

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 9602

Roll No.

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**B.Tech.**

(SEM. I) ODD SEMESTER THEORY

EXAMINATION 2012–13

**ENGINEERING PHYSICS—I**

*Time : 2 Hours*

*Total Marks : 50*

**SECTION—A**

1. Attempt **all** parts. All parts carry equal marks. Write answer of each part in short. (2×5=10)
- (a) What are massless particles ?
  - (b) Two independent sources could not produce interference. Why ?
  - (c) What do you mean by dispersive power of a plane diffraction grating ?
  - (d) What is stimulated emission of radiation ?
  - (e) Describe scattering loss in optical fiber.

**SECTION—B**

2. Attempt any **three** parts. All parts carry equal marks. (5×3=15)
- (a) The total energy of a moving meson is exactly twice its rest energy. Find the speed of the meson.

- (b) Two plane glass surfaces in contact along one edge are separated at the opposite edge by a thin wire. If 20 interference fringes are observed between these edges, in sodium light of wavelength  $\lambda = 5890 \text{ \AA}$  of normal incidence, find the diameter of the wire.
- (c) A plane grating has 15000 lines per inch. Find the angle of separation of the  $5048 \text{ \AA}$  and  $5016 \text{ \AA}$  lines of helium in the second order spectrum.
- (d) A certain length of 5% solution causes the optical rotation of  $20^\circ$ . How much length of 10% solution of the same substance will cause  $35^\circ$  rotations ?
- (e) A step index fiber has core and cladding refractive indices 1.466 and 1.460 respectively. If the wavelength of light  $0.85 \text{ \mu m}$  is propagated through the fiber of core diameter  $50 \text{ \mu m}$ , find the normalized frequency and the number of mode supported by the fiber.

### SECTION—C

**Note :—** Attempt **all** questions of this section. All questions carry equal marks.

3. Attempt any **one** part of the following : (1×5=5)
- (a) Discuss the objective and outcome of Michelson Morley experiment.
- (b) Show that the relativistic invariance of the law of conservation of momentum leads to the concept of variation of mass with velocity.

4. Attempt any **one** part of the following : (1×5=5)
- (a) What do you understand by coherent sources ? How are these obtained in practice ?
  - (b) Describe the formation of Newton's rings in reflected light. Explain briefly why Newton's rings are circular.
5. Attempt any **one** part of the following : (1×5=5)
- (a) What do you understand by missing orders ? Which order will be missing if opacities are twice the transparencies ?
  - (b) What do you understand by resolving power ? Deduce the expression for the resolving power of grating.
6. Attempt any **one** part of the following : (1×5=5)
- (a) Describe the construction and working of a Nicol prism.
  - (b) What are Einstein's coefficients A and B ? Establish a relation between them.
7. Attempt any **one** part of the following : (1×5=5)
- (a) What is an optical fiber ? Discuss its classification.
  - (b) Discuss main characteristics and applications of holography.