

## Physics (Theory) Paper-II

Attempt **FIVE** Questions in all. **Section-A** is **Compulsory**. Select **TWO** questions from **Section-B** and **TWO** from **Section-C**. All questions carry equal marks.

### SECTION-A

1- Attempt any Four Parts:

2x4=8

- Why does amplitude of damped harmonic oscillations gradually decrease?
- Is there any loss of energy of waves when they interfere? Explain.
- Can both longitudinal and transverse wave be polarized?
- Is there any limit on the highest order of diffraction maximum that can be observed by a grating?
- Why is reversible process considered as an ideal process?

### SECTION-B

- Show that total energy of a simple harmonic oscillator remains conserved during its oscillations. 8
- Explain polarization of light by reflection and Brewster's Law. 5,3
- What is Carnot Engine and Carnot Cycle? Work out formula for efficiency of a Carnot Engine in terms of absolute temperatures of source and sink. 2,6

### SECTION-C

- A mass-spring oscillator ( $k = 456 \text{ Nm}^{-1}$ ) has a displacement  $x = 11.2 \text{ cm}$  and acceleration  $a = -123 \text{ ms}^{-2}$  at an instant. Find a) Frequency b) Mass of Oscillator 6.5
- In a Newton's Rings Experiment the radius of curvature  $R$  of the lens is  $0.5\text{m}$  and its diameter is  $20\text{mm}$ . How many rings are produced of light of  $589 \text{ nm}$  wavelength is used? 6.5
- A narrow slit is illuminated by white light. The first minimum of red light of wavelength  $650 \text{ nm}$  is diffracted at an angle of  $15^\circ$ . Determine the slit width. 6.5
- Four moles of ideal gas are allowed to expand isothermally from a volume  $V_1$  to  $V_2 = 3.45V_1$  at  $410 \text{ K}$  temperature. Find workdone by the gas. 6.5

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