2E3203

Roll No. _____ Total No. of Pages: 3

2E3203

B. Tech. II - Sem. (Main / Back) Exam., - 2024

2FY2-02 Engineering Physics

Time: 3 Hours **Maximum Marks: 70**

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

PART – A

[10×2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1 Why Newton's rings are circular in shape?

Q.2 Define matter waves.

Q.3 Write two differences between spatial and temporal coherence.

Q.4 Mention the units of Einstein's coefficients of spontaneous emission and stimulated emission.

Q.5 Write Expression for Fermi-Dirac distribution function.

Q.6 Mention two properties of metallic bond.

Q.7 State physical significance of curl of static magnetic field.

Q.8 Write expression for Bio-Savart's Law in vector form.

Q.9 Express Bragg's condition for X-ray diffraction.

Q.10 The coherence time for sodium light of wavelength 5896 $\mathring{A}$ is 10^{-10} sec. What is the maximum thickness of the film that could be measured using interference of sodium light?

PART – B

[5×4=20]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1 Michelson interferometer experiment is performed with a source which have two wavelength 5882 $\mathring{A}$ and 5886 $\mathring{A}$. By what distance, does the mirror have to be move between two positions of disappearance of fringes?

Q.2 Derive time independent Schrodinger's wave equation.

Q.3 Two wave-trains overlaps 40% of their length. If the maxima in the resulting interference pattern receives 20 units of light, how much do the minima receives?

Q.4 Explain the essential requirement for production of laser action.

Q.5 Derive an expression for Hall coefficient. Mention two applications of Hall effect.

Q.6 Deduce the expression for Poynting vector and explain its physical meaning.

Q.7 A parallel beam of sodium light is incident normally on a plane transmission grating having 4250 lines /cm and a second order spectral line is observed at an angle 30°. Determine the wavelength of light.

PART – C

[3×10=30]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any three questions

Q.1 Describe Fraunhofer diffraction due to a single slit. Deduce the position of maximas and minimas.

Q.2 Show that energy of an electron confined in a 1D potential well of length 'L' and infinite depth is quantized. Is the electron allowed to have zero energy? Comment.

Q.3 What are the basic requirements of semi-conductor laser? With the help of energy band diagram explain working of semi-conductor laser.

Q.4 (a) Explain clearly the propagation of an electromagnetic wave inside an optical fibre.

(b) An optical fibre has 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.

Q.5 Deduce the expressions for Maxwell's Equations in integral and differential form. Also discuss their physical significance.
