Code No: R201103 **R20** SET - 1

I B. Tech I Semester Supplementary Examinations, December - 2021

ENGINEERING PHYSICS

(Com. to CE, ME, Phar. E & Agri 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) Explain the theory of plane transmission grating and derive equations for maxima and minima. (10M)

   b) Calculate the wavelength of light that has its second-order maximum at 45^o when falling on a diffraction grating that has 5000 rulings per centimetre. (4M)

Or

2. a) How will you conclude the transverse nature of the light? Discuss any two methods to produce plane-polarized light. (10M)

   b) If a quartz plate act as a half-wave plate for plane-polarized light of wavelength λ, then show that the same plate would act as a quarter-wave plate for a wavelength 2λ. (4M)

UNIT-II

3. a) What is population inversion? Using energy level diagrams, explain how it is achieved in a Helium-Neon laser? (10M)

   b) Distinguish between spontaneous and stimulated emissions (4M)

Or

4. a) How optical fibres are classified based on the modes, material and refractive index profile. (10M)

   b) A fibre cable has an acceptance angle of 300 and a core of refractive index 1.4. Calculate the refractive index of the cladding. (4M)

UNIT-III

5. Explain the domain theory of Ferromagnetism. Using that theory explain the formation of hysteresis in ferromagnetic materials. (14M)

Or

6. What is the internal field? Derive an expression for local field and hence obtain Clausius- Mosotti relation. (14M)

UNIT-IV

7. a) What is the inverse piezoelectric effect? With the help of a circuit diagram, explain the production of ultrasonic waves using a piezoelectric oscillator. (10M)

   b) A quartz crystal in an ultrasonic interferometer produces stationary waves of frequency 1.5 MHz. If the distance between 6 consecutive nodes is 2.75 mm, find the velocity of ultrasonic waves. (4M)

Or

8. a) Write in detail about the factors affecting architectural acoustics and their remedies. (10M)

   b) Calculate the reverberation time of a hall having volume of 4000 m^3 and total sound absorption of 160 Sabine. Find the additional sound absorption required for an optimum reverberation of 1.5 s (4M)

UNIT-V

9. a) Describe the steps to determine Miller indices and also mention their importance. (10M)

   b) Sketch the following atomic planes in a simple cubic structure (010), (110) and (111) (4M)

Or

10. a) Describe with a suitable diagram the powder method for the determination of crystal structure. (10M)

    b) A beam of X-rays of wavelength 0.071 nm is diffracted by (110) plane of rock salt with the lattice constant of 0.28 nm. Find the glancing angle for the second-order diffraction. (4M)