schrodinger time independent wave equation.	3	3	PLO-1	1.3.2
E3	Obtain energy of a particle in a 1D potential well of infinite height.	3	3	PLO-1	1.3.2
S5	Explain the physical interpretation of wave function.	2	2	PLO-1	1.1.2
S7	What is meant by Eigen functions and Eigen values?	1	1	PLO-1	1.1.1

Unit-V: Superconductivity

Q. No	Question	BTL	CLO	PLO	PI Code
E1	Explain Type-I and Type-II superconductors.	2	2	PLO-1	1.1.2
E2	Discuss about BCS Theory.	2	2	PLO-1	1.1.2
S3	Mention the applications of superconductors.	1	1	PLO-1	1.2.1
S4	Explain the Meissner effect.	2	2	PLO-1	1.1.2
S5	Define critical temperature, critical magnetic field, and isotope effect.	1	1	PLO-1	1.1.1

GOVERNMENT COLLEGE (A), RAJAHMUNDRY
II B. Sc-Physics Hons - UG IV SEMESTER
SUBJECT: INTRODUCTION TO NUCLEAR AND PARTICLE PHYSICS
Time: 2 1/2 Hours Max. Marks: 50M

Question Bank

UNIT-I: Introduction to Nuclear Physics

Essay Answer Questions

1. Discuss about the general properties of nuclei.
2. Explain the liquid drop model of the nucleus.
3. Explain the Shell model of the nucleus.

Short Answer Questions

1. What are the general properties of nuclei?
2. Define the mass defect and binding energy.
3. What are the characteristics of nuclear forces?
4. Explain Yukawa's meson theory of nuclear forces.
5. What is the shell model of the nucleus?

UNIT-II: Elementary Particles and Interactions

Essay Answer Questions

1. Classify elementary particles and describe the properties of leptons, mesons, and baryons.
2. Explain the different types of fundamental interactions and discuss the conservation laws associated with them.
3. Explain the differences between strong, electromagnetic, and weak interactions.

Short Answer Questions

1. How are elementary particles classified? Provide examples.
2. Discuss the properties of leptons, mesons, and baryons.
3. What are the conservation laws in particle physics? Explain with examples.
4. Explain isospin conservation.
5. What is parity, and discuss about its conservation.

UNIT-III: Nuclear Reactions and Nuclear Detectors

Essay Answer Questions

1. Describe the working principle, and the construction the Geiger-Muller counter.
2. Explain about the different types of nuclear reactions.
3. Explain the various conservation laws in nuclear reactions.

Short Answer Questions

1. Derive an expression for reaction energetics and explain threshold energy.
2. What are the different types of nuclear reactions? Give examples.
3. Discuss the conservation laws applicable in nuclear reactions.
4. Explain the working principle of a Geiger-Muller counter.
5. Describe the construction and working of a scintillation counter.

UNIT-IV: Nuclear Decays and Nuclear Accelerators

Essay Answer Questions

1. Explain Gamow's theory of alpha decay
2. Discuss Fermi's theory of beta decay and its significance.
3. Describe the construction and working of a cyclotron.

Short Answer Questions

1. What are the selection rules for beta decay?
2. What are the applications of a cyclotron?
3. What are the applications of a synchrocyclotron?
4. Compare electrostatic and electrodynamic accelerators with examples.

UNIT-V: Applications of Nuclear and Particle Physics

Essay Answer Questions

1. Discuss the applications of nuclear physics in radiation therapy and medical imaging techniques.
2. Explain the working principle of nuclear reactors and their role in power generation.
3. Discuss imaging techniques using nuclear physics in the medical field.

Short Answer Questions

1. Describe the working principle of nuclear reactors for power generation.
2. What are the environmental and safety concerns related to nuclear reactors?
3. What are the advantages of nuclear energy over conventional energy sources?
4. Explain the potential applications of nuclear and particle physics in modern science and technology.

Question Bank

Essay Questions

Unit	Question	CLO*	PLO	PI Code
1	State and prove Gauss's law in Electrostatics?	CLO1	PLO1	1.1.2
2	Expression for electric potential due to uniformly charged sphere?	CLO2	PLO1	1.1.2
3	Define D, E and P and derive the relation between them.	CLO1	PLO1	1.1.1
4	Apply Kirchhoff's Laws to Wheatstone bridge and obtain the balancing condition?...	CLO3	PLO1	1.3.2
5	State and Prove Maximum power transfer theorem?	CLO1	PLO1	1.1.2
6	State and Prove Thevenin's Theorem?	CLO1	PLO1	1.1.2
7	State and Prove Norton's Theorem?	CLO1	PLO1	1.1.2
8	State Biot-Savart's law. Derive an expression for the magnetic field at the center and at any point on the axis of a circular current-carrying loop.	CLO1	PLO1	1.1.2
9	Explain Hall effect and derive Hall coefficient.	CLO2	PLO1	1.2.2
10	Derive expression for self-inductance of a long solenoid?	CLO1	PLO1	1.1.2
11	Derive Maxwell's equations in differential form.	CLO1	PLO1	1.1.2
12	Derive plane electromagnetic wave equation in free space.	CLO2	PLO1	1.1.2
13	Define Poynting vector, derive expression and significance.	CLO1	PLO1	1.1.1
14	Derive equations for growth and decay in CR circuit?	CLO3	PLO1	1.3.2
15	Derive equations for growth and decay in LR circuit?	CLO3	PLO1	1.3.2
16	Explain resonance in series LCR circuit and resonant frequency.	CLO2	PLO1	1.1.2

Short Answer Questions

Unit	Question	CLO*	PLO	PI Code
1	Explain about equipotential surfaces?	CLO2	PLO1	1.1.2
2	What are dielectrics? (Polar and non-polar)	CLO1	PLO1	1.1.1
3	The dielectric constant of distilled water is 81. Calculate the refractive index and velocity.	CLO3	PLO1	1.3.2
4	Define drift velocity and obtain expression.	CLO1	PLO1	1.1.1
5	State Ohm's law and mention limitations.	CLO1	PLO1	1.1.1
6	State Ampere's Circuital Law and conditions.	CLO1	PLO1	1.1.1
7	State Faraday's laws and Lenz's law.	CLO1	PLO1	1.1.1
8	Write Maxwell's equations in Integral form	CLO1	PLO1	1.1.1
9	Write Maxwell's equations in differentially form	CLO1	PLO1	1.1.1
10	Explain Q-factor and Power factor?	CLO2	PLO1	1.1.2
11	Phase difference in Pure R, L, and C circuits?	CLO2	PLO1	1.1.2
12	Calculate the resonant frequency of an LCR series circuit with $L = 5\text{Mh}$, $C = 0.1\mu\text{F}$, $R = 100\text{ K ohm}$.	CLO3	PLO1	1.3.2

PRACTICAL

S.No	Description	Marks
1	Formula	05
2	Tabular Form & Readings	10
3	Calculations & Result (Including Graph)	15
4	Precautions & Units	05
5	Viva-Voce	05
6	Record**	10
	Total	50

Question Bank: Modern Physics

Government College (Autonomous)

Rajahmundry

MODERN PHYSICS (Minor)

Unit-I: Introduction to Atomic Structure and Spectroscopy

Q. No	Question	BTL	CLO	PLO	PI Code
E1	Explain the Quantum Numbers associated with Vector Atom model.	2	2	PLO-1	1.1.2
E2	Describe the Stern and Gerlach experiment and indicate the importance of the results obtained.	2	4	PLO-1	1.4.1
E3	Explain the experimental arrangement of Zeeman effect.	2	4	PLO-1	1.4.1
S4	Explain L-S Coupling Scheme.	2	2	PLO-1	1.1.2
S5	Explain j-j Coupling Scheme.	2	2	PLO-1	1.1.2
S6	What is Zeeman Effect?	1	1	PLO-1	1.1.1

Unit-II: Molecular Structure and Spectroscopy

Q. No	Question	BTL	CLO	PLO	PI Code
E1	What is Raman Effect? Explain the formation of Stoke's and Anti Stoke's lines on the basis of quantum theory.	2	2	PLO-1	1.1.2
E2	Explain the experimental arrangement of Raman effect.	2	4	PLO-1	1.4.1
S3	Mention any four applications of Raman Effect.	1	1	PLO-1	1.2.1
S4	write a short note on characteristics of the raman effect	3	3	PLO-1	1.3.2
S5	Write a short note on IR Spectroscopy	3	3	PLO-1	1.3.2

Unit-III: Matter Waves and Uncertainty Principle

Q. No	Question	BTL	CLO	PLO	PI Code
E1	Describe the Davisson and Germer experiment to demonstrate the wave character of electrons.	2	4	PLO-1	1.4.1
E2	What are matter waves? Derive an expression for de-Broglie wavelength.	2	3	PLO-1	1.3.2
E3	State and Explain Heisenberg's uncertainty principle; extend it to Energy and Time.	2	2	PLO-1	1.1.2
S4	Write the properties of matter waves.	1	1	PLO-1	1.1.1

Q. No	Question	BTL	CLO	PLO	PI Code
S5	Calculate the de-Broglie wavelength associated with a proton ($v = 1/20 c$).	3	3	PLO-1	1.3.2

Unit-IV: Quantum Mechanics

Q. No	Question	BTL	CLO	PLO	PI Code
E1	Derive Schrodinger time dependent wave equation.	3	3	PLO-1	1.3.2
E2	Derive Schrodinger time independent wave equation.	3	3	PLO-1	1.3.2
E3	Obtain energy of a particle in a 1D potential well of infinite height.	3	3	PLO-1	1.3.2
S4	Explain the physical interpretation of wave function.	2	2	PLO-1	1.1.2
S5	Write the properties of wave function?	1	1	PLO-1	1.1.1
S6	Write the Postulates of Quantum mechanics?				

Unit-V: Superconductivity

Q. No	Question	BTL	CLO	PLO	PI Code
E1	Explain Type-I and Type-II superconductors.	2	2	PLO-1	1.1.2
E2	Discuss about BCS Theory.	2	2	PLO-1	1.1.2
S3	Mention the applications of superconductors.	1	1	PLO-1	1.2.1
S4	Explain the Meissner effect?	2	2	PLO-1	1.1.2
S5	Define critical temperature, critical magnetic field, and isotope effect.	1	1	PLO-1	1.1.1

Question Bank:

UNIT-I

Essays

1. Derive an expression for effective resistance in series and parallel combination of resistors?
2. Derive an expression for effective capacitance in series and parallel combination of capacitors?
3. Explain Principle, Charging and discharging of a Capacitor?

Short answer questions

1. What are Passive and Active elements
2. Discuss about Applications of a Resistor as a heating element in heaters and as a fuse element?
3. Derive an expression for energy stored in an inductor?
4. Derive an expression for energy stored in a capacitor?
5. Explain Application of choke in a fan?

UNIT-II

Essays

1. Explain construction and working of Lead acid batteries,
2. Explain construction and working of Li- Ion batteries,

Short answer questions

1. What are the differences between AC and DC
2. Describe Series, Parallel & Series-Parallel configuration of batteries?
3. Discuss about Constant Voltage source?
4. Discuss Constant Current Source?
5. Discuss about SMPS used in computers

UNIT-III

Essays

1. Draw and explain the working principle of a transformer ?
2. Describe construction and working principle of aAC Generator,
3. Discuss about working principle of single phase motor ?

Short answer questions

1. Distinguish between Step-up and Step-down transformers
2. Define emf? Explain relation between primary turns and secondary turns of the transformer
3. What is the use of a transformer in a regulated power supplies
4. Write the Applications of transformers?

UNIT-IV

Essays

1. Explain Amplitude Modulation(AM) and demodulation with a necessary block diagram?
2. Explain Frequency Modulation(FM) and demodulation with a necessary block diagram?
3. Explain how the diode as detector in modulation concepts?

Short answer questions

1. Explain amplitude modulation index?
2. Explain frequency modulation index?
3. Distinguish Amplitude and frequency modulation?

UNIT-V

Essays

1. Describe the construction and operating principle of a DC motor
2. Explain about construction and operating principle of a simple motor (fan)?
3. Explain the construction and working of step down (ex: 220-12V) transformer?

Short answer questions

1. Define the terms (i) calculation of power (ii) voltage and (iii) current in a DC motor
2. Write the differences between DC and AC generators?
3. Explain design and construction of DC charger?

7.

GOVERNMENT COLLEGE (A): RAJAMAHENDRAVARAM
DEPARTMENT OF PHYSICS
QUESTION BANK
MODULE – V: OPTICAL INSTRUMENTS AND OPTOMETRY
(As Approved in the BOS meeting held on 02 Aug 2022 for batch 2022-2023)

UNIT–I Optical Microscopes

Essay Questions

1. Explain the construction, working and magnifying power of a simple microscope under normal adjustment.
2. Describe the compound microscope. Derive the expression for its magnifying power under normal adjustment and discuss its resolving power.
3. Explain the operating principle of a phase contrast microscope. Discuss its advantages and applications in biological studies.

Short Answer Questions

1. Explain magnifying power of a microscope.
2. What is normal adjustment in a microscope? Define magnifying power of compound microscope
3. Write two advantages and two applications of phase contrast microscope.
4. Mention the uses of travelling microscope.

UNIT–II: Telescopes

Essay Questions

1. Describe the construction and working of a refracting astronomical telescope and obtain an expression for its magnifying power.
2. What is a terrestrial telescope? Explain its construction, working and magnifying power.
3. Explain the working principle of binoculars. Discuss their construction and applications.

Short Answer Questions

1. Distinguish between refracting and reflecting telescopes.
2. Explain resolving power of a telescope.
3. What is the function of an erecting lens in terrestrial telescopes?
4. Write the important applications of binoculars.

UNIT–III Applications of Optical Instruments

Essay Questions

1. Describe in detail electron microscopes (TEM and SEM) and explain their working principles and uses.
2. Write an essay on scanning probe and scanning acoustic microscopes and mention their applications.
3. Explain different types of telescopes – optical, radio, solar, infrared and ultraviolet – and their applications in astronomy.

Short Answer Questions

1. Differentiate between TEM and SEM.
2. What is a confocal microscope? Explain.
3. Define radio telescope and mention the major uses.
4. Explain the functioning of scanning probe microscopy?

UNIT–IV Optical Vision

Essay Questions

1. Explain eye as an optical instrument and describe image formation in the eye.
2. Explain myopia and hypermetropia and describe their correction using ophthalmic lenses.
3. Discuss the working principle and types of contact lenses and their advantages.

Short Answer Questions

1. Explain in detail about optical vision.
2. What are ophthalmic lenses? Give examples.
3. What is near point and far point of the human eye?
4. Write any two advantages of contact lenses.

UNIT–V Ophthalmic Techniques and Optometry

Essay Questions

1. Explain the construction and working principles of ophthalmoscope.
2. Describe the evaluation of eye disorders using ophthalmic instruments.
3. Describe the simple phoropter, its construction, working principle and uses. Also explain computer-based eye testing.

Short Answer Questions

1. What is an ophthalmoscope? Write the major uses.
2. Mention two guidelines for eye chart preparation.
3. Write short notes on computer-based eye testing.

**GOVERNMENT COLLEGE (A), RAJAHMUNDRY
DEPARTMENT OF PHYSICS
MINOR-6 ELECTRONIC INSTRUMENTATION
QUESTION BANK**

UNIT I: Essay Questions (7 marks)

1. Define accuracy, precision, sensitivity, and resolution. Explain their significance in measurement with suitable examples.
2. Discuss the working principle of a digital multimeter with a block diagram.
3. Explain the basic principles and types of errors in electronic measurements. How can they be minimized?

Short Answer Questions (3 marks)

1. What are the key differences between analog and digital measuring instruments?
2. Write any three applications of a function generator in electronics labs.
3. Define the term 'instrument calibration' and mention its importance.

UNIT II:

Essay Questions (7 marks)

1. Describe the block diagram and working of a Digital Storage Oscilloscope (DSO). What advantages does it have over analog CRO?
2. Explain how voltage, frequency, and phase difference are measured using an oscilloscope.
3. Discuss the major controls of an oscilloscope (Time/div, Volt/div, Triggering) and their functions during measurements.

Short Answer Questions (3 marks)

1. What is the role of a trigger in an oscilloscope?
2. Mention any three practical applications of an oscilloscope in circuit diagnostics.
3. What is meant by waveform comparison? Give one example.

UNIT III:

Essay Questions (7 marks)

1. What are transducers? Classify them and explain the working principles of LVDT and Thermistor.
2. Discuss the construction and working of a Wheatstone Bridge. How is it used for resistance measurement?
3. Explain construction and working of Wien bridge oscillator

Short Answer Questions (3 marks)

1. Write any three differences between active and passive transducers.
2. What physical quantities can be measured using piezoelectric and capacitive transducers?
3. Write a short on error analysis in bridge measurements.

UNIT IV:

Essay Questions (7 marks)

1. Compare LED, LCD, and SSD displays based on construction, working principle, and applications.
2. Explain the working of a 7-segment display. Distinguish between common anode and common cathode types with diagrams.
3. Discuss the application of display technologies in digital voltmeters and counters.

Short Answer Questions (3 marks)

1. What are the advantages of LED over LCD displays?
2. Write a short note on the structure and use of a 7-segment display.
3. Name three devices where SSDs are commonly used.

UNIT V:

Essay Questions (7 marks)

1. Describe the block diagram and working of an ECG machine. What kind of information does it provide?
2. Explain the working principles of a pulse oximeter and a digital blood pressure monitor.
3. Write a short note on medical imaging techniques: X-ray, Ultrasound, and CT scan. Mention one use of each.

Short Answer Questions (3 marks)

1. What is the basic principle of a clinical thermometer?
2. How does a glucometer work? Mention its significance in healthcare.
3. Differentiate between MRI and CT scans based on working principles.

UG – III B.Sc. Physics Honors
VI SEMESTER
Course Title: Low Temperature Physics & Refrigeration
Question Bank

UNIT-I

ESSAY QUESTIONS:

1. Explain the Joule-Thomson effect and discuss the about Inversion temperature.
2. Describe the liquefaction of gases with reference to the Linde process.
3. Explain the production of liquid hydrogen with neat diagrams.

SHORT ANSWER QUESTIONS:

1. What are freezing mixtures? Give one example.
2. Write a note on adiabatic demagnetization.
3. Write a short note on low temperature properties of materials.

UNIT-II

ESSAY QUESTIONS:

1. Explain the gas thermometer, its corrections and calibration.
2. Explain the principle and working resistance thermometers.
3. Explain vapour pressure thermometers

SHORT ANSWER QUESTIONS:

1. What is a secondary thermometer?
2. Discuss about the magnetic thermometers.
3. Explain the about thermocouple.

UNIT-III

ESSAY QUESTIONS:

1. Describe the vapour absorption refrigeration system
2. Explain vapour Compression refrigeration system.
3. Discuss ideal refrigerants and classification of refrigerants.

SHORT ANSWER QUESTIONS:

1. Distinguish between natural and artificial refrigeration.
2. List the properties of a good refrigerant.
3. Explain about the eco-friendly refrigerants.

UNIT-IV

ESSAY QUESTIONS:

1. Describe the construction and working of a refrigerator with a neat block diagram.
2. Explain Coefficient of Performance (COP), Ton of Refrigeration (TR) and Energy Efficiency Ratio (EER).
3. Describe different types of compressors used in refrigeration.

SHORT ANSWER QUESTIONS:

1. What is defrosting?
2. Write a note on refrigerant leakage detection.
3. What is energy efficiency ratio (EER)?

UNIT-V

ESSAY QUESTIONS:

1. Explain the applications of low temperatures in medicine and biology.
2. Discuss domestic and industrial applications of refrigeration.
3. Explain the applications of refrigeration in food preservation and cold storage.

SHORT ANSWER QUESTIONS:

1. What is cryosurgery?

Essays

1. Derive an expression for effective resistance in series and parallel combination of resistors?
2. Derive an expression for effective capacitance in series and parallel combination of capacitors?
3. Explain Principle, Charging and discharging of a Capacitor?

Short answer questions

1. What are Passive and Active elements
2. Discuss about Applications of a Resistor as a heating element in heaters and as a fuse element?
3. Derive an expression for energy stored in an inductor?
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5. Explain Application of choke in a fan?

UNIT-II

Essays

1. Explain construction and working of Lead acid batteries,
2. Explain construction and working of Li- Ion batteries,

Short answer questions

1. What are the differences between AC and DC
2. Describe Series, Parallel & Series-Parallel configuration of batteries?
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UNIT-III

Essays

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2. Describe construction and working principle of aAC Generator,
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Short answer questions

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2. Define emf? Explain relation between primary turns and secondary turns of the transformer
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4. Write the Applications of transformers?

UNIT-IV

Essays

1. Explain Amplitude Modulation(AM) and demodulation with a necessary block diagram?
2. Explain Frequency Modulation(FM) and demodulation with a necessary block diagram?
3. Explain how the diode as detector in modulation concepts?

Short answer questions

1. Explain amplitude modulation index?
2. Explain frequency modulation index?

3. Distinguish Amplitude and frequency modulation?

UNIT-V

Essays

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2. Explain about construction and operating principle of a simple motor (fan)?
3. Explain the construction and working of step down (ex: 220-12V) transformer?

Short answer questions

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2. Write the differences between DC and AC generators?
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Direct Assessment	20M	• CIA – I	20M
Indirect Assessment	30M	• CIA – II (On line)	10M
		• Assignment	5M
		• Seminar/any pedagogical method	5M
		• Attendance	5M
		• Clean & Green	5M

SCHEME FOR SEMESTER END THEORY EXAMINATION

(SEE) – (Major1 /Major-2)

EXTERNAL (50)

TYPE OF QUESTION	MARKS	SCHEME
PART-A Essay Questions	Each question carries 7 Marks	Answer all the questions 5x7 = 35 M Theoretical Questions, Maximum 2 questions from Each unit with internal choice
PART-B Short Answer Questions	Each question carries 3 Marks	Answer any 5 out of 8 questions 3x5= 15 M Minimum 1 question from Each unit subjected to maximum of 2 questions from each unit.

**GOVERNMENT COLLEGE (A), RAJAHMUNDRY
DEPARTMENT OF PHYSICS
MINOR-6 ELECTRONIC INSTRUMENTATION
QUESTION BANK**

UNIT I:

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3. Discuss the working principle of a digital multimeter with a block diagram.
4. Explain the basic principles and types of errors in electronic measurements. How can they be minimized?

Short Answer Questions (3 marks)

6. What are the key differences between analog and digital measuring instruments?

7. Write any three applications of a function generator in electronics labs.
8. Define the term 'instrument calibration'; and mention its importance.

UNIT II:

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1. Describe the block diagram and working of a Digital Storage Oscilloscope (DSO). What advantages does it have over analog CRO?
2. Explain how voltage, frequency, and phase difference are measured using an oscilloscope.
3. Discuss the major controls of an oscilloscope (Time/div, Volt/div, Triggering) and their functions during measurements.

Short Answer Questions (3 marks)

4. What is the role of a trigger in an oscilloscope?
5. Mention any three practical applications of an oscilloscope in circuit diagnostics.
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UNIT III:

Essay Questions (7 marks)

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3. Explain construction and working of Wien bridge oscillator

Short Answer Questions (3 marks)

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5. What physical quantities can be measured using piezoelectric and capacitive transducers?
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UNIT IV:

Essay Questions (7 marks)

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2. Explain the working of a 7-segment display. Distinguish between common anode and common cathode types with diagrams.
3. Discuss the application of display technologies in digital voltmeters and counters.

Short Answer Questions (3 marks)

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7. Name three devices where SSDs are commonly used.

UNIT V:

Essay Questions (7 marks)

1. Describe the block diagram and working of an ECG machine. What kind of information does it provide?
2. Explain the working principles of a pulse oximeter and a digital blood pressure monitor.
3. Write a short note on medical imaging techniques: X-ray, Ultrasound, and CT scan. Mention one use of each.

Short Answer Questions (3 marks)

4. What is the basic principle of a clinical thermometer?
5. How does a glucometer work? Mention its significance in healthcare.

2. Write short note on importance of Biodiversity.
3. Write a short note on forest resources in India.
4. What are the consumptive and productive values of biodiversity?

Unit – 2: Environmental Degradation and Impacts

10 Marks Questions

1. Discuss the impact of human population growth on the environment.
2. Explain the causes and effects of deforestation.
3. Describe various types of pollution and their effects on human health.
4. Write an essay on global environmental problems like greenhouse effect, global warming, and ozone depletion.

5 Marks Questions

1. What are the main causes of land degradation and desertification?
2. Write a short note on over-exploitation of water resources.
3. What are the effects of non-renewable energy resource utilization?
4. Write briefly about acid rain and its impacts.
5. Mention any four threats to biodiversity.

Unit – 3: Conservation of Environment

10 Marks Questions

1. Discuss the control measures for air, water, and soil pollution.
2. Write an essay about solid waste management.
3. Explain in-situ and ex-situ conservation of biodiversity with examples.
4. Discuss various environmental laws and their significance.
5. Write an essay on international environmental agreements and movements in India.

5 Marks Questions

1. What is sustainable development?
2. Write short notes on Montreal and Kyoto Protocols.
3. Mention any two methods of solid waste management.
4. What are renewable and alternate sources of energy?
5. Write briefly about the Chipko and Silent Valley movements.

HOUSE HOLD ELECTRICAL WIRING

QUESTION BANK

UNIT-1

Short Answer questions:

1. Write ohm's law
2. Write various types of house wiring
3. What is power load?

Essay questions:

1. Discuss the basic requirements of various electrical utilities?
2. Discuss materials and accessories used in domestic wiring?
3. Explain different types of loads and sub circuits?
4. Write briefly different types of service mains?

UNIT –II

Short Answer questions:

1. How do you select a main switch cable?
2. How to estimate wiring cable for a small residential building?
3. Write kirchhoff's laws in electricity?

Essay questions:

1. How do you estimate the length of wiring cable and labour charges?
2. Write the standard proforma in preparation of estimation?
3. Discuss various steps involved in selection of main switch cable?

UNIT – III

Short Answer questions:

1. Define potential difference?
2. Name the different wiring methods?
3. What are the characteristics of a fuse wire?

Essay questions:

1. write various steps involved preparation of wiring installation?
2. What are the materials and accessories that are used in motor installation?
3. Discuss various loads and wiring methods?

QUESTION BANK

UNIT – 1

1. Describe briefly about photography?
2. What is camera obscura? Explain Camera Obscura?
3. How many types of eyes are there? Distinguish between the human eye and camera?
4. Define image and pictures? Explain about them?

UNIT – II

1. Who discovered first partially successful photograph of the camera?
2. What are the primary elements of photograph developed by Fox Talbot?
3. Define range finder camera and SLR?
4. Explain about mirror less camera?

UNIT – III

1. Describe briefly about CCD and CMOS sensors?
2. Explain about Full Frame CMOS and APSC CMOS?
3. What is rolling shutter? How it works?
4. Explain about wide angle lens and zoom lens?

UNIT – IV

1. Explain briefly about ISO and how it works?
2. Explain about focus modes AF-S, AF-C, AF-A?
3. What are metering modes?
4. Explain about composition and rule of thirds?