

17202

11920

2 Hours / 50 Marks

Seat No.

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- Instructions :**
- (1) All Questions are *compulsory*.
  - (2) Answer each next main Question on a new page.
  - (3) Illustrate your answers with neat sketches wherever necessary.
  - (4) Figures to the right indicate full marks.
  - (5) Assume suitable data, if necessary.
  - (6) Use of Non-programmable Electronic Pocket Calculator is permissible.
  - (7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

**Marks**

1. Attempt any NINE of the following :

18

- (a) State relation between linear velocity and angular velocity.
- (b) Determine the quantity of water raised in 15 min to a height of 24 m by using pump of 12 kW.
- (c) Porter lifts a suitcase weighing 20 kg from the platform and put it on his head 2 m above the platform. Calculate the work done by porter on the suitcase.
- (d) Define centripetal and centrifugal force.
- (e) State any two properties of ultrasonic wave.
- (f) Explain variation of thermo emf with temperature.
- (g) State Joule's law of heating.

- (h) Define work function and stopping potential.
- (i) The photoelectric work function of a metal is 5 eV. Calculate threshold wavelength.
- (j) State formula for cut-off wavelength of X-Ray and explain meaning of symbols used in it.
- (k) State any two applications of X-Ray.
- (l) Distinguish between stimulated emission and spontaneous emission.

**2. Attempt any FOUR of the following:**

**16**

- (a) A railway wagon of mass 200 kg moving with a velocity of 18 km/hr has a head on collision with a stationary wagon of 3000 kg. If wagon move together after collision. Calculate their common velocity and loss of kinetic energy due to collision.
- (b) A bullet is fired with a velocity of 490 m/s at an angle of  $30^\circ$  with the horizontal. How high will it rise ? How long will it takes to reach to this height ?
- (c) Explain production of ultrasonic wave by using Piezoelectric method.
- (d) State four factors on which NDT method can be selected.
- (e) Explain process of transmission ultrasonic testing and pulse echo UT testing.
- (f) A car starting from rest, is given a uniform acceleration of  $2 \text{ m/s}^2$  for 5 seconds. It then moves with a constant velocity for one minute. The breaks are then applied and the car is brought to rest in 5 seconds. Determine total distance covered by the car.

**3. Attempt any FOUR of the following :****16**

- (a) Distinguish between Seebeck and Peltier effect.
  - (b) Find ratio of heat evolved in a conductor of 1 watt and 2 watt respectively connected across a battery.
  - (c) Explain construction and working of photocell. State its any two applications.
  - (d) Explain construction and working of Coolidge tube for production of X-Ray.
  - (e) Define population inversion and explain optical pumping by using three level system.
  - (f) A flywheel is starting from rest is subjected to an acceleration of  $0.7 \text{ rad/s}^2$ . Calculate its angular displacement in  $5^{\text{th}}$  second.
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