

[This question paper contains 3 printed pages.]

Your Roll No.

3332

J

B. Tech/I

Paper II—EEC/EEE-102 : PHYSICS – I

Time : 3 Hours

Maximum Marks : 70

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

Attempt any five questions.

Assume missing data, if any, suitably.

1. (a) What are central forces? Discuss with example.
- (b) State Einstein's postulate of special theory of relativity.
- (c) Differentiate between Fresnel & Fraunhöffer diffraction.
- (d) Calculate wavelength associated with 1 MeV electron.
- (e) Define Resolving and Dispersive power of a grating.
- (f) Write Lorentz transformation equation for position.
- (g) Define nuclear fission process with an example.

$$7 \times 2 = 14$$

[P. T. O.]

2. (a) Write necessary theory for the Newton's ring method for determination of the wavelength of mono-chromatic light. Explain why the central ring is dark in the reflected system of Newton's ring experiment. 8
- (b) What are coherent sources? Why can independent sources not be coherent? 6
3. (a) Write down the physical significance of quantum mechanical wave function. Establish time independent Schrödinger equation for a particle exhibiting wave-like character. 9
- (b) State Heisenberg's uncertainty relation. Discuss its applications with suitable example. 5
4. (a) Name methods for production of ultrasonic waves. Point out engineering applications of ultrasonic waves. Describe one method to produce ultrasonic waves. 9
- (b) What are central forces? Show that motion under central forces must be in a plane. 5
5. (a) Deduce Einstein's mass-energy relation $E = mc^2$ 7
- (b) Find the velocity at which the mass of a particle is :
- (i) Double its rest mass.
- (ii) Half its rest mass. 7

6. (a) Explain the nuclear fission process on the basis of "liquid drop model". 6
- (b) Explain difference between spontaneous and stimulated emission of radiation. Write down the specific properties of LASER light. Write down major components and working of a LASER. 8
7. (a) What is specific rotation? Describe Laurent's Half-shade polarimeter and hence describe a method to obtain specific rotation of optically active substance. 7
- (b) Explain and deduce Bragg's law in X-ray diffraction. What are continuous and characteristic X-rays? 7
8. Write short notes on any *four* of the following :
- (a) Photo-electric Effect and its applications
- (b) Time Dilation
- (c) Nuclear Reactor
- (d) Nuclear Binding Energy
- (e) Fundamental Force
- (f) Simple Harmonic Motion. $4 \times 3\frac{1}{2}$