Total No. Of Questions-8] [Total No. of Printed Pages-3

B.E. II Semester Examination

BE - II/6(A)

214165

ENGG. PHYSICS

Course No.-PHY-202

Time Allowed- 3Hours *Maximum Marks-100*

Note:- Attempt **FIVE** questions, selecting **atleast two** questions from each section.

SECTION - I

1. a) On the basis of Lorentz transformation, explain Length contraction and Time-dilation. **(12)**

   b) Calculate the fringe shift in Michelson-Morley experiment if the effective length of each path is 6 meters and light of wavelength $6000A^0$ is used. [Given earth velocity = 3×10^4 m/s]. **(8)**

2. a) Explain what is meant by "Frame of Reference". Distinguish between Inertial and Non-inertial frames. Derive Galilean transformation equations for two inertial frames moving with respect to each other. Show that velocity is variant whereas acceleration is invariant under Galilean transformations. **(12)**

   b) If total energy of a particle is exactly thrice its rest energy, What is the velocity of the particle. **(8)**

3. a) Describe how the energy distribution in the spectrum of black body radiation has been experimentally studied and how it has been explained. Discuss the short-comings of Rayleigh-Jeans law for black body radiation. Explain the term "Ultraviolet catastrophe". **(12)**

b) Calculate the surface temperature of a star whose wave length for maximum emission is 7.2×10^{-10}m **(8)**

4. a) Explain De-broglie's concept of matter waves and discuss experimental evidence in support of this concept. Describe the properties of matter waves. Is uncertainty principle a direct consequence of the dual nature of matter, explain how? **(12)**

b) What voltage must be applied to an expression microscope to produce electrons of wavelength 0.5 A^0 **(8)**

SECTION -II

5. a) Explain Tunnel Effect. Obtain an expression for the transmission co-efficient of a rectangular potential barrier. **(14)**

b) Draw the energy level diagram for a harmonic oscillator and discuss the significance of Zero-point energy. **(6)**

6. a) Explain the terms:

i) Eigen function and Eigen value.

ii) Expectation values and operators.

Qbtain the expressions for expectation values of position, Momentum and energy in terms of corresponding operators. **(12)**

b) Find the probability of finding a particle described by the wavefunction $f(x) = \sqrt{x}, 0 < x < 1$ **(8)**

7. a) Differentiate between diffusion and drift currents. Derive Einstein's relation for a P-N junction. **(10)**

b) Write notes on:

i) Conducting polymers

ii) Dielectric materials. **(5,5)**

8. a) Describe the construction and working of a Ruby Laser. **(10)**

b) Describe the essential components of a laser. Explain the characteristics of a laser beam. How it is different than ordinary light? Discuss important applications of lasers. **(10)**

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