Vidyavardhini's College of Engineering and Technology, Vasai (West)

First Year Engineering

Academic Year: 2024-2025

Assignment No: 02

Subject: BSC102/AP **Date: 11/11/2024**
Max Marks: 30 **Duration: 1 Hr**

CO3: Determine the wavelength of light and refractive index of liquid using the interference phenomenon.
CO4: Articulate the significance of Maxwell's equations.

Q. No.	Questions	Marks	CO	CL
1	(a) Find the thickness of the soap film which appears yellow (wavelength 5896 Å) in reflection when it is illuminated by white light at an angle of 45°. Given refractive index of the film is 1.33. (b) A soap film 4×10^{-5} cm thick is viewed at an angle of 35° to normal. Calculate the wavelength of light in the visible spectrum that will be absent from the reflected light ($\mu = 1.33$).	4	3	3
2	(a) In Newton's Ring experiment, the wavelength of light incident is 5×10^{-5} cm. If the diameter of the 10th dark ring is 0.5 cm, calculate the radius of curvature R. (b) In Newton's ring experiment, the diameter of the 15th ring was found to be 0.590 cm and that of the 5th ring was 0.336 cm. If the radius of the plano-convex lens is 100 cm, compute the wavelength of light used.	4	3	3
3	(a) Find the gradient of a scalar field $\phi = x^2y + 4xy + xy^2z^2$. (b) Calculate $\nabla \cdot \mathbf{B}$ for $B = x^2 + y^2 + z^2$ at a point $(1, -2, 4)$.	4	4	3
4	(a) Find the divergence of a vector field $\mathbf{F} = 4x\hat{i} + 2y\hat{j} + 3z\hat{k}$. (b) Calculate $\nabla \cdot \mathbf{A}$ at a point $(1, -2, 2)$ for $\mathbf{A} = x^2y\hat{i} - 3xyz^2\hat{j} + 2xy\hat{k}$.	4	4	3

5	(a) Find the curl of a vector field $\mathbf{E} = 4x\hat{i} + 2y\hat{j} + 3z\hat{k}$. (b) Calculate $\nabla \times \mathbf{A}$ at a point $(2, -2, 2)$ for $\mathbf{A} = x^2y\hat{i} - 3xyz^2\hat{j} + 2xy\hat{k}$.	**4**	**4**	**3**