Unit - V

5. a) What do you understand by spontaneous and stimulated emission? rgpvonline.com

b) What is the numerical aperture of an optical fibre cable with a clad index of 1.378 and a core index of 1.546?

c) Explain what do you understand by population inversion. How it is achieved by optical pumping?

d) Describe the construction and working of Ruby laser.

OR

Give a brief classification of optical fibres with their importance and limitations.

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BE - 201
B.E. I & II Semester
Examination, December 2015
Engineering Physics
Time : Three Hours

Maximum Marks : 70

Note: i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.

ii) All parts of each question are to be attempted at one place.

iii) All questions carry equal marks, out of which part A and B (Max.50 words) carry 2 marks, part C (Max.100 words) carry 3 marks, part D (Max.400 words) carry 7 marks.

iv) Except numericals, Derivation, Design and Drawing etc.

Unit - I

1. a) What is the physical significance of Heisenberg's uncertainty principle?

b) Obtain operator value of momentum P.

c) Explain compton shift.

d) Derive an expression for time dependent and time independent Schrodinger equation.

OR

What do you understand by group velocity and wave velocity of matter wave? Derive the relation between them.

Unit - II

2. a) The central point in Newton's rings seen in reflected light appears dark. Why?

   b) In a Michelson interferometer 200 fringes cross the field of view when the movable mirror is moved through 0589mm. Calculate the wave length of light used.

   c) What do you understand by resolving power of grating? Derive necessary expression.

   d) Describe the construction of a nicol prism and show how it can be used as a polarizer or as an analyzer.

OR

On introducing a thin sheet of mica

(thickness $= 12 \times 10^{-5}$ cm) in the path of one of the interfering beams in a biprism arrangement. The central fringe is shifted through a distance equal to the spacing between successive bright fringe. Calculate the refractive index of mica ($\lambda = 6 \times 10^{-5}$ cm).

Unit - III

3. a) What is the magic about magic numbers?

   b) Why do we say that a nucleus behave like a drop of liquid? What are essential features which are common to a drop of liquid and a nucleus?

   c) Explain the working of GM counter. What are its limitations?

   d) Give the construction and working of a betatron. What is betatron condition?

OR

Determine in a cyclotron describe a circle of radius 32m just before emerging from the dees. The frequency of applied e.m.f. is 10 MHz. Find the flux density of magnetic field and the velocity of deuterons emerging out of the cyclotron, mass of deuterium $= 3.32 \times 10^{-27}$ kg; $e = 1.6 \times 10^{-19}$ C.

Unit - IV

4. a) What is Meissner effect?

   b) What are the differences between photo diode and solar cell?

   c) Write a short note on polarization of dielectric materials.

   d) An electric field of 100V/m is applied to a sample of n-type semiconductor whose Hall-coefficient is $- 0.0125$m^3/C. Determine the current density in the sample assuming $\mu_e = 0.36$m^{2}V^{-1}S^{-1}B.

OR

Find the effective mass of electron on the basis of Kronig-Penney model.