

Uni. Roll No.....

GLA University, Mathura

Course: B.Tech, I-Year, I - Mid Term (Odd Sem.) Examination, 2013-14

Subject: Engineering Physics - I (AHP-101)

Time: 90 Minutes

M. M: 20

Notes:-

1. Answer **Any Four** questions from **Section A**, **Any Two** from **Section B** and **Any Two** from **Section C**.
2. All questions of a particular section should be answered collectively at one place.
3. Answer should be to-the-point and whatever required supplemented with neat sketches.
4. Any missing data may be assumed suitably giving proper justification.
5. Figures on the right-hand side margin indicate marks.

Section-A

Attempt any four questions.

1 × 4 = 4

- Q.1 What is principle of superposition?
Q.2 Write the conditions for minima and maxima in terms of phase difference.
Q.3 In Newton's ring experiment, a dark spot is obtained at point of contact in reflected light. Explain why?
Q.4 What is Fraunhofer diffraction?
Q.5 Write two differences between interference and diffraction.

Section-B

Attempt any two questions.

3 × 2 = 6

- Q.1 What are coherent sources? Two coherent sources of intensity ratio α^2 interfere. Prove that in the

interference pattern,
$$\frac{I_{\max} + I_{\min}}{I_{\max} - I_{\min}} = \frac{\alpha^2 + 1}{2\alpha}$$

Q.2 A biprism is illuminated by the light (wavelength range 4000 Å to 8000 Å) coming from a slit. On a screen 160 cm away from the slit a colored interference pattern is obtained by coherent sources (formed by biprism) which are at a distance of 1 mm. If a pin hole is made on this screen at a distance of 4.0 mm from the central white fringe, what wavelengths will be absent in the transmitted light?

Q.3 Two plane glass surfaces in contact along one edge separated at the opposite edge by a thin wire. If 40 fringes are observed between these edges in sodium light ($\lambda = 5890 \text{ Å}$) for normal incidence, what is the thickness of the wire? Explain the shape of interference fringes formed between these glass surfaces.

Section-C

Attempt any two questions.

5 × 2 = 10

Q.1 What is meant by interference? Derive an expression for the resultant intensity due to superposition of two waves of amplitudes a_1 and a_2 and having a constant initial phase difference δ . Using it plot intensity distribution curve for these superimposing waves.

Q.2 Explain the formation of Newton's rings in reflected light. Derive an expression for the diameter of dark ring of order n in Newton's ring experiment immersed in a liquid of refractive index μ . In Newton's ring experiment the diameters of 6th and 14th dark rings are 0.500 cm and 0.800 cm respectively. Deduce the diameter of 22th dark ring.

Q.3 Obtain the expressions for the positions of bright and dark fringes formed due to the superposition of light waves coming from two coherent monochromatic sources. Using one of these expressions find the expression for the fringe width. What will happen if monochromatic sources are replaced by white light coherent sources in above case?