Roll No .....

BE - 201

B.E. I & II Semester

Examination, June 2016

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 do you understand by wave function?
   b) Obtain operator values of energy $\hat{E}$.
   c) Find out the relationship between group velocity (v_g) and wave velocity (v_p).
   d) What is the uncertainty principle? Apply this to prove the non-existence of electron in the nucleus.

OR

Derive an expression for time independent Schrodinger wave equation to particle trap in a one dimensional square potential well.

Unit - II

2. a) In Newton's ring experiment why the Plano convex lens have larger radius of curvature?
   b) Give the methods for producing plane polarized light.
   c) A source containing a mixture of hydrogen and deuterium atoms emits a red double at $\lambda = 6563$ A°. Whose separation is 1.8 A°. Find the minimum number of lines required in a plane transmission grating which can resolve the double in the first order.
   d) Give the complete description of Michelson's interferometer.

OR

Show that the thin film which appears bright in reflected light, appears dark in transmitted light. Deduce the necessary expression.

Unit - III

3. a) Explain briefly the shell model of nucleus.
   b) A GM counter wire collects 10^8 electrons per discharge. When the counting rate is 500 counts/minute, what will be the average current in the circuit?
   c) Write a short note on LINAC.
   d) Discuss the construction and working of Bainbridge mass spectrograph.

OR

Explain the principle and working of an Aston's mass spectrograph. Derive the condition for its focussing.

Unit - IV

4. a) Explain Type-I and Type-II superconductors.
   b) Discuss the breakdown mechanism in P-n junction.
   c) Write down the important conclusions of Kronig-Penney model. Draw E-k curve for a one dimensional lattice.
   d) Prove that in an intrinsic semiconductor the Fermi level lies in the middle of the forbidden gap.

OR

Give the relationship between $\vec{E}, \vec{D}$ and $\vec{P}$ vectors. What is the significance of each of these vectors?

Unit - V

5. a) What is a LASER? How does the light from laser differ from ordinary monochromatic source?
   b) Explain the difference between step index fibre and graded index fibre.
   c) Explain how helium neon laser is superior to a ruby laser?
   d) An optical fibre has a NA of 0.20 and a cladding refractive index of 1.59. Determine the acceptance angle for the fibre in water which has a refractive index of 1.33.

OR

What is a carbon-dioxide (CO_2) laser? Explain its setup along with vibrational modes of CO_2 molecule.

******