Roll No. | | | | | | | | | | H

TPH–201

B. Tech. (Second Semester)

(All Branches)

Mid Semester EXAMINATION, 2017

ENGINEERING PHYSICS

Time : 1:30 Hours] [*Maximum Marks : 50*

Note : (i) This question paper contains two Sections.

(ii) Both Sections are compulsory.

Section—A

1. Fill in the blanks/True-False : (1×5=5 Marks)

(a) An ideal polariser can have a maximum transmission of ..... percent.

(b) ..... laser was first developed by Maiman in 1960.

(c) The substances which rotate the plane of vibration to the right, they are called .....

(d) In reflected system, the centre of Newton's ring is .....

(e) The dispersive power of a diffraction grating is defined as the rate of change ..... of with wavelength of light.

2. Attempt any *five* parts : (3×5=15 Marks)

(a) What do you mean by coherent sources and what are the necessary conditions for obtaining sustained interference pattern ?

(b) A laser beam can be focused on an area of 10×10^{-4} m^2. If laser radiates energy at the rate 10 mW, find the intensity of focused beam.

(c) Explain the difference between interference and diffraction. Write minimum three differences.

(d) If in an interference pattern, the ratio between maximum and minimum intensities is 36 : 1 then find the ratio between the amplitudes and intensities of two interfering waves.

(e) Find the thickness of a quarter wave plane when the wavelength of light is equal to 5890 Å and $\mu_O = 1.55$ and $\mu_E = 1.54$.

(f) What is the Rayleigh criterion of resolution ?

Section—B

3. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)

(a) What are Einstein's A and B coefficients ? Derive a relation between them.

(b) A sugar solution in a tube of length 20 cm produces an optical rotation of 13°. The solution is diluted to one-fourth of its previous concentration. Find the optical rotation produced by 30 cm long tube containing the dilute solution.

(c) A plane transmission grating has 1500 lines per inch. Find the resolving power of the grating and the smallest wavelength difference that can be resolved with a light of wavelength 6000 Å in the second order.

4. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)

(a) Define the following terms :

(i) Spontaneous emission

(ii) Stimulated emission

(iii) Absorption,

(iv) Population inversion

(v) Pumping

(b) Calculate the specific rotation, which rotates the plane of polarisation 15.2° in 20% sugar solution of 25 cm length.

(c) Discuss the formation of Newton's rings by reflected light. Describe the experimental arrangement and give necessary theory.

5. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)

(a) Write down the construction and working of Helium-Neon laser.

(b) 80 gm of impure sugar is dissolved in a liter of water. The solution gives an optical rotation of 9.9° when placed in a tube of length 20 cm. If the specific rotation of pure sugar solution is $66^{\circ}\ dm^{-1}\ (gm/cc)^{-1}$, find the percentage purity of sugar sample.

(c) Find the resultant amplitude of diffracted ray in fraunhofer diffraction due to single slit.

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