17210

21415

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.

(8) Preferably, write the answers in sequential order.

Marks

1. Attempt any NINE of the following: **18**

a) Define specific resistance and state its SI unit.

b) State the working principle of Wheatstone's network.

c) Mention the uses of potentiometer.

d) When a charge of 0.04 μc is given to a capacitor, its potential is raised to 200 volts, find its capacitance.

e) Define Conduction band and Valence band.

f) Explain how P-N junction diode is formed.

g) State Planck's quantum hypothesis.

Marks

h) Find minimum wavelength of X-rays produced by an X-ray tube operated at 12V.

i) State the properties of Laser.

j) Define spontaneous and stimulated emission.

k) What is nanotechnology? Define nanoscale.

l) State any two properties of nanoparticles.

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

a) Calculate the resistance of 3m length of wire having diameter 0.6 mm and specific resistance $0.35 \times 10^{-6}\ \Omega m$.

b) Four resistance in the Wheatstone's network are 2Ω, 4Ω, R3Ω and 6Ω respectively in a cyclic order, calculate the resistance R3 to balance the network.

c) Obtain an expression for the capacity of parallel plate condenser.

d) Three condensers of capacitance 6μf, 12μf and 16μf are connected in series. A potential difference of 220 volt is applied to the combination. How much charge will be drawn across the capacitors?

e) With I-V curve, Explain forword biased characteristics of P-N junction diode.

f) What is photodiode? Explain the principle of photodiode.

Marks

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

a) Draw Energy Band diagrams and explain the classification of solids into conductors, semiconductors and insulators, on the basis of band theory of solids.

b) If a light of wavelength 4000 A° is incident on metal surface of work function is 5ev, will the electron be ejected or not? Given Planck's constant = 6.62×10^{-34} J.S.

Velocity of light = 3×10^{8} m/s.

c) Explain the production of X-rays using coolidge tube with a neat labelled diagram.

d) Mention any four engineering applications of laser.

e) State any four characteristics of photoelectric effect.

f) Explain any two physical methods of synthesis of nanoparticles.

———