

2212**B.Tech. Examination, 2015****(First Semester)****(C.S. and I.T. Branch)****ENGINEERING PHYSICS****Paper-I****Time Allowed : Three Hours****Maximum Marks : 100**

Note : Attempt any five questions. All questions carry equal marks.

- Q. 1. (a) What are coherent sources ? How can you measure the wavelength of sodium light by Newton's ring experiment ? 15
- (b) What is Rayleigh criterion of resolution ? 5
- Q. 2. (a) What is a circularly polarized light ? How it can be produced ? 10
- (b) Explain the construction and working of Nicol prism. 10
- Q. 3. (a) What are Einstein's coefficients ? Derive a relation between them. 5
- (b) Explain the construction and working of Helium-Neon (He-Ne) laser. 15

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- Q. 4. (a) What are graded index multimode fibres ?
Explain the propagation of light in this fibre. 10
- (b) Using Heisenberg's uncertainty principle prove the non-existence of electron in nucleus. 10
- Q. 5. (a) Derive Schrodinger's wave equation in time independent form. 10
- (b) Derive Claussius – Mussoiti equation. 10
- Q. 6. (a) Write a short note on carbon bucky ball nanomaterial. 10
- (b) What is Meissner's effect ? Explain different types of Superconductors. 10
- Q. 7. (a) Derive electromagnetic wave equation in free space. 10
- (b) Write Maxwell's equation and calculate intrinsic impedance. 10
- Q. 8. (a) Deduce Lorentz transformation equation. 10
- (b) What will be the apparent length of a meter stick measured by an observer at rest when the stick is moving along its length with a velocity of $\frac{\sqrt{3}}{2}C$? 5
- (c) Derive Mass-Energy equivalence relation. 5

B. Tech. (IInd Sem.) Examination, 2006

M. E. and E. C.

IInd (b)

Physics

Time : Three Hours]

[Maximum Marks : 100

Note : Attempt any **five** questions. All questions carry equal marks.

1. (a) Write Lorentz Transformation Equations. Derive the length contraction formula from Lorentz transformation equations.
(b) A rocket was found to be of length 100 m when measured on the earth. It then leaves the earth and moves away at a constant velocity of 2×10^8 m/sec. What will be its length now as measured from the earth?
2. (a) Derive the time dilation formula of special theory of relativity.
(b) Derive an expression for the path difference between the rays reflected from the upper and lower surfaces of a parallel thin film.
3. (a) What is Diffraction of Light? Give the construction and principle of working of a plane transmission grating.

- (b) What is the highest order of spectrum which may be seen with light of wavelength 5800 \AA by means of a grating with 3000 lines/inch?
4. (a) Explain clearly what do you mean by circularly polarised light. Describe how it can be produced.
- (b) What is Specific Rotation? Calculate the specific rotation of sugar if plane of polarisation is rotated by 12.5° . The length of the tube containing solution is 20 cm and 8.0 gm of sugar is dissolved in 100 cc of water.
5. (a) What do you mean by the resolving power of an optical instrument? Explain clearly the Rayleigh Criterion of Resolution. Find an expression for the resolving power of a telescope.
- (b) Write a note on construction and theory of retardation plates. Calculate the thickness of half-wave plate for light of wavelength 5890 \AA . Given :

$$(\mu_o = 1.65 \text{ and } \mu_E = 1.45)$$

- (a) Write Maxwell's equations. Show that the velocity of propagation of a plane electromagnetic wave in free space is :

$$C = \frac{1}{\sqrt{\mu_o \epsilon_o}} \text{ metre/second}$$

(b) What name is given to the quantity $(\vec{E} \times \vec{h})$, the electromagnetic wave? What does it represent?

7. (a) Explain the difference between para-ferro and diamagnetism. Give Langevin theory of paramagnetism.

(b) What is Hysteresis? Describe a method for plotting Hysteresis loop. Derive an expression for the energy dissipated in a Hysteresis cycle.

8. (a) Show that 'Compton shift' is independent of wavelength of incident X-rays. How will you explain normal scattering by Compton's equation?

(b) On operating at 40 kV an X-ray tube emits continuous X-ray spectrum with short wavelength limit $\lambda_{\min} = 0.310 \text{ \AA}$. Calculate Plank's Constant.

9. (a) State Heisenberg's Uncertainty Principle and explain it in view of de-Broglie's concept of matter waves.

(b) Establish steady state Schrödinger's wave equation for a single particle, in three dimensional space, for a constant potential field. Express this equation in terms of Hamiltonian function.

10. Write note on any **two** of the following :

(a) Michelson Morley Experiment

(b) Laser and its Applications

(c) Bragg's Law.