

Seat No. **OCT-NOV 2025 WINTER EXAMINATION****12609 Bachelor of Technology (NEP-2.1)****Sub. Name: Engineering Physics****Sub. Code: 114847****Day and Date: Monday ,19-01-2026****Total Marks: 60****Time: 10:30 AM To 12:30 PM**

Instructions: 1. Draw neat labelled diagrams wherever necessary
 2. Figures to the right indicate full marks
 3. Use of Scientific calculator is allowed

Special Inst.: 1. Question No. 1 is Compulsory.
 2. Attempt Any THREE Questions from Question No. 2 to 5.
 3. Given: - Avogadro's number = 6.02×10^{26} /kg.mole
 Planck's constant $h = 6.62 \times 10^{-34}$ J.s
 Electronic charge $e = 1.6 \times 10^{-19}$ C
 Electron mass $m = 9.1 \times 10^{-31}$ kg
 Speed of light, $c = 3 \times 10^8$ m/s

Q1) Choose the correct alternative and rewrite the sentence.**[6]**

- i. The property of rotating the plane of vibration of a plane polarized light about its direction of travel possessed by certain substances is called.....
 A. birefringence
 B. optical activity
 C. chemo luminescence
 D. None of the above
- ii. Which are the active centers in ruby laser.....
 A. Chromium ions
 B. Aluminium ions
 C. Neon atoms
 D. Oxygen atoms
- iii. Which of the following alternative represents Sabine's formula for reverberation time?
 A. $T = \frac{0.651V}{\sum aS}$
 B. $T = \frac{0.165V}{\sum aS}$
 C. $T = \frac{\sum aS}{0.651V}$
 D. $T = \frac{\sum aS}{0.165V}$
- iv. If the certainty in the position measurement of a particle increases, then the

certainty in the momentum measurement of the same particle during simultaneous measurement.....

- A. increases
- B. is not affected
- C. decreases
- D. None of these

- v. What is the interplanar spacing for (132) plane in a SC lattice, where the lattice constant is 4.2 A.U?
- A. 1.40 A.U.
 - B. 2.40 A.U.
 - C. 1.90 A. U.
 - D. 1.12 A.U.
- vi. Scanning tunneling microscope can be used to see image of.....
- A. Conducting samples
 - B. Non conducting samples
 - C. Both conducting as well as non-conducting samples
 - D. None of the above

Q2) Answer the following questions [18]

- a. Explain construction and working of Laurent's half shade polarimeter. [6]
- b. The monochromatic light of wavelength 6000 \AA falls normally on a grating 2 cm wide. The first order spectrum is produced at an angle of 30° from the normal. What is the number of lines on the grating? [6]
- c. What is the long form of LASER? State and explain properties of laser.(Any five) [6]

Q3) Answer the following questions [18]

- a. Define reverberation, reverberation time and absorption coefficient. State and explain Sabine's formula. [6]
- b. An amphitheatre has the following important specifications: Volume = 500 m³, wall area = 100 m², floor area = 50 m², ceiling area = 50 m² and the sound absorption coefficient for (i) wall = 0.01, (ii) ceiling = 0.4, (iii) floor = 0.03. Calculate average absorption coefficient and reverberation time. [6]
- c. State and explain Heisenberg's Uncertainty Principle. [6]

Q4) Answer the following questions [18]

- a. Explain centre of symmetry and plane of symmetry in a cubic crystal system. [6]

- b. Draw (101), (111) and (100) planes in cube. The atomic radius of BCC crystal is 10^{-8} cm. What will be the volume of unit cell? [6]
- c. Define nanomaterial. Explain the colloidal method for synthesis of nanomaterials. [6]

Q5) Answer the following questions**[18]**

- a. The refractive indices of core and cladding of an optical fiber are 1.48 and 1.39 respectively. Determine the critical angle, numerical aperture and acceptance angle of an optical fiber. [6]
- b. State and explain Compton Effect. Define Compton shift. Write formula for Compton Shift and explain the terms involved in it. [6]
- c. With neat diagram, explain the construction and working of Atomic Force Microscopy. [6]

End Of Question Paper**Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -**

This Question Paper may be distributed for following Subjects as common code.

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1] (12609) Bachelor of Technology (NEP-2.1) (114847) Engineering Physics Part 1 SEM 1