

# 17202

**14115**

**2 Hours / 50 Marks**

Seat No.

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- Instructions* –
- (1) All Questions are *Compulsory*.
  - (2) Illustrate your answers with neat sketches wherever necessary.
  - (3) Figures to the right indicate full marks.
  - (4) Assume suitable data, if necessary.
  - (5) Use of Non-programmable Electronic Pocket Calculator is permissible.
  - (6) 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) Define angular displacement. State its S.I. unit.
  - b) Define impulse and impulsive force.
  - c) State work energy principle.
  - d) Define centripetal force. State its S.I. unit.
  - e) State two properties of ultrasonic waves.
  - f) State two characteristics of thermocouple.
  - g) Define:
    - (i) Neutral temperature
    - (ii) Inversion temperature
  - h) State Einstein's photoelectric equation with usual meaning of symbols.

P.T.O.

- i) The photoelectric work function of a certain metal is  $3.2 \times 10^{-19}$  J. Calculate its threshold frequency ( $h = 6.63 \times 10^{-34}$  J-S).
- j) State any two applications of X-Ray's.
- k) Define spontaneous and stimulated emission.
- l) State any two properties of X-Ray's.

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

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- a) A bullet of mass 100 gram is fired with a muzzle velocity of 500 m/s from a gun of mass 10 kg. Calculate recoil velocity of gun.
- b) Define:
  - (i) Angle of projection
  - (ii) Trajectory
  - (iii) Time of flight
  - (iv) Range of projectile.
- c) Explain piezoelectric method for production of ultrasonic waves.
- d) State the criteria for selection of NDT method.
- e) A body is allowed to fall from the terrace of a building 200 m high. After what time will it reach the ground? What will be its velocity at that time?
- f)
  - (i) State any four NDT methods used in industries.
  - (ii) State advantages of NDT.

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

- a) Differentiate between seebeck effect and peltier effect.
  - b) (i) Explain variation of thermo e.m.f. with temperature using thermocouple characteristic curve.  
(ii) State Joule effect. Express it in mathematical form.
  - c) State characteristics of photoelectric effect.
  - d) Find minimum wavelength and maximum frequency of X-Ray's produced by an X-Ray tube working on 50 KV.
  - e) State any four engineering application's of LASER.
  - f) A wheel of diameter 3 m increases its speed uniformly from 150 rpm to 300 rpm in 30 second. Calculate angular acceleration and linear acceleration.
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