

Seat No. **MAR-APR 2025 SUMMER EXAMINATION****11731 Bachelor of Technology (NEP-2.0)****Sub. Name: Engineering Physics****Sub. Code: 109815/108716****Day and Date: SEPTEMBER,08-09-2025****Total Marks: 60****Time: 10:30 AM To 01:00 PM**

- Instructions:**
1. All questions are compulsory
 2. Draw neat labelled diagrams wherever necessary
 3. Figures to the right indicate full marks
 4. Use of Scientific calculator is allowed

Special Inst.: 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) Attempt any three from the following questions [15]

- a. Describe construction and working of Laurent's half shade polarimeter to determine the specific rotation of sugar solution. [5]
- b. Describe construction and working of Ruby laser with neat diagram. [5]
- c. Define and explain in brief 1) Reverberation 2) Reverberation time 3) Absorption Coefficient 4) Sabine formula. [5]
- d. Define critical angle. The refractive indices of core and cladding of an optical fiber are 1.48 and 1.39 respectively. Determine the critical angle and acceptance angle of an optical fiber. [5]

Q2) Attempt any three from the following questions [15]

- a. Define de Broglie's waves. Derive an expression for de Broglie's wavelength associated with an accelerated electron in terms of kinetic energy (E) and a potential difference 'V' volt. [5]
- b. Explain the properties of matter waves. (Any 5) [5]
- c. State and explain Compton effect. Define Compton shift. [5]
- d. State Heisenberg's uncertainty principle. Calculate the smallest possible uncertainty in the momentum of an electron for which the uncertainty in its position is 4×10^{-10} m. [5]

Q3) Attempt any three from the following questions

- a. Define atomic radius. Obtain atomic radius for BCC and FCC structure. **[5]**
- b. What is mean by center of symmetry and plane of symmetry? Draw nine planes of symmetry in a cubic crystal system. **[5]**
- c. Define lattice constant. Derive the relation between lattice constant and density of the cubic crystal. **[5]**
- d. A beam of X-ray of wavelength 1.8 \AA is diffracted through 18° in first order. Find the angle of diffraction from second order. **[5]**

Q4) Attempt any three from the following questions**[15]**

- a. Define nanomaterial. What is Top-down approach and Bottom-up approach for production of nanomaterial? **[5]**
- b. Explain colloidal method of production of nanomaterial. **[5]**
- c. With neat diagram, explain construction and working of scanning tunneling microscope. **[5]**
- d. State and explain different properties of nanomaterial. (Any 5) **[5]**

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.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (11731) Bachelor of Technology (NEP-2.0) (109815) Engineering Physics Part 1 SEM 2

2] (11731) Bachelor of Technology (NEP-2.0) (108716) Engineering Physics Part 1 SEM 1