Code No: R201222 **R20** SET - 1

I B. Tech II Semester Regular/Supplementary Examinations, August- 2022

ENGINEERING PHYSICS

(Com. to AME, Mining, PE, FE)

Time: 3 hours Max. Marks: 70

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

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UNIT-I

1. a) Why Newton's rings are circular in shape? Obtain an expression for the radius of the n^{th} dark ring in the case of Newton's rings. (7M)

   b) State and explain the superposition theorem. A Newton's ring experiment is performed with a source of light having two wavelengths $\lambda_1 = 6 \times 10^{-5}$ cm and $\lambda_2 = 4.5 \times 10^{-5}$ cm. It is found that the n^{th} dark ring due to λ_1 coincides with $(n+1)^{th}$ dark ring due to λ_2. If the radius of curvature of the curved surface is 90cm, find the diameter of the n^{th} dark ring for λ_1. (7M)

Or

2. a) What are wave plates? Derive the expression for thickness of quarter and half wave plates. (7M)

   b) Explain the construction of half wave plate. Calculate the thickness of i) a quarter wave plate and ii) half wave plate. Given that $\mu_e = 1.533$, $\mu_o = 1.544$ and $\lambda = 5000$Å. (7M)

UNIT-II

3. a) What are the three Einstein coefficients? Derive the relations between them. (10M)

   b) How lasing action taking place in a laser? Explain. (4M)

Or

4. a) Explain the terms numerical aperture, critical angle, acceptance angle, acceptance cone and principle of optical fibre. (10M)

   b) A silica optical fibre with core diameter large enough to be considered by ray theory has a core refractive index of 1.5 and cladding refractive index 1.47. Determine 1) The Numerical Aperture 2) The acceptance angle. (4M)

UNIT-III

5. a) Define the terms magnetic susceptibility and permeability. Write notes on Ferro magnetism. (10M)

   b) A paramagnetic material has a magnetic field intensity of 10^4 Am^{-1}. If the susceptibility of the material at room temperature is 3.7×10^{-5}. Calculate the magnetization and flux density in the material. (4M)

Or

6. a) What is electronic polarization? Show that the electronic polarization depends on the volume of the constituent atom. (10M)

   b) Derive Clausius-Mossotti equation. (4M)
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UNIT-IV

7.	a)	What is non-destructive testing? Explain with principle how flaw in a solid can be detected by using pulse echo system.	(10M)
	b)	Discuss applications of ultrsonics in medical field.	(4M)

Or

8.	a)	What are the assumptions made by Sabine to obtain reverberation time? Derive Sabine's formula for reverberation time.	(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)	Explain the terms 'unit cell' and 'lattice parameters'. What is a primitive cell and how does it differ from unit cell?	(7M)
	b)	Shows that the packing factor for simple cubic, body centered and face centered lattices are 52%, 68% and 74% respectively.	(7M)

Or

10.	a)	State Bragg's law and derive Bragg's equation.	(5M)
	b)	Describe with suitable diagram, the powder method for determination of crystal structure.	(6M)
	c)	Calculate the maximum order of diffraction if X-rays of wavelength 0.819Å is incident on a crystal of lattice spacing 0.282 nm.	(3M)