Seat No.

Total No. of Pages : 2

OCT-NOV 2025 WINTER EXAMINATION

11731 Bachelor of Technology (NEP-2.0)

Sub. Name: Engineering Physics

Sub. Code: 108716

Day and Date: Monday ,19-01-2026 **Total Marks: 60**

Time: 10:30 AM To 01:00 PM

Instructions:
1. All questions are compulsory
2. Figures to the right indicate full marks
3. Use of Scientific calculator is allowed

Special Inst.: Given: - Avogadro's number = 6.02×10^26/Kg.mole
Planck's constant h = 6.62×10^(-34) J.s
Electronic charge e = 1.6×10^(-19)C
Electron mass m= 9.1×10^(-31) kg
Speed of light, c = 3×10^(8) m/s

Q1) Attempt any three from the following questions **[15]**

a. What is double refraction? Distinguish between positive and negative crystal. **[5]**

b. Explain the principle and construction of optical fiber. **[5]**

c. Explain basic requirement for acoustically good hall. **[5]**

d. A diffraction grating used at normal incidence gives a yellow line (λ=6000 AU) in certain order superimposed on a blue line (λ=4800 AU) of next higher order. If the angle of diffraction is 30^0, calculate the grating element. **[5]**

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

a. What is dual nature of radiation? Derive an expression for de-Broglie wavelength in terms of kinetic energy (E). **[5]**

b. Explain the properties of matter waves. (Any 5) **[5]**

c. State and explain Heisenberg's uncertainty principle. **[5]**

d. X-rays of 1A.U.wavelength are scattered from a carbon block and the scattered radiation is viewed at an angle of 90^0 to the incident beam. Find Compton shift Δλ and kinetic energy imparted to the recoiling electron. **[5]**

Q3) Attempt any three from the following questions **[15]**

a. What is mean by center of symmetry and plane of symmetry? Draw nine planes of symmetry in a cubic crystal system. **[5]**

b. Define lattice constant. Derive the relation between lattice constant and density of the cubic crystal. **[5]**

c. What are Miller indices? Explain the procedure to find Miller indices and mention the properties of Miller indices. **[5]**

d. Determine the spacing between (110) and (111) planes in NaCl crystal having lattice constant 5.64 A.U. **[5]**

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

a. With neat diagram, explain construction and working of atomic force microscope. **[5]**

b. Explain colloidal method of production of nanomaterial. **[5]**

c. Write note on applications of nanomaterial. (Any 5) **[5]**

d. Define nanotechnology. What is Top-down approach and Bottom-up approach for production of nanomaterial? **[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) (108716) Engineering Physics Part 1 SEM 1