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) Define the term:
      (i) Retardation
      (ii) Velocity time graph
   b) Define one newton and one watt.
   c) Define:
      (i) Time of flight
      (ii) Horizontal range
   d) Define ultrasonic wave.
   e) Name any four non destructive testing method.
   f) Explain the term:
      (i) Reverberation
      (ii) Reverberation time
   g) Intensity of sound produced by thunder is 0.2 \(\text{Wm}^{-2}\). Calculate the level in decibel.

P.T.O.
h) State the principle of photometry.
i) Define threshold frequency and stopping potential.
j) State the range of wavelength of x-ray.
k) State photoelectric effect.
l) State Newton’s third law motion with equation.

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

   a) State the equation of K.E. of body:
      (i) at rest
      (ii) when its velocity is doubled

   b) Distinguish between centripetal force and centrifugal force.

   c) Describe piezoelectric method for their production.

   d) A hall of volume 5000 m$^3$ has a reverberation time of 3 sec. The surface area of sound absorbing surface 3500 m$^2$. Calculate the average coefficient of absorption.

   e) Explain the working of Bunsen’s photometer with help of a neat ray diagram.

   f) Find minimum wavelength and maximum frequency of X-ray production by an X-ray tube work on 50 kV

\[ h = 6.62 \times 10^{-34} \text{ Js, } c = 3 \times 10^8 \text{ m/s, } e = 1.6 \times 10^{-19} \text{ C} \]

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

   a) A flywheel starting from rest is subjected to an acceleration of 150 rpm$^2$. Find its angular displacement during the 10$^{th}$ sec.

   b) A train weighing 300 kN is moving with a velocity of 60 km/hr. The velocity is reduced to 40 km/hr in a second by applying the brakes, find the braking force assuming it is to be uniform.

   c) State the principle of LPT and explain its experimental procedure.

   d) A lamp of 300 candela is at a distance of 10 m from a wall. Find the illuminance of the wall.

   e) Derive Einstein photoelectric equation.

   f) Explain the production of X-ray using Coolidge’s X-ray tube.