



GOVERNEMENT COLLEGE(A), RAJAHMUNDRY
DEPARTMENT OF PHYSICS

2025-26

I.B.Sc-(PHYSICS)-(H)

COURSE-I : INTRODUCTION TO MATHEMATICAL PHYSICS

Model question paper

Section -A



Answer All questions

5 x 7 = 35 Marks

Q.No	Question	BT Level	CLO	PLO	PI
1	State and prove the divergence of a vector field.	BT4	CLO2	PLO1, PLO2	1.1.2, 2.2.1
	[OR]				
2	State and prove Stokes' theorem of vector calculus.	BT5	CLO3	PLO1, PLO3	2.3.1, 3.3.4
3	Determine the Eigen values and Eigen vectors of the given matrix.	BT4	CLO2	PLO2	2.2.1, 2.3.1
	[OR]				
4	By using matrices, find the tension in two ropes supporting a weight of 100 N, making angles 30° and 45° with the horizontal.	BT4	CLO3	PLO2, PLO3	2.2.1, 3.3.1
5	Derive the expression for impedance of a series LCR circuit using phasor concept.	BT4	CLO3	PLO1, PLO2	1.1.2, 2.2.1
	[OR]				
6	Explain modulus and argument of a complex number with an example.	BT2	CLO1	PLO1	1.1.1

7	State Bayes' Theorem and 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
	[OR]				

8	State Binomial Distribution and 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
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9	State and explain Fourier Theorem and evaluate Fourier coefficients.	BT4	CLO3	PLO1, PLO2	1.1.2, 2.2.1
[OR]					
10	State Fourier Theorem and analyse a square wave using Fourier series.	BT4	CLO3	PLO1, PLO3	2.2.1, 3.3.3

Section –B

Answer Any FIVE questions

5 x 3 = 15

11	Write the physical significance of gradient of a scalar field.	BT2	CLO1	PLO1	1.1.1
12	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
13	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
14	Find the inverse of the given matrix. $A = \begin{pmatrix} 1 & 3 & 3 & 1 & 4 & 3 & 1 & 3 & 4 \end{pmatrix}$	BT3	CLO2	PLO2	1.3.2
15	Represent the complex number $Z=-1-i$ in polar form.	BT3	CLO2	PLO2	1.3.2
16	Write a short note on sample space and events of probability theory.	BT2	CLO1	PLO1	1.1.1
17	If two dice are thrown at a time, find the probability that the sum of digits is 9.	BT3	CLO2	PLO2	1.3.2, 2.1.2
18	Explain briefly the importance of Fourier analysis.	BT2	CLO1	PLO1	1.1.2

COURSE-I : INTRODUCTION TO MATHEMATICAL PHYSICS

BLUE PRINT

Duration: 2:30 Hours

Maximum Marks: 50

SECTION – A: Long Answer Questions (7 Marks)

Answer ONE question from each Unit.

$5 \times 7 = 35$ Marks

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

Max. Marks: 50

Time: 2½ Hours

SECTION - A

Answer any Five questions

5 × 7 = 35M

Q.No	Question	BT	CLO	PLO	PI Code(s)
1	State Newton's second law. Derive an expression for equation of motion of a variable mass system. (OR)	BT4	CLO1	PLO3	3.2.1
2	Explain variable mass system and obtain an expression for motion of a rocket.	BT4	CLO1	PLO3	3.2.1
3	Define Central force and show that central force is the negative gradient of Potential energy. (OR)	BT4	CLO2	PLO3	3.2.1
4	State and prove Kepler's First law.	BT4	CLO2	PLO2	2.1.1
5	Derive the relation between Elastic constants? (OR)	BT4	CLO3	PLO3	3.2.1
6	Explain Different types of loads and different types of Bending?	BT3	CLO3	PLO1	1.4.1
7	State and prove Bernoulli's theorem? (OR)	BT4	CLO4	PLO3	3.2.1
8	Explain working of Venturimeter and Airplane lift?	BT3	CLO4	PLO2	2.1.1
9	Derive expressions for Lorentz transformations? (OR)	BT4	CLO5	PLO3	3.2.1
10	Obtain an expression for Einstein's mass-energy relation?	BT3	CLO5	PLO3	3.2.1

SECTION - B

Answer ANY FIVE questions

5 × 3 = 15 M

Q.No	Question	BT	CLO	PLO	PI Code(s)
11	State Newton's laws of motion.	BT1	CLO1	PLO1	1.1.1
12	Write a short note on impact parameter.	BT2	CLO1	PLO1	1.2.1
13	Define central force and give examples for central force.	BT1	CLO2	PLO1	1.1.1
14	State Kepler's laws.	BT1	CLO2	PLO1	1.1.1
15	Define stress and strain.	BT1	CLO3	PLO1	1.1.1
16	Write different types of beams	BT2	CLO3	PLO1	1.2.1
17	What is Reynold's number and explain its importance?	BT2	CLO4	PLO1	1.2.1
18	Obtain an expression for length contraction?	BT1	CLO5	PLO1	1.1.1

GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY

(Accredited by NAAC "A+" Grade)

DEPARTMENT OF COMPUTER SCIENCE &
APPLICATIONS

Semester-I

Fundamentals of AI

MODEL QUESTION PAPER

Time: 2 ½ Hrs.

Max Marks: 50M

SECTION-A

Answer Any Five Questions

Each Question Carries 6 Marks

5 X 6 = 30M

Q.No Question BT CLO PLO PI Code(s)

- | | | |
|----|---|---------------------|
| 1 | Differentiate between narrow AI, general AI, and super AI, with examples. | BT4 CLO1 PLO2 2.1.1 |
| 2 | Explain the types of learning in AI (supervised, unsupervised, reinforcement) with real-life examples and advantages/limitations. | BT3 CLO2 PLO2 2.1.1 |
| 3 | Discuss the applications of AI in healthcare | BT2 CLO3 PLO1 1.2.1 |
| 4 | Discuss AI in agriculture | BT2 CLO3 PLO1 1.2.1 |
| 5 | Explain the common ethical challenges in AI, including bias, privacy, transparency, and accountability | BT2 CLO4 PLO1 1.2.1 |
| 6 | Analyze how to address bias in AI systems and its impact on fairness | BT4 CLO4 PLO2 2.1.1 |
| 7 | Discuss real-world examples of AI in research, such as drug discovery, protein folding, and climate modeling. | BT2 CLO3 PLO1 1.2.1 |
| 8 | Explain prompt engineering, its definition, why it is necessary, and components of an effective prompt. | BT2 CLO5 PLO1 1.2.1 |
| 9 | Describe how prompt engineering is used in content creation for writing, design, and video scripts | BT2 CLO5 PLO1 1.2.1 |
| 10 | Explain popular tools for prompt engineering in education and business. | BT2 CLO5 PLO1 1.2.1 |

SECTION-B

Answer ALL Questions (Multiple Choice Questions)

20 X 1 = 20M

1. Which period marks the birth of artificial intelligence?
 - a) 16th–19th Century
 - b) Early 20th Century
 - c) 2000s–Present
 - d) 1950s–1960s
2. Knowledge engineering involves:
 - a) Generating images
 - b) Building robots
 - c) Collecting and structuring knowledge for AI
 - d) Processing natural language
3. Expert systems are used for:
 - a) Playing games
 - b) Simulating human expert decision-making
 - c) Generating music
 - d) Driving cars
4. The main component of a robot is:
 - a) Only actuators
 - b) Sensors, actuators, and AI brain
 - c) Only wheels
 - d) Only sensors
5. Autonomous vehicles use AI for:
 - a) Self-driving and navigation
 - b) Swimming
 - c) Manual driving
 - d) Flying
6. Benefits of AI in education include:
 - a) Accessibility for all learners
 - b) Limited access
 - c) Only for some
 - d) No accessibility
7. A challenge of AI in healthcare is:
 - a) Too cheap
 - b) Always accurate
 - c) Ethical considerations like privacy
 - d) No challenges
8. Algorithmic trading in finance is:
 - a) No trading
 - b) Random trading
 - c) Manual trading
 - d) AI-driven buying/selling
9. Responsible hardware usage in AI involves:
 - a) Buying new
 - b) Reusing and recycling
 - c) No usage
 - d) Wasting hardware
10. Robustness in AI means:
 - a) Handling unusual inputs without errors
 - b) Failing on inputs
 - c) Ignoring inputs
 - d) No handling
11. A cause of AI failures is:
 - a) Perfect data
 - b) Too much data
 - c) Poor quality data
 - d) No data
12. To improve reliability, use:
 - a) Continuous monitoring
 - b) Random monitoring
 - c) Stop monitoring
 - d) No monitoring

13. AlphaFold is used for:

- a) No prediction
- c) Weather prediction

- b) Protein folding prediction
- d) Stock prediction

14. A challenge of AI in research is:

- a) No data
- b) Data quality
- c) Too much data
- d) Perfect data

15. Generative AI uses:

- a) Large language models like LLMs
- b) Small models
- c) Old models
- d) No models

16. Perplexity AI is:

- a) Manual search
- b) No search
- c) AI-powered search with citations
- d) No citations

17. Tools like Jasper AI are for:

- a) Marketing content
- b) Random content
- c) No content
- d) Video content

18. Holistic learning prompts include:

- a) No diagrams
- b) More Text
- c) Random
- d) Diagrams and examples

19. Runway ML is for:

- a) Manual video
- b) Audio Only
- c) Visuals
- d) Video creation

20. Napkin AI creates:

- a) Videos
- b) No visuals
- c) Visuals from text
- d) Manual visuals

GOVERNMENT COLLEGE (A), RAJAHMUNDRY
DEPARTMENT OF PHYSICS
I B.Sc MATERIAL SCIENCE (HONS)
SEMESTER-II - COURSE-3: WAVES AND OPTICS
MODEL PAPER

Time: 2 ½ Hours

Maximum Marks: 50

SECTION – A

Answer ONE question from EACH Unit

(5 × 7 = 35 Marks)

Q.No	Question	CLO	PLO	BTL	PI Code
1	Derive the differential equation of a simple harmonic oscillator and obtain its solution (OR)	CLO3	PLO1	BTL-3	1.3.2
2	Explain differential equation of damped harmonic oscillations and obtain its solution	CLO4	PLO2	BTL-4	2.2.1
3	Derive the equation for transverse waves along a stretched string and obtain its solution (OR)	CLO3	PLO1	BTL-3	1.3.2
4	Derive an expression for velocity of transverse wave in stretched strings?	CLO4	PLO2	BTL-4	2.2.1
5	Explain Newton's rings experiment and obtain an expression for wavelength of light? (OR)	CLO4	PLO3	BTL-4	3.3.4
6	Explain Fresnel's biprism experiment and wavelength determination	CLO3	PLO2	BTL-3	2.2.1
7	Explain Fraunhofer diffraction at single slit experiment (OR)	CLO4	PLO3	BTL-4	3.3.3
8	Explain Construction and working of Zone plates	CLO4	PLO3	BTL-4	3.3.4
9	Construction and working of Nicol prism with diagrams (OR)	CLO3	PLO2	BTL-3	2.2.1
10	Explain construction and working of Laurent's half shade polarimeter?	CLO4	PLO3	BTL-4	3.3.4

SECTION – B

Answer any FIVE questions.

(5 × 3 = 15 Marks)

Q.No	Question	CLO	PLO	BTL	PI Code
11	Define Simple Harmonic Motion	CLO1	PLO1	BTL-1	1.1.1
12	What is logarithmic decrement?	CLO1	PLO1	BTL-1	1.1.1
13	Explain briefly about Tuning fork	CLO2	PLO2	BTL-2	2.1.1
14	Write the conditions for Interference of Light	CLO2	PLO1	BTL-2	1.1.2
15	Explain colors in thin films?	CLO1	PLO1	BTL-1	1.1.1

Q.No	Question	CLO	PLO	BTL	PI Code
16	Write any three differences between interference and diffraction	CLO4	PLO3	BTL-4	3.3.3
17	Explain about Brewster law	CLO3	PLO2	BTL-3	2.2.1
18	State Malus law	CLO2	PLO1	BTL-2	1.1.2

MODEL QUESTION PAPER
UG – II Semester (Major)
Major-4: Heat and Thermodynamics
MODEL PAPER

Time: 2.30Hrs

Max. Marks: 50M

SECTION – A

Answer all from the following question

5×7=35M

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
OR					
2	State coefficient of viscosity and derive its expression using kinetic theory of gases	BT4	CLO3	PLO2	2.2.1
3	Describe the working of Carnot engine and derive an expression for its efficiency	BT4	CLO3	PLO2	2.2.1
OR					
4	State and prove Carnot theorem and indicate how it leads to an absolute scale of temperature	BT5	CLO4	PLO3	3.3.4
5	Derive Maxwell's thermodynamic relations using thermodynamic potentials	BT4	CLO3	PLO2	2.2.1
OR					
6	State and explain Joule–Kelvin effect and obtain an expression for Joule–Kelvin coefficient	BT4	CLO3	PLO2	2.2.1
7	Describe Joule–Kelvin porous plug experiment and mention its important inferences	BT4	CLO3	PLO2	2.3.1
OR					
8	Explain adiabatic demagnetisation method for producing low temperatures	BT5	CLO5	PLO3	3.3.4
9	State and derive Planck's radiation law and deduce Wien's displacement law	BT5	CLO5	PLO3	3.3.4
OR					
10	State and derive Planck's radiation law and deduce Rayleigh– Jeans law	BT5	CLO5	PLO3	3.3.4

SECTION – B

Answer ANY FIVE questions

5×3=15M

Q.N	Question	BT	CLO	PLO	PI
11	State the principle of equipartition of energy	BT1	CLO1	PLO1	1.1.1

12	At what temperature will the RMS speed of oxygen molecules be double of its RMS speed at 27 °C?	BT3	CLO2	PLO2	1.3.2
13	State and explain the second law of thermodynamics	BT2	CLO1	PLO1	1.1.2
14	Calculate the change in entropy when 1 kg of ice at 0 °C is converted into water at the same temperature. ($L = 0.336 \times 10^6 \text{ J kg}^{-1}$)	BT3	CLO2	PLO2	1.3.2
15	Write a short note on Gibbs free energy and Helmholtz free energy	BT2	CLO1	PLO1	1.1.2
16	Write a short note on inversion temperature	BT2	CLO1	PLO1	1.1.2
17	Determine the temperature of the Sun using Wien's displacement law ($b = 2.92 \times 10^{-3} \text{ mK}$, $\lambda_{\text{max}} = 4900 \text{ \AA}$)	BT3	CLO2	PLO2	1.3.2
18	What is black body? What are the salient features of black body radiation?	BT1	CLO1	PLO1	1.1.1

Government College (A) Rajahmundry
II B.Sc. SEMESTER – III
COURSE 5: OPTICS {for Batch (w.e.f. 2024-2025)}
MODEL QUESTION PAPER

Time: 21/2 Hrs.

Max. Marks: 50

SECTION – A

7 *5 = 35 Marks

Answer all questions

Q.No	Question	BTL	CLO	PLO	PI
1	Derive conditions for achromatism when two lenses are in contact.	BL3	CLO3	PLO2	2.2.1
(OR)					
2	Explain about the monochromatic aberrations: (i) Coma and (ii) Astigmatism.	BL2	CLO2	PLO2	2.1.1
3	Explain Fresnel's biprism experiment for determination of wavelength of light.	BL2, BL3	CLO3	PLO2	2.2.1
(OR)					
4	Explain the determination of wavelength of monochromatic light using Newton's rings.	BL2, BL3	CLO3	PLO2	2.3.1
5	Explain Fraunhofer diffraction due to single slit with necessary theory.	BL2, BL3	CLO4	PLO2	2.2.1
(OR)					
6	Explain how a zone plate is constructed. Compare the zone plate with convex lens.	BL2, BL3	CLO4	PLO3	3.3.3
7	Describe the construction and working of a Nicol prism.	BL1, BL2	CLO2	PLO1	1.1.2
(OR)					
8	Explain the determination of specific rotation by Laurent's half shade polarimeter.	BL2, BL3	CLO3	PLO2	2.1.1
9	Explain the construction and working of Helium-Neon gas laser.	BL1, BL2	CLO3	PLO2	2.2.1
(OR)					
10	Write the basic principle of holography and the applications of holography.	BL1	CLO5	PLO4	4.1.3

SECTION – B (3 Marks each)

BTL – CLO – PLO – PI Mapping

Q.No	Full Question	BTL	CLO	PLO	PI Code
11	Explain about chromatic aberration.	BL2	CLO2	PLO1	1.1.2
12	Explain the formation of colors in thin films.	BL3	CLO4	PLO3	3.3.3
13	State and explain Malus law.	BL1, BL2	CLO1	PLO1	1.1.1
14	Write the distinctions between Fresnel and Fraunhofer diffraction.	BL1	CLO2	PLO1	1.1.1
15	Write the applications of LASER.	BL1	CLO5	PLO4	4.1.3
16	Write about quarter wave plate.	BL1, BL3	CLO4	PLO2	2.1.1

Q.No	Full Question	BTL	CLO	PLO	PI Code
17	In a Newton's rings experiment, the diameter of 5th ring is 0.3 cm and the 25th ring is 0.8 cm. If the radius of curvature of the plano-convex lens is 100 cm, find the wavelength of light used.	BL3	CLO3	PLO2	2.3.1
18	Calculate the minimum thickness of a quarter wave plate made of quartz for light of wavelength 600 nm. Given $\mu_o = 1.544$ and $\mu_e = 1.533$.	BL3	CLO3	PLO2	2.3.1

Blue print

SCHEME FOR INTERNAL (ODD SEM) & EXTERNAL (EVEN SEM) PRACTICAL EXAMINATION

INTERNAL (50)

Examination	No. of Marks	Remarks
Internal Examination	50	Model of Examination pattern Furnished below.
	Direct Assessment 20M Indirect Assessment 30M	<ul style="list-style-type: none"> • CIA – I 20M • 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): RAJAMAHENDRAVARAM
DEPARTMENT OF PHYSICS
MODEL PAPER FOR III - SEMESTER END EXAMINATION MODULE - III:
THERMODYNAMICS

SECTION – A

SECTION – A

Answer all questions

7 *5 = 35 Marks

Q.No	Full Question	BTL	CLO	PLO	PI Code
1	Derive an expression for the viscosity of a gas on the basis of kinetic theory of gases.	BL3	CLO3	PLO2	2.3.1
	(or)				
2	Derive expression for the Maxwell's law of distribution of molecular velocities.	BL3	CLO3	PLO2	2.2.1
3	Explain the working of Carnot's heat engine. Derive an expression for its efficiency.	BL2, BL3	CLO3	PLO2	2.3.1
	(or)				

Q.No	Full Question	BTL	CLO	PLO	PI Code
4	Explain the concept of entropy. Calculate the change in entropy in case of (i) reversible process and (ii) irreversible process.	BL2, BL3	CLO4	PLO3	3.3.3
5	Derive Maxwell's thermodynamic relations from thermodynamic potentials.	BL3	CLO4	PLO3	3.3.3
(or)					
6	Derive Clausius–Clapeyron equation based on Maxwell's equation and explain its applications.	BL2, BL3	CLO3	PLO2	2.2.1
7	Explain the Joule–Thomson expansion. Obtain expression for Joule–Thomson cooling.	BL2, BL3	CLO3	PLO2	2.3.1
(or)					
↵	Explain the production of low temperatures by the process of adiabatic demagnetization.	BL1, BL2	CLO2	PLO1	1.1.2
↳	Derive Planck's law of black body radiation. Hence obtain Wien's law and Rayleigh–Jeans law from it.	BL3	CLO4	PLO3	3.3.3
(or)					
10	Explain about solar constant and determine it using Angstrom pyrhelimeter.	BL1, BL2, BL3	CLO5	PLO1	1.2.1

SECTION – B

Answer any FIVE questions

3*5=15 Marks

Q.No	Full Question	BTL	CLO	PLO	PI Code
11	Explain different transport phenomenon in ideal gases.	BL2	CLO2	PLO1	1.1.2
12	State and prove Carnot's theorem.	BL1, BL3	CLO4	PLO3	3.3.3
13	Explain the physical significance of thermodynamic potentials.	BL2	CLO2	PLO1	1.1.2
14	Explain the differences between adiabatic and Joule–Thomson expansion.	BL2	CLO4	PLO3	3.3.3
15	Estimate the surface temperature of the Sun.	BL2	CLO5	PLO1	1.2.2
16	Calculate the inversion temperature of helium gas.	BL3	CLO3	PLO2	2.3.1
17	A reversible engine works between two temperatures whose difference is 100°C. If it absorbs 746 J of heat from the source and gives 546 J of heat to the sink, calculate the temperatures of source and sink.	BL3	CLO3	PLO2	2.3.1
18	Calculate the RMS speed of O ₂ molecules at 300 K.	BL3	CLO3	PLO2	2.3.1

DEPARTMENT OF PHYSICS
MODEL PAPER FOR III - SEMESTER END EXAMINATION
COURSE 7: ELECTRONIC DEVICES AND CIRCUITS
MODEL PAPER

Hours 2.30 Hrs.

Max. Marks: 50M

SECTION-A

Answer ALL the following questions

5x7=35 Marks

Q.No	Full Form of Question	BTL	CLO	PLO	PI
1	What is a PN Junction Diode? Explain the V-I characteristics of a PN Junction Diode.	BL2	CLO1	PLO1	PI1, PI2
(or)					
2	What is a Tunnel Diode? Explain the working principle of a tunnel diode.	BL2	CLO1	PLO1	PI1, PI2
3	Define a Transistor. Explain different types of transistors and describe the Common Emitter configuration of a transistor.	BL2, BL3	CLO2	PLO1, PLO2	PI1, PI2
(or)					
4	Discuss the input and output characteristics of Common Base (CB) and Common Emitter (CE) configurations of a transistor.	BL3	CLO2	PLO2	PI2, PI3
5	Explain the construction and working of a Junction Field Effect Transistor (JFET).	BL2	CLO1	PLO1	PI1, PI2
(or)					
6	Discuss the construction, working and V-I characteristics of a Unijunction Transistor (UJT).	BL3	CLO2	PLO2	PI2, PI3
7	What is a Light Emitting Diode (LED)? Explain the construction and working of LED.	BL2	CLO1	PLO1	PI1, PI2
(or)					
↵	Discuss the construction and working of a	BL2	CLO1	PLO1	PI1,

Q.No	Full Form of Question	BTL	CLO	PLO	PI
	Phototransistor.				PI2
↳	Explain the Half Wave Rectifier and derive an expression for its efficiency.	BL3	CLO3	PLO2	PI2, PI3
(or)					
10	Discuss Choke Input Filter and L-section Filter with suitable explanation.	BL3	CLO3	PLO2	PI2, PI3

SECTION – B

3*5=15 Marks

Q.No	Question	BTL	CLO	PLO	PI
11	Explain the Zener Diode.	BL2	CLO1	PLO1	PI1
12	Write a short note on the applications of Tunnel Diode.	BL2	CLO4	PLO1	PI1
13	Discuss the Common Base (CB) configuration of a transistor.	BL3	CLO2	PLO2	PI2
14	Explain Voltage Divider Biasing of a transistor.	BL2	CLO2	PLO2	PI2
15	What is a MOSFET? Distinguish between its different types.	BL2	CLO1	PLO1	PI1
16	Discuss the Silicon Controlled Rectifier (SCR).	BL3	CLO1	PLO2	PI2
17	Write the applications of Light Dependent Resistor (LDR).	BL2	CLO4	PLO1	PI1
18	Discuss the Zener Diode as a Voltage Regulator.	BL3	CLO3	PLO2	PI3

Government College (A) Rajahmundry
II B.Sc Physics (Hon)
Major-4 : Analog and Digital Electronics
MODEL QUESTION PAPER

Time: 2.30 hours.

Max marks: 50

Section A

Answer the all Questions

5*7=35 Marks

Q.No	Full Question	BTL	CLO	PLO	PI
1	List and explain five characteristics of an amplifier which are modified by negative feedback amplifier.	BL2, BL3	CLO2	PLO2	PI2
(or)					
2	Derive the expression for output voltage with feedback for inverting and non-inverting operational amplifiers.	BL1, BL2	CLO2	PLO2	PI2
3	Explain the characteristics of an ideal operational amplifier.	BL2, BL3	CLO1	PLO1	PI1
(or)					
4	Draw and explain the circuit of a voltage–shunt feedback amplifier.	BL2, BL3	CLO2	PLO2	PI2
5	Describe the various types of number systems with suitable examples.	BL2	CLO2	PLO1	PI1
(or)					
6	State and explain De Morgan’s theorems and verify them using truth tables.	BL3	CLO3	PLO2	PI3
7	Describe briefly the construction and working of a 4-bit binary adder and subtractor.	BL4	CLO3	PLO3	PI3
(or)					
8	Explain briefly the working of a 2-to-1 multiplexer and a 1-to-4 demultiplexer.	BL2	CLO3	PLO2	PI2
9	Define flip-flop and explain the working of a clocked SR flip-flop.	BL3	CLO3	PLO2	PI2
(or)					
10	Explain the working of BCD-to-decimal converter and BCD-to-Gray code converter.	BL3	CLO4	PLO3	PI3

SECTION – B (Short Answer Questions – 3 Marks)

Q.No	Full Question	BTL	CLO	PLO	PI
11	Define (a) input offset voltage, (b) output offset voltage, and (c) bandwidth of an operational amplifier.	BL1	CLO1	PLO1	PI1
12	Describe the common-mode rejection ratio (CMRR) and slew rate of an ideal operational amplifier.	BL2, BL3	CLO1	PLO1	PI1
13	Draw and explain the block diagram of an operational amplifier.	BL3	CLO1	PLO1	PI1
14	Explain the emitter follower circuit using an operational amplifier.	BL3	CLO2	PLO2	PI2
15	Explain the applications of encoders and decoders.	BL2	CLO4	PLO3	PI3
16	Describe the half subtractor with its truth table.	BL2	CLO3	PLO2	PI2
17	Explain the Exclusive-OR (EX-OR) gate with truth table.	BL3	CLO3	PLO2	PI2

Q.No	Full Question	BTL	CLO	PLO	PI
18	Write the differences between combinational and sequential logic circuits.	BL3	CLO3	PLO2	PI2

Blue print

SCHEME FOR INTERNAL (ODD SEM) & EXTERNAL (EVEN SEM) PRACTICAL EXAMINATION

INTERNAL (50)

Examination	No. of Marks	Remarks
Internal Examination	50	Model of Examination pattern Furnished below.
	Direct Assessment 20M Indirect Assessment 30M	<ul style="list-style-type: none"> • CIA – I 20M • 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

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

Government College (Autonomous), Rajahmundry
Department of Physics
Semester – IV - Electricity & Magnetism
Model Question Paper.

SECTION – A

Answer all questions

5*7 = 35 Marks

Q. No	Question	Marks	BL	CLO	PLO	PI Code
1	State and Prove Gauss's law in Electrostatics. (OR)	7	1, 3	1, 3	1	1.1.2
2	Define D, E, and P; derive their relation.	7	1, 3	1, 3	1	1.1.1
3	Apply Kirchoff's Laws to Wheatstone bridge. (OR)	7	3	3	1	1.3.2
4	State and Prove Maximum Power Transfer Theorem.	7	1, 3	1, 3	1	1.1.2
5	Magnetic induction on the axis of a circular coil. (OR)	7	3	3	1	1.1.2
6	Self-inductance of a long solenoid.	7	3	3	1	1.1.2
7	Maxwell's equations in differential form (OR).	7	2	2	1	1.1.2
8	EM wave equation and velocity in free space.	7	3	3	1	1.1.2
09	Growth and decay of currents in CR circuit. (OR)	7	3	3	1	1.3.2
10	Series LCR circuit behavior and resonance.	7	1, 2	1, 2	1	1.1.2

SECTION – B (Short Answer Questions)

Answer any Five questions.

5*3 = 15 Marks

Q. No	Question	Marks	BL	CLO	PLO	PI Code
11	Explain about equipotential surfaces.	3	2	2	1	1.1.2
12	State Ohm's law and mention limitations.	3	1, 2	1, 2	1	1.1.1
13	Define star (Y) and delta (Δ) networks.	3	1, 2	1, 2	1	1.1.1
14	State and prove Ampere's Circuital law.	3	1, 3	1, 3	1	1.1.2
15	Explain Faraday's laws of induction.	3	2	2	1	1.1.2
16	Hall Effect and its applications.	3	1	1	1	1.2.1
17	Integral and differential forms of Maxwell's eqs.	3	1	1	1	1.1.1
18	Explain Q-factor and Power factor.	3	2	2	1	1.1.2

GOVERNMENT COLLEGE (A): RAJAMAHENDRAVARAM
DEPARTMENT OF PHYSICS
MODEL PAPER FOR IV - SEMESTER END EXAMINATION
Modern Physics (MAJOR)
MODEL PAPER

Time: 2 Hr. 30 Min.

Max. Marks: 50M

Answer all Questions

5*7 = 35 Marks

No	ESSAY QUESTIONS	BTL	CLO	PLO	PI Code
SEC-A					
1	Describe Stern and Gerlach experiment. What is its importance?	2	CLO1	PLO1	1.1.2
(or)					
2	Explain the Quantum Numbers associated with Vector Atom model.	2	CLO1	PLO1	1.1.2
3	What is Raman Effect? Explain the formation of Stoke's and Anti Stoke's lines on the basis of quantum theory.	2	CLO2	PLO1	1.1.2
(or)					
4	What is Raman Effect? How it is experimentally studied.	2	CLO2	PLO1	1.3.2
5	Explain De-Broglie hypothesis for matter waves. Derive an expression for De-Broglie wavelength.	2	CLO3	PLO1	1.1.2
(or)					
6	Explain Davison and Germer experiment for detection of matter waves.	2	CLO3	PLO1	1.1.2
7	Derive Schrödinger's time independent wave equation.	2	CLO4	PLO1	1.1.2
(or)					
8	Obtain an expression for the energy of a particle in one dimensional potential wall.	3	CLO4	PLO1	1.3.2
9	What is super conductivity? Explain Meissner effect. Mention the properties of super conductivity.	2	CLO5	PLO1	1.1.2
(or)					
10	Explain Type-I and Type-II superconductors?	2	CLO5	PLO1	1.1.2

SECTION – B

Answer any 5 Questions

5X3=15 M

SHORT ANSWER QUESTIONS					
11	Explain L-S coupling and J-J coupling.	2	CLO1	PLO1	1.1.2
12	What is Zeeman Effect?	1	CLO1	PLO1	1.1.1
13	Mention any four applications of Raman Effect.	2	CLO2	PLO1	1.2.1
14	Explain Basic Postulates of Quantum Mechanics.	2	CLO4	PLO1	1.1.2
15	Calculate the de-Broglie wave length associated with a proton moving with a velocity of 2200m/sec.	3	CLO3	PLO1	1.3.2
16	What are matter waves? Write the properties of matter waves.	1	CLO3	PLO1	1.1.1
17	The Exciting line in an experiment is 5460\AA and stokes line is at 5520\AA . Find the wave length of anti – stokes line.	3	CLO2	PLO1	1.3.2
18	Mention the applications of superconductors.	2	CLO5	PLO1	1.2.1



**Government College (Autonomous)
Rajahmundry**

Program &

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

(Answer any FIVE questions. Each question carries 7 marks.) 5x7 =35 Marks

Q. No	Full Question	BTL	CL O	PLO	PI Code
1	Discuss about the general properties of nuclei.	2	2	PLO-1	1.1.2
(OR)					
2	Explain the liquid drop model of the nucleus.	2	2	PLO-1	1.1.2
3	Classify elementary particles and describe the properties of leptons, mesons, and baryons.	2	2	PLO-1	1.1.1
(OR)					
4	Explain the different types of fundamental interactions and discuss the conservation laws associated with them.	2	2	PLO-1	1.1.2
5	Explain about the different types of nuclear reactions.	1, 2	1, 2	PLO-1	1.1.1
(OR)					
6	Describe the working principle and construction of the Geiger-Muller counter.	2	4	PLO-1	1.4.1
7	Explain Gamow's theory of alpha decay.	3	3	PLO-1	1.3.2
(OR)					
8	Describe the construction and working of a cyclotron.	2	4	PLO-1	1.4.1
9	Discuss the applications of nuclear physics in radiation therapy and medical imaging techniques.	3	5	PLO-1	1.2.2
(OR)					
10	Explain the working principle of nuclear reactors and their role in power generation.	2	2	PLO-10	7.2.2

Section-B

(Answer any FIVE questions. Each question carries 3 marks.)

5x3 =15 Marks

Q. No	Full Question	BTL	CL O	PLO	PI Code
11	What is the shell model of the nucleus?	1	1	PLO-1	1.1.1
12	What are the characteristics of nuclear forces?	2	2	PLO-1	1.1.2
13	Explain isospin conservation.	2	4	PLO-1	1.4.1
14	What are the selection rules for beta decay.	1	1	PLO-1	1.1.1
15	What are the advantages of synchrocyclotron?	4	2	PLO-2	2.2.2
16	What are the advantages of nuclear energy over conventional energy sources?	3	5	PLO-1	1.2.1
17	What are the safety measures taken in nuclear power plants?	2	5	PLO-10	7.2.1
18	Discuss about the scintillation counter.	2	4	PLO-1	1.4.1

Government College (Autonomous), Rajahmundry
Department of Physics
Minor Paper - Semester – IV - Electricity & Magnetism
Model Question Paper.

SECTION – A (Essay Questions)

Answer all questions

5 × 3 = 15 M

Q. No	Question	Marks	BL	CLO	PLO	PI Code
1	State and Prove Gauss's law in Electrostatics.	7	1, 3	1, 3	1	1.1.2
(or)						
2	Define D, E, and P; derive their relation.	7	1, 3	1, 3	1	1.1.1
3	Apply Kirchoff's Laws to Wheatstone bridge and obtain the balancing condition?.	7	3	3	1	1.3.2
(or)						
4	State and Prove Maximum Power Transfer Theorem.	7	1, 3	1, 3	1	1.1.2
5	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..	7	3	3	1	1.1.2
(or)						
6	Derive expression for self-inductance of a long solenoid?.	7	3	3	1	1.1.2
7	Derive Maxwell's equations in differential form starting from their integral forms.	7	2	2	1	1.1.2
(or)						
8	derive the plane electromagnetic wave equation and velocity in free space from Maxwell's equations	7	3	3	1	1.1.2
9	Derive equations for growth and decay in CR circuit?	CLO3	PLO1	1.3.2	1	1.3.2
(or)						

Q. No	Question	Marks	BL	CLO	PLO	PI Code
10	Derive equations for growth and decay in LR circuit?	CLO3	PLO1	1.3.2	1	1.1.2

SECTION – B (Short Answer Questions)

Answer any 5 Questions

$5 \times 3 = 15 M$

Q. No	Question	Marks	BL	CLO	PLO	PI Code
11	Explain about equipotential surfaces.	3	2	2	1	1.1.2
12	State Ohm's law and mention limitations.	3	1, 2	1, 2	1	1.1.1
13	Define star (Y) and delta (Δ) networks.	3	1, 2	1, 2	1	1.1.1
14	State and prove Ampere's Circuital law.	3	1, 3	1, 3	1	1.1.2
15	Explain Faraday's laws of induction.	3	2	2	1	1.1.2
16	Integral and differential forms of Maxwell's eqs	3	1	1	1	1.2.1
17	Explain Q-factor and Power factor	3	1	1	1	1.1.1
18	Calculate the resonant frequency of an LCR series circuit with $L = 5\text{Mh}$, $C = 0.1\mu\text{F}$, $R = 100\text{K ohm}$	3	2	2	1	1.1.2

GOVERNMENT COLLEGE (A): RAJAMAHENDRAVARAM
DEPARTMENT OF PHYSICS
MODEL PAPER FOR IV - SEMESTER END EXAMINATION
Modern Physics(MINOR)

Time: 2 Hr. 30 Min.

Max. Marks: 50M

Answer all Questions

$5 \times 7 = 35 M$

Q. No	ESSAY QUESTIONS	BTL	CLO	PLO	PI Code
SECTION – A					
1	Describe Stern and Gerlach experiment. What is its importance?	2	CLO1	PLO1	1.1.2
(OR)					
2	Explain the Quantum Numbers associated with Vector Atom model.	2	CLO1	PLO1	1.1.2
3	What is Raman Effect? Explain the formation of Stoke's and Anti Stoke's lines on the basis of quantum theory.	2	CLO2	PLO1	1.1.2
(OR)					
4	What is Raman Effect? How it is experimentally studied.	2	CLO2	PLO1	1.3.2
5	Explain De-Broglie hypothesis for matter waves. Derive an expression for De-Broglie wavelength.	2	CLO3	PLO1	1.1.2
(OR)					
6	Explain Davison and Germer experiment for detection of matter waves.	2	CLO3	PLO1	1.1.2
7	Derive Schrödinger's time independent wave equation.	2	CLO4	PLO1	1.1.2
(OR)					
8	Obtain an expression for the energy of a particle in one dimensional potential wall.	3	CLO4	PLO1	1.3.2
9	What is super conductivity? Explain Meissner effect. Mention the properties of super conductivity.	2	CLO5	PLO1	1.1.2
(OR)					

Q. No	ESSAY QUESTIONS	BTL	CLO	PLO	PI Code
10	Explain Type-I and Type-II superconductors?	2	CLO5	PLO1	1.1.2

SECTION – B

Answer any 5 Questions

5X3=15

Marks

SHORT ANSWER QUESTIONS					
11	Explain L-S coupling and J-J coupling.	2	CLO1	PLO1	1.1.2
12	What is Zeeman Effect?	1	CLO1	PLO1	1.1.1
13	Mention any four applications of Raman Effect.	2	CLO2	PLO1	1.2.1
14	Explain Basic Postulates of Quantum Mechanics.	2	CLO4	PLO1	1.1.2
15	Calculate the de-Broglie wave length associated with a proton moving with a velocity of 2200m/sec.	3	CLO3	PLO1	1.3.2
16	What are matter waves? Write the properties of matter waves.	1	CLO3	PLO1	1.1.1
17	The Exciting line in an experiment is 5460\AA and Stokes line is at 5520\AA . Find the wave length of anti – Stokes line.	3	CLO2	PLO1	1.3.2
18	Mention the applications of superconductors.	2	CLO5	PLO1	1.2.1

Government College (A), R-ajahmundry Department of Physics
III B.Sc- Sem-V/VI
Minor-5 **APPLICATIONS OF ELECTRICITY AND MAGNETISM**
As per BoS approved on 15-Sep-2025 for the academic year 2025-26

MODEL PAPER

Section – A

Answer all questions.

(5 × 7 = 35Marks)

1. Derive an expression for effective resistance in series and parallel combination of resistors.
OR
2. Explain Principle, Charging and Discharging of a Capacitor.
3. Explain the construction and working of Lead–Acid batteries?
OR.
4. Explain the construction and working of Li–Ion batteries.
5. Draw and explain the working principle of a transformer?
OR
6. Describe the construction and working principle of an AC Generator.
7. Explain Amplitude Modulation (AM) and Demodulation with necessary block diagram?
OR
8. Explain Frequency Modulation (FM) and Demodulation with necessary block diagram.
9. Describe the construction and operating principle of a DC motor.
OR
10. Explain the construction and working of a Step-Down Transformer (220 V to 12 V).

Section – B

Answer any five questions.

(3 × 5 = 15Marks)

11. What are Passive and Active elements?
12. What are the differences between AC and DC?
13. Discuss about SMPS used in computers.
14. Distinguish between Step-up and Step-down transformers
15. Explain Amplitude Modulation Index.
16. Distinguish between Amplitude and Frequency Modulation?
17. Write the differences between DC and AC generators.
18. Define the terms: (i) Power, (ii) Voltage, and (iii) Current in a DC motor.

GOVERNMENT COLLEGE (A): RAJAMAHENDRAVARAM
DEPARTMENT OF PHYSICS
MODEL PAPER VI – SEMESTER END EXAMINATION
MODULE – V: OPTICAL INSTRUMENTS AND OPTOMETRY
(As Approved in the BOS meeting held on 02 Aug 2022 for batch 2025-2026)

Time: 2Hr. 30 Min

Max.Marks: 50M

SECTION – A

Answer ALL Questions

5 X 7M = 35M

1. Explain the construction, working and magnifying power of a simple microscope under normal adjustment.
(or)
2. Describe the compound microscope. Derive the expression for its magnifying power under normal adjustment and discuss its resolving power.
3. Describe the construction and working of a refracting astronomical telescope and obtain an expression for its magnifying power.
(or)
4. Explain the working principle of binoculars. Discuss their construction and applications.
5. Describe in detail electron microscopes (TEM and SEM) and explain their working principles and uses.
(or)
6. Write an essay on construction and working of confocal microscope. Mention its applications.
7. Explain myopia and hypermetropia and describe their correction using ophthalmic lenses.
(or)
8. Discuss the working principle of Contact lenses and various types of contact lenses
9. Explain the construction and working principles of ophthalmoscope with neat Diagram
(or)
10. Explain the preparation and guidelines of standardized eye chart in detail.

SECTION -B

Answer any FIVE Questions

5 X 3M =15 M

11. Explain its construction and applications of Travelling microscope
12. Discuss the operating principle of a phase contrast microscope with neat diagram.
13. Distinguish between Astronomical and Terrestrial telescopes.
14. Explain the construction and working of a reflecting telescope with neat labeling.
15. Mention any two applications in Scanning Probe Microscope and Scanning Acoustic Microscope.
16. Define radio telescope and optical telescope mention one major use.
17. Compare image formation in the human eye and camera.
18. Write any three uses of simple Phoropter

GOVERNMENT COLLEGE (A), RAJAHMUNDRY
DEPARTMENT OF PHYSICS
III B.Sc ORG. CHEMISTRY (H) & INDUSTRIAL CHEMISTRY
MINOR-6 ELECTRONIC INSTRUMENTATION
Model question paper

Time : 2:30Hr

Max.Marks : 50M

SECTION-A

Answer the following questions

(5X7=35 MARKS)

1. Explain the operation of a digital multimeter with the help of a block diagram
(OR)
2. Explain the basic principles and types of errors in electronic measurements. How can they be minimized?
3. Explain how voltage, frequency, and phase difference are measured using an oscilloscope.
(OR)
4. Describe the block diagram and working of a Digital Storage Oscilloscope (DSO)
5. Explain the construction and working of an LVDT with a neat diagram
(OR)
6. Explain construction and working of Wien's bridge
7. Explain the working of a 7-segment display.
(OR)
8. Explain the working of an LCD. and give its applications?
9. Explain the working principles of a pulse oximeter and a digital blood pressure monitor.
(OR)
10. Explain the working principle of an ECG machine

SECTION-B

Answer any FIVE from the following questions

(5X3=15 MARKS)

11. Explain differences between analog and digital measuring instruments
12. Write three practical applications of an oscilloscope
13. Define the term 'instrument calibration' and mention its importance
14. What is a transducer? Give two examples
15. Write a short on error analysis in bridge measurements.
16. What are the advantages of LED over LCD displays?
17. Name three devices where SSDs are commonly used
18. What is the basic principle of a clinical thermometer?

MODEL QUESTION PAPER
UG – III B.Sc. Physics Honors
VI SEMESTER
Course Title: Low Temperature Physics & Refrigeration
MODEL PAPER

Time: 3 Hours

Maximum Marks: 50

SECTION –A

(Answer ONE question from each Unit. (Each question carries 7 marks) 5x7=35M

1. Explain the Joule–Thomson effect and discuss the about Inversion temperature.
(OR)
2. Describe the liquefaction of gases with reference to the Linde process.
3. Explain the gas thermometer, including its construction, working, corrections and calibration.
(OR)
4. Describe secondary thermometers used for low temperature measurement.
5. Explain the principle and working of vapour compression refrigeration system
(OR)
6. Describe the vapour absorption refrigeration system and compare it with vapour compression system.
7. Describe the construction and working of a refrigerator with a neat block diagram
(OR)
8. Explain Coefficient of Performance (COP), Ton of Refrigeration (TR) and Energy Efficiency Ratio (EER).
9. Discuss the applications of low temperatures in medicine and scientific
(OR)
10. Explain the applications of refrigeration in food preservation and cold storage.

SECTION – B

(Answer ANY FIVE questions. Each question carries 3 marks) 5x3=15M

11. What are freezing mixtures? Give one example.
12. Discuss about the adiabatic demagnetization.
13. List the corrections applied in a gas thermometer.
14. Write a short note on resistance thermometers.
15. Define refrigeration. Distinguish between natural and artificial refrigeration.
16. What is an ideal refrigerant? List any four properties.
17. What is defrosting in a refrigerator?
18. Mention any three applications of refrigeration.

Minor-5 **APPLICATIONS OF ELECTRICITY AND MAGNETISM**
As per BoS approved on 15-Sep-2025 for the academic year 2025-26

MODEL PAPER

Section – A

Answer all questions.

(5 × 7 = 35Marks)

1. Derive an expression for effective resistance in series and parallel combination of resistors.
OR
2. Explain Principle, Charging and Discharging of a Capacitor.
3. Explain the construction and working of Lead–Acid batteries?
OR.
4. Explain the construction and working of Li–Ion batteries.
5. Draw and explain the working principle of a transformer?
OR
6. Describe the construction and working principle of an AC Generator.
7. Explain Amplitude Modulation (AM) and Demodulation with necessary block diagram?
OR
8. Explain Frequency Modulation (FM) and Demodulation with necessary block diagram.
9. Describe the construction and operating principle of a DC motor.
OR
10. Explain the construction and working of a Step-Down Transformer (220 V to 12 V).

Section – B

Answer any five questions.

(3 × 5 = 15Marks)

11. What are Passive and Active elements?
12. What are the differences between AC and DC?
13. Discuss about SMPS used in computers.
14. Distinguish between Step-up and Step-down transformers
15. Explain Amplitude Modulation Index.
16. Distinguish between Amplitude and Frequency Modulation?
17. Write the differences between DC and AC generators.
18. Define the terms: (i) Power, (ii) Voltage, and (iii) Current in a DC motor.

6. Differentiate between MRI and CT scans based on working principles.

GOVERNMENT COLLEGE (A), RAJAHMUNDRY
DEPARTMENT OF PHYSICS
III B.Sc CHEMISTRY (H) & ANALYTICAL CHEMISTRY
MINOR-6 ELECTRONIC INSTRUMENTATION
Model question paper

Time : 2:30H r

Max.Marks : 50M

SECTION-A

Answer the following questions

(5X7=35 MARKS)

1. Explain the operation of a digital multimeter with the help of a block diagram
(or)
2. Explain the basic principles and types of errors in electronic measurements. How can they be minimized?

3. Explain how voltage, frequency, and phase difference are measured using an oscilloscope.
(or)
4. Describe the block diagram and working of a Digital Storage Oscilloscope (DSO)
5. Explain the construction and working of an LVDT with a neat diagram
(or)
6. Explain construction and working of Wien's bridge.
7. Explain the working of a 7-segment display.
(or)
8. Explain the working of an LCD. and give its applications?
9. Explain the working principles of a pulse oximeter and a digital blood pressure monitor.
(or)
10. Explain the working principle of an ECG machine

SECTION-B

Answer any FIVE from the following questions (5X3=15 MARKS)

11. Explain differences between analog and digital measuring instruments
12. Write three practical applications of an oscilloscope
13. Define the term "instrument calibration" and mention its importance
14. What is a transducer? Give two examples
15. Write a short on error analysis in bridge measurements.
16. What are the advantages of LED over LCD displays?
17. Name three devices where SSDs are commonly used
18. What is the basic principle of a clinical thermometer?

GOVERNMENT COLLEGE(A), RAJAHMUNDRY
DEPARTMENT OF CHEMISTRY
COMMON VALUE-ADDED COURSE
ENVIRONMENTAL EDUCATION
Model Question Paper – 50 Marks

SECTION – A

Answer any THREE questions from the following

3 × 10 =30M

1. Write an essay on scope and importance of environmental education.
2. Discuss the importance and different values of biodiversity.
3. Describe the causes and effects of deforestation and its impact on the environment.
4. Write an essay on global environmental problems such as greenhouse effect, and ozone depletion.
5. Discuss various environmental laws and their significance.

6. Explain in-situ and ex-situ conservation of biodiversity with suitable examples.

SECTION – B

Answer any FOUR questions from the following.

(4 × 5 = 20 Marks)

7. Write short notes on forest resources in India.
8. Write short note on importance of Biodiversity.
9. What are the main causes of land degradation and desertification?
10. What are the effects of non-renewable energy resource utilization?
11. Write briefly about solid waste management in urban areas.
12. Write briefly about the Chipko movement.

GOVERNMENT COLLEGE(A), RAJAHMUNDRY
CERTIFICATE COURSE
TITLE: HOUSEHOLD ELECTRICAL WIRING

Time:3Hr

Max.Marks:50M

SECTION - A

Answer all the questions

10 × 2 = 20M

1. Write Ohm's law?
2. Write Kirchoff's laws?
3. What is potential difference?
4. Write various types of house wiring?
5. What are the characteristics of a fuse wire?
6. How to estimate the length of the wire for residential building?
7. Name the different wiring methods?
8. What is a single line diagram?
9. What is the function of power circuit breaker?
10. Write a note on earthing?

SECTION - B

Answer any five questions:

5 × 6 = 30 M

11. What are the basic requirements for various electrical utilities?
12. Discuss various types of loads and sub circuits?
13. Discuss various steps involved in selection of main switch cable?
14. What are the materials and accessories that are used in motor installation?
15. write various steps involved preparation of wiring installation?
16. Explain basic elements of single line diagram?
17. Write differences between single phase power and three phase power?
18. Discuss various steps involved in selecting the main switch cable?

MODEL PAPER
BASICS OF PHOTOGRAPHY

TIME:2Hrs.

Max. Marks: 50M
20x1=20 M

1. CHOOSE THE CORRECT ANSWER

- | | | |
|----|---|-----|
| 1 | Which lens are called as standard lens?
A) 50MM
B) 70-200 MM | [] |
| 2 | In Nikon-750, how many focus points are there?
A) 51 focus points
B) 39 focus points | [] |
| 3 | In 5D Mark, hoe many focus points are there?
A) 60 focus points
B) 61 focus points | [] |
| 4 | What is the name of D-90 centre focus points?
A) Vertical focus points
B) Cross type focus point | [] |
| 5 | For Daylight photography, which Kelvin is correct?
A) 5500 K
B) 2850 K | [] |
| 6 | What is the use of polarising filters?
A) Reducing reflections
B) Safety filters | [] |
| 7 | When was the first world's photography day?
A) 19 th Aug 1839
B) 19 th Aug 1838 | [] |
| 8 | When the subject is moving very fast, which shutter speed we have to use?
A) 80
B) 1000 | [] |
| 9 | To make the background blur, hoe much aperture we haveto use?
A) F18
B) F2.8 | [] |
| 10 | To work focus mode continuously, which function we haveto use?
A) AF-C
B) AF-S | [] |

II. Answer the following

5x6=30M

1. What is the Exposure triangle?
2. Draw the line view camera block diagram.
3. What is the portrait photography?
4. What is the Bokeh Photography?
5. What is the candid photography?