Code No. 3393/S

FACULTY OF ENGINEERING & INFORMATICS

B.E. I – Semester (Suppl.) Examination, June / July 2017

Subject: Engineering Physics – I

Time: 3 Hours **Max.Marks: 70**

Note: Answer all questions from Part A and any five questions from Part B.

PART – A (20 Marks)

1 Light of wavelength 5893 A^0 is reflected at nearly normal incidence from a soap film of refractive index n = 1.42. What is the least thickness of the film that will appear dark? (2)

2 Distinguish between Fresnel's and Fraunhoffer's diffraction. (2)

3 Calculate the thickness of a quartz that will introduce a phase difference of π radians. between e-ray and o-ray on emergence (n_e = 1.553 and n_o = 1.544 and λ = 5000 A^0) (2)

4 Mention any four applications of lasers. (2)

5 Define the terms "Critical angle and Numerical Aperture" of an optical fibre. (2)

6 Ultrasonic waves have important applications as Sonar because: (2)

a) These waves travel in all possible directions.
b) These waves travel longer distance due to high frequency
c) These waves cannot heard from miles
d) These waves travel long distances in desired direction using medium and reflect from obstacles.

7 Define "Ensemble and Phase Space". (2)

8 The number of possible arrangements of two fermions in three cells is _____. (2)

9 Complete the de-Broglie wavelength of a proton whose kinetic energy is equal to the rest energy of an election (m_e = 9.1 x 10^{-31} kg, m of proton = 1.67x 10^{-27} kg). (2)

10 Define Pointing theorem. (2)

PART – B (5x10 = 50 Marks)

11 a) Derive an expression for diameter of a dark ring by using Newton's rings experiment (6)

b) A diffraction grating used at normal incidence gives a spectral line (5400 A^0) in a certain order superimposed on another line (4050 A^0) of the next higher order. If the angle of diffraction is 30^0, how many lines per c.m. are there in the grating? (4)

12 a) Explain the construction and working of Nicol's Prism. (5)

b) Describe the experimental method of Ruby laser with necessary energy level diagram. (5)

13 a) Explain the double crucible method for fibre drawing. (4)

b) What are the properties of ultrasonics and discuss Debye-Sears method to determine wavelength of ultrasonics. (6)

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14 a) Derive the expression for the distribution of fermions using Fermi –Dirac statistics. (7)
b) Deduce the Wein's law and Rayleigh-Jean's law function from Max-Planck's law. (3)

15 a) Derive the expression for wave function of particle in an infinite square well potential (6)
(b) State and explain Pointing theorem. (4)

16 a) Derive the expression for resultant intensity due to a single slit diffraction and discuss the effect of slit width on it. (6)

(b) Explain Einstein's coefficients of spontaneous and stimulated emission of radiation. (4)

17 a) Explain the method to detect the ultrasonics by piezo electric detector and mention any two applications of ultrasonics. (5)

b) State and explain de Broglie's concept of matter waves and derive the expression for wavelength associated with an election. (5)

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