



VIT

Vellore Institute of Technology

(Deemed to be University under section 3 of UGC Act, 1956)

SCHOOL OF ADVANCED SCIENCES, DEPARTMENT OF PHYSICS

Subject: PHY1005 – Modern Physics Semester: Winter 2023 - 24

Exam: CAT-II Max. Marks: 50 Time: 90 Minutes Slot: E2+TE2

Faculty names: Sangem Rajesh (VL2023240501984), Premkumar (VL2023240504909)

Instructions:

- Answer all the questions.
- Wherever necessary, draw the diagram.

Q. No.	Question	Marks
1.	Discuss the interference due to white light. Derive the expression for the thickness of a transparent thin film in the double slit experiment when it is introduced in the path of an interfering beam	10
2.	Give the theory of plane transmitting grating. What particular spectra would be absent if the width transparencies and opacities of the grating are equal? Find the maximum number of order available in a grating.	10
3.	(a) Wavelength $5000 \text{ \AA}$ light is reflected at nearly normal incidence from a soap film of refractive index 1.42. What is the least thickness of the film that will appear i) black and ii) bright. (5 Marks) (b) Calculate the minimum number of lines in a grating which will just resolve the sodium lines in the first order spectrum. The wavelengths are 5890 and 5896 $\text{\AA}$. (5 Marks)	10
4.	(a) What is the displacement current. How did Maxwell modified the Ampere's law. (5 Marks) (b) Find out whether the following vector field represents electrostatic field or magnetic field. $\vec{V} = k(y^2\hat{i} + (2xy + z^2)\hat{j} + 2yz\hat{k})$, where k is a constant. (5 Marks)	10
5.	Derive and prove that accelerating electric and magnetic fields travel with speed of light in vacuum.	10
