17202

11718

2 Hours / 50 Marks Seat No. | | | | | | | | |

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** : **18**

a) State the Kinematical equations of motion for a freely falling body under gravity. State the meanings of symbols used in it.

b) Define Impulse and Impulsive force.

c) A load is pulled 40 m along the horizontal by a force of 500 N acting at 60° to the horizontal. Calculate the work done.

d) State any two applications of centrifugal force.

e) State any two properties of ultrasonic waves.

f) State and explain Joule's effect.

g) What is thermoelectric series? How are the metals selected from thermoelectric series to form a thermocouple ?

h) State and explain Planck's hypothesis.

i) The photoelectric work function of a certain metal is 8.28 eV. Calculate its threshold frequency. ($h = 6.625 \times 10^{-34}$ J-s)

j) State any two Engineering applications of X-rays.

k) Define Spontaneous and Stimulated emission.

l) Find the minimum wavelength of X-rays produced by an X-ray tube operating at 50 KV.

Marks

2. Attempt **any four** : **16**

a) A bullet of mass 50 grams is fired with a muzzle velocity of 600 m/s from a gun of mass 15 Kg. Calculate the recoil velocity of gun.

b) Define the following :

1) Angle of projection
2) Range of projectile
3) Time of flight
4) Trajectory.

c) Explain the Piezoelectric method for the production of ultrasonic waves.

d) State any four advantages of NDT methods.

e) Explain the liquid penetrant testing method with neat diagrams.

f) A train crosses a tunnel in 30 seconds. At the entry of the tunnel, its velocity is 72 Km/hr. and at the exit of tunnel it is 36 Km/hr. Find the length of the tunnel.

3. Attempt **any four** : **16**

a) Distinguish between Seeback effect and Peltier effect. (any 4 points)

b) Explain the variation of thermo e.m.f. with temperature with the help of characteristic curve. Hence define Neutral temperature and Inversion temperature.

c) State Einstein's photoelectric equation and write the meaning of all symbols involved. Calculate the maximum kinetic energy of the photoelectrons ejected from the surface of a metal when light of frequency 1.2×10^{15} Hz is incident upon it.

(Given Planck's constant , $h = 6.625 \times 10^{-34}$ J-s; Threshold wavelength of the metal surface = 4000 A°)

d) Explain the production of X-rays using Coolidge tube.

e) State any four properties of LASER.

f) A wheel of diameter 3m increases its speed uniformly from 150 r.p.m. to 300 r.p.m. in 30 seconds. Calculate its angular acceleration and linear acceleration.