Total No. of Questions—**8**] [Total No. of Printed Pages—**4**

Seat No.	

[4756]-204

F.E. (Second Semester) EXAMINATION, 2015

ENGINEERING PHYSICS

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. **:—** (*i*) Neat diagrams must be drawn wherever necessary.

(*ii*) Figures to the right indicate full marks.

(*iii*) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

(*iv*) Assume suitable data, if necessary.

Constants : $h = 6.63 \times 10^{-34}$ J.sec

$c = 3 \times 10^{8}$ m/s

$e = 1.6 \times 10^{-19}$ C

$m_e = 9.1 \times 10^{-31}$ kg.

$m_p = 1.67 \times 10^{-27}$ kg.

1. (*a*) Derive an equation for path difference in reflected light when monochromatic light falls on the uniform thickness film and hence state the conditions for maxima and minima. [6]

P.T.O.

(*b*) State any *two* factors affecting the acoustics of a hall and explain in brief remedies on that. [3]

(*c*) Calculate the reverberation time of hall with volume of 1500 m^3 and total absorption is equivalent to 100 m^2 Sabine. [3]

Or

2. (*a*) What is Piezoelectric effect ? Draw a neat circuit diagram and explain Piezoelectric generator for the production of ultrasonic waves. [6]

(*b*) Explain the formation of Newton's rings in the laboratory. [3]

(*c*) A laser light of wavelength 6328 A.U. falls normally on a grating which is 2 cm long. The first order spectrum is observed at an angle of 20°. Find the total number of slits on grating. [3]

3. (*a*) Explain with neat labeled diagram construction and working of Ruby laser. [6]

(*b*) What is Fermi level ? Show the position of Fermi level in P-type semiconductor at temperature T = 0 K and T > 0 K. [3]

(*c*) Calculate the number of acceptors to be added to a germanium sample to obtain the resistivity of 10 Ω cm. [3]
(μ = 1700 cm^2/V.sec.)

Or

4. (*a*) What is Hall effect ? Derive the equation of Hall voltage. [6]

(*b*) State and prove Law of Malus. [3]

(*c*) A retardation plate of thickness 2.275×10^{-3} cm is cut with its faces parallel to optic axis. If the emergent beam of light is elliptically polarized. Find the wavelength of monochromatic light made incident normally on the plate. Given that, $\mu_0 = 1.586$ $\mu_e = 1.592$. [3]

5. (*a*) State and explain Heisenberg's Uncertainty principle. Illustrate the same with electron diffraction at a single slit. [6]

(*b*) What is wave function ψ ? Give the physical significance of it. [4]

(*c*) An electron is trapped in a rigid box of width 2 A.U. Find its lowest energy in eV. [3]

Or

6. (*a*) Deduce Schrödinger's time independent wave equation. [6]

(*b*) Define phase velocity and prove that it is always greater than velocity of light. [4]

(*c*) Calculate the de Broglie wavelength of proton when it is accelerated by potential difference of 10 kV. [3]

7. (*a*) State and explain Meissner effect and hence show that superconductivity is influenced by perfect diamagnetism. [6]

(*b*) Explain how colloids are synthesized by the chemical route. [4]

(*c*) Discuss applications of nanotechnology in medical field. [3]

Or

8. (*a*) Explain any *two* properties of nanoparticle. [6]

(*b*) Distinguish between type-I and type-II superconductors. [4]

(*c*) State any *six* applications of superconductivity. [3]