(Following Paper ID and Numbers to be filled in your Answer book)

Paper ID: 1   9   9   1   2   3   Roll No.:

B.TECH
(SEM. I) (ODD SEM) THEORY EXAMINATION, 2015-16
ENGINEERING PHYSICS-I

Time: 3 Hours   **[Total Marks: 100]**

Section-A

Q.1 Attempt all parts. All parts carry equal marks. Write answer of each part in short.   **(2x10 = 20)**

(a)   Is earth inertial frames? Explain.

(b)   What are the conclusions of Michelson-Morley experiment?

(c)   Prove that the velocity of light is the maximum attainable velocity.

(d)   Write the statement of Heisenberg's uncertainty principle.

(e)   Write the characteristics of a wave function.

(f)   Why Newton's are rings circular in shape?

(g)   What do you understand by dispersive power of grating?

(h)   What do mean by optic axis??

(i)   Define the population inversion.

(j)   Describe the basic principle of an optical fibre?

Section-B

Note: Attempt any **five** parts. All parts carry equal marks: **(5×10=50)**

Q.2   What was the objective of conducting Michelson-Morley experiment? Discuss the negative results of this experiment.

Q.3   Derive the mass energy relation. An electron moves with speed   m/s. Calculate its mass, momentum, total energy and kinetic energy.

Q.4   Describe and discuss the Davisson Germer experiment and its outcome.

Q.5   Derive an expression for the wave function and energy of a particle confined in one dimensional potential box of length L using Schroedinger's wave equation. Calculate the energy difference between the ground state and the first excited state for an electron in a one-dimensional rigid box of length 2×10^{-8} cm.

Q.6   Prove that the diameter of dark rings in Newton's ring is directly proportional to square root of natural numbers. Newton's rings are formed in reflected light of wave length 6000   with liquid between the plane and curved surfaces, if the diameter of 6th dark ring is 3.1 mm. and radius of curvature of curved surfaces is 100cm. calculate the refractive index of liquid.

Q.7   What is Rayleigh's criterion of resolution? Discuss the resolving power of grating.

Q.8 Describe the different type of optical fibre in detail.

Q.9 Explain the construction and working of Helium – Neon laser. In He-Ne laser Number of Ne atom is 2.7×10^{20}. If the laser emits radiation of wavelength 6300Å, calculate the energy of laser pulse, also calculate momentum of a photon.

Section-C

Note: Attempt any **two** questions from this section. **(2×15=30)**

Q.10 (a) What do you mean by time dilation? Find the expression for it.

(b) Using Heisenberg's uncertainty principle, find the binding energy of an electron in an atom.

(c) At what speed should a clock be moved so that it may appear to lose 10 minute in two days?

Q.11 (a) Prove that for a wave packet, .

(b) Describe the formation of Newton's Ring. How wavelength of a monochromatic light can be determined by this experiment?

(c) Calculate the least width that a grating has to resolve the components of sodium D- lines in the second order, the grating having 1000 lines per cm. The wavelength of two components of sodium lines are 5890 Åto 5896 respectively.

Q.12 (a) How plane, circularly and elliptically polarized light can be produced?

(b) What is holography? Discuss the construction and reconstruction of hologram.

(c) Calculate the maximum radius for operating of single mode fibre from following data.

= 0.8µm and n_1 = 1.483 n_2 = 1.475.

Physical Constants

Mass of electron	m_o	= 9.1×10^{-31} kg
Mass of Proton	m_p	= 1.67×10^{-27} kg
Speed of light	c	= 3×10^{8} m/s
Plank Constant	h	= 6.63×10^{-34} J/s
Charge on electron	e	= 1.6×10^{-19} C
Boltzmann Constant	k	=1.38×10^{-23} m^2 kg s^{-2} K^{-1}