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

| **Seat No.** | |
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# [5558]-103

## F.E. (II Sem.) EXAMINATION, 2019

## ENGINEERING PHYSICS

## (2015 PATTERN)

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

**1.** (*a*) Explain the formation of Newton's rings. Prove that for Newton's rings in reflected light, the diameters of dark rings are proportional to the square root of natural numbers. [6]

(*b*) What is reverberation time ? Explain any *two* measures to control reverberation time in an auditorium. [3]

(*c*) In a plane transmission grating, the angle of diffraction for the second order principal maximum for the wavelength $5 \times 10^{-5}$ cm is 30°. Calculate the number of lines/cm of the grating surface. [3]

*Or*

**2.** (*a*) What is piezoelectric effect ? Draw neat and labelled diagram for piezoelectric oscillator and hence explain its construction and working. [6]

(*b*) Explain with suitable diagram how interference is used to design antireflection coating. [3]

P.T.O.

(*c*) The average reverberation time of a hall is 1.5 sec and the area of interior surface is 3340 $m^2$. If the volume of the hall is 13000 $m^3$. Find absorption coefficient. [3]

**3.** (*a*) What is double refraction ? Explain Huygen's theory of double refraction. [6]

(*b*) Calculate the number of acceptor to be added to a germanium sample to obtain the resistivity of 10 Ω-cm. [3]

(Given : $\mu = 1700$ $cm^2$/volt-sec

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

(*c*) What is holography ? Explain the process of Hologram recording. [3]

*Or*

**4.** (*a*) Define Fermi level in conductors and semiconductors. Show that the Fermi level lies at the centre of energy gap in an instrinsic semiconductor. [6]

(*b*) A 20 cm long tube containing 48 c.c. of sugar solution rotates the plane of polarization by 11°. If the specific rotation of sugar is 66°, calculate the mass of sugar in the solution. [3]

(*c*) List any *three* applications of solar cell. Explain any *one* of them in brief. [3]

**5.** (*a*) State and explain Heisenberg's uncertainty principle. Illustrate the principle of electron diffraction at a single silt. [6]

(*b*) What is De-Broglie hypothesis ? Derive an expression for de-Broglie wavelength for an electron when it is accelerated by potential difference V. [4]

(*c*) Lowest energy of an electron trapped in a potential well is 38 eV. Calculate the width of the well. [3]

($h$ : $6.63 \times 10^{-34}$ Js

$m$ : $9.1 \times 10^{-31}$ kg)

*Or*

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

(*b*) An electron initially at rest is accelerated through a potential difference of 3000 V. Calculate for the electron wave the following parameters : [3]

(*i*) The de-Broglie wavelength and

(*ii*) The momentum.

($h$ : $6.63 \times 10^{-34}$ Js)

(*c*) Write down the conditions which are to be satisfied by well behaved wave function. [4]

**7.** (*a*) Explain optical and electrical properties of nanoparticles. [6]

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

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

*Or*

**8.** (*a*) Explain the following terms of superconductivity with the help of necessary figure. Give formula and graph whenever necessary :

(*i*) Meissner effect

(*ii*) Critical magnetic field. [6]

(*b*) Give any *four* points to distinguish between Type I and Type II superconductors. [4]

(*c*) State applications of nano-particle. Explain any *one* application. [3]