

This question paper contains 3 printed pages.

3307

Your Roll No.....

B.Tech. (C) / I
(Part Time) (Civil Engg.)
Paper II - PHYSICS
(ECE-102)

J

Time : 3 hours

Maximum Marks : 70

*(Write your Roll No. on the top immediately
on receipt of this question paper.)*

Answer any five questions.
Assume missing data, if any, suitably.

1. a) Define central forces. Show that central forces are conservative forces. Also show that motion under central forces must be in a plane. 07
b) What are fundamental interactions. Compare the fundamental interactions on the basis of field quanta, relative strength, range and the interacting particles. 07
2. a) Write down the equation of Simple Harmonic Motion. Deduce the expressions for :
(i) Displacement ;
(ii) Velocity and
(iii) Acceleration.
of a body executing simple harmonic motion. 05
b) A body of unknown mass is attached to an ideal spring with force constant 120N/m. It is found to vibrate with a frequency of 6Hz. Find :

P.T.O

- (i) the time period;
(ii) angular frequency;
(iii) mass of the body. 05
- c) State Fourier theorem. What are the conditions for its applicability? 04
- 3 a) What are the various features of a heat engine? Deduce the expression for efficiency of a reversible heat engine. 07
- b) Define thermal conductivity. Describe Lee's method of determination of thermal conductivity of a bad conductor. 07
- 4 a) What is photo-electric effect? Write down and explain Einstein's photo-electric equation and define threshold frequency and stopping potential. 07
- b) Calculate the de-Broglie wavelength associated with :-
(i) 1 MeV electron
(ii) 1 MeV proton
(iii) 1 MeV photon
The rest mass of electron and proton are 9.1×10^{-31} kg and 1.67×10^{-27} kg respectively. 07
- 5 a) What are mass defect, binding energy and packing fraction of a nucleus? Draw the curve showing the variation of binding energy per nucleon with mass number and write the important conclusions that can be extracted from this curve. 07

- b) Explain spontaneous and stimulated emissions of radiation. discuss the construction and working of He - Ne laser. 07
- 6 a) With a neat ray diagram explain the formation of Newton's rings. Prove that in reflected light the diameters of dark rings are proportional to the square of the natural numbers. 07
- b) In a Newton's ring experiment, the diameter of 5th ring is $0.336 \times 10^{-2} \text{m}$ and the diameter of 15th ring is $0.590 \times 10^{-2} \text{m}$. Find the radius of curvature of the planoconvex lens if the wavelength of light used is 5890\AA . 07
- 7 a) What is plane diffraction grating? Show that the resolving power of a plane diffraction grating is given by the product of total number of rulings and the order of the spectrum. 07
- b) What are Miller indices? Deduce the expression for the distance between parallel planes of Miller indices (hkl) for a cubic crystal. 07
- 8 Write short notes on any FOUR of the following :
- a) Piezoelectric effect.
 - b) Nuclear fission and fusion.
 - c) Dislocation in crystals.
 - d) Nicol prism.
 - e) Double refraction.
 - f) Engineering application of Ultrasonics. $4 \times 3\frac{1}{2}$