

Time: 2:00 Hours

Marks:50

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate marks.

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- Que.1 Answer any two questions out of three. (10)
- 1) Derive an equation, $x = A \sin(\omega t + \delta)$ of the motion of a simple harmonic motion.
 - 2) Explain simple pendulum and derive time period of pendulum.
 - 3) Explain forced harmonic motion.
- Que.2 Answer any two questions out of three. (10)
- 1) Explain various types of strains.
 - 2) Explain the method of determining Young's modulus of a long wire.
 - 3) Write a short note on torsion pendulum.
- Que.3 Answer any two questions out of three. (10)
- 1) Explain the formation of depletion layer and potential barrier in a P-N junction diode.
 - 2) Explain Zener diode and Zener breakdown mechanism.
 - 3) Explain Voltage – Current (V-I) Characteristics of a P-N junction diode.
- Que.4 Answer any five questions out of nine. (10)
- 1) The resultant force acting on a particle executing simple harmonic motion is 6 N when it is 3 cm away from the centre of oscillation. Find the spring constant.
 - 2) Define: (1) Amplitude (2) Time period.
 - 3) Define damped oscillation.
 - 4) Explain Bulk Modulus.
 - 5) Explain modulus of rigidity.
 - 6) Explain Poisson's ratio.
 - 7) Explain breakdown voltage.
 - 8) Write a note on extrinsic P- type semiconductor.
 - 9) Classify the materials based on energy band structure.
- Que.5 Answer any two questions out of three. (10)
- 1) Write short note on simple harmonic motion
 - 2) Explain effect of temperature on semiconductor.
 - 3) By Using Hook's law, define Young Modulus (Y), Bulk Modulus (K) and Modulus of Rigidity (η).
