R20

SET - 1

I B. Tech I Semester Supplementary Examinations, August/Sep- 2022
ENGINEERING PHYSICS
(Com. to CE, ME, Agri E, Phar. E)

Time: 3 hours　　　　　　　　　　　　　　　　　　　　　　　　　　Max. Marks: 70

Answer any five Questions one Question from Each Unit
All Questions Carry Equal Marks

UNIT-I

1.　a)　Describe the construction of a Nicol prism. Explain its working as a polarizer and as an analyzer.　(10M)

　　b)　Given incident 590 nm light, compute the minimum thickness which a quartz retarder much have if it is to be a quarter-wave plate. The indices of refractions are μ_o=1.544 and μ_e=1.553　(4M)

Or

2.　a)　Define resolving power of an optical instrument. Obtain an expression for the resolving power of a grating.　(10M)

　　b)　A plane transmission grating having 6000 lines per cm used to obtain a spectrum of light from a sodium light in the second order. Find the angular separation between the two sodium lines(λ_1=5890 A° and λ_2=5896 A°).　(4M)

UNIT-II

3.　a)　Explain the construction and working of a He-Ne laser with an energy level diagram. What are the merits of a He-Ne laser?　(10M)

　　b)　What are the characteristics of laser light?　(4M)

Or

4.　a)　Define numerical aperture and derive an expression for numerical aperture and angle of acceptance of fibre in terms of the refractive index of the core and cladding.　(10M)

　　b)　The refractive indices of core and cladding materials of a step-index fibre are 1.48 and 1.45, respectively. Calculate: (i) numerical aperture, (ii) acceptance angle, and (iii) the critical angle at the core-cladding interface and (iv) fractional refractive indices change.　(4M)

UNIT-III

5.　a)　Explain the classification of materials based on magnetic behaviour with examples.　(10M)

　　b)　Define the terms permeability and magnetic susceptibility.　(4M)

Or

6.　a)　Define the term polarizability in dielectrics. Derive an expression for electronic polarizability.　(10M)

　　b)　Write short notes on piezoelectricity.　(4M)

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UNIT-IV

7. a) Explain the Magnetostriction effect. Describe the production of ultrasonic waves by the Magnetostriction oscillator method with a neat circuit diagram. (10M)

   b) A nickel rod of length 10 cm is used in a magnetostriction oscillator. Calculate the frequency of ultrasonic waves generated. Nickel has Young's modulus of 210 GPa and density of 8900 kg/m^3. (4M)

Or

8. a) What is reverberation time? Using Sabine's formula explains how the sound absorption coefficient of a material is determined. (10M)

   b) A hall has dimensions of 25mX 20mX 8m. The reverberation time is 4 s. Determine the average absorption coefficient of the surfaces. (4M)

UNIT-V

9. a) Discuss the Simple, Body-centred and Face centred cubic crystal structures (10M)

   b) Explain "unit cell" and "lattice parameters". (4M)

Or

10. a) Describe Bragg's X-ray spectrometer and explain how Bragg's law can be verified. (10M)

    b) Monochromatic X-rays of wavelength 1.5Å are incident on a crystal face having an interplanar spacing of 1.6 Å. Find the highest order for which Bragg's reflection maximum can be seen. (4M)

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