

**Model Question Paper**  
**Electromagnetic waves and wave options - Part V**

12th Standard

**Physics**

Reg.No. : 

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I. Answer all the Questions.

II. Use blue pen only.

Time : 02:00:00 Hrs

Total Marks : 100

5 x 1 = 5

**Section-A**

- 1) Which property of light could not be changed when reflection, refraction of light occurs ?  
(a) velocity (b) frequency (c) wavelength (d) all of these
- 2) The condition for getting total internal reflection  
(a) The light ray travels from denser medium to rare medium (b) The angle of incidence is equal to critical angle  
(c) The angle of incidence is greater than the critical angle (d) Both (a) and (c)
- 3) The light waves emitted by two same type monochromatic light sources could not be coherent because the light waves are not having  
(a) same wavelength (b) same amplitude (c) same phase (d) same frequency
- 4) Condition for getting sustained interference is  
(a) The two sources could be coherent (b) Two sources should be very narrow (c) Two sources should be very close to each other (d) All the above
- 5) The colours appeared by interference due to reflection of light rays on thin film depends upon  
(a) The thickness of the film (b) density of the film material (c) The angle of incidence of light (d) Both (a) and (c)

**Section-B**

5 x 3 = 15

- 6) In young's double slit method, the wavelength of light used is  $6 \times 10^{-7}$  m and the screen is at a distance of 2.5 m. If the fringe width is 0.3mm, calculate the distance between the source.
- 7) A parallel beam of monochromatic light is allowed to incident normally on a plane transmission grating having 5000 lines per cm. A second order spectral line is found to be diffracted at an angle of  $30^\circ$ . Find the wavelength of light.
- 8) The refractive index of the medium is  $\sqrt{3}$ . Calculate the angle of refraction if the unpolarized light incident on it at the polarizing angle of medium.
- 9) A 20 cm long tube containing sugar solution of unknown strength. When observed through polarimeter, the plane of polarization is rotated through  $10^\circ$ . Find the strength of sugar solution in gm/cc. Specific rotation of sugar is  $60^\circ$  / dm/unit concentration.
- 10) The polarising angle for water is  $53^\circ 4'$ . Calculate its refractive index.

**Section-C**

5 x 5 = 25

- 11) A monochromatic light of wavelength  $5890 \text{ \AA}$  is incident on a water surface of refractive index 1.33. Find the velocity, frequency and wavelength of light in water.
- 12) In young's experiment a light of frequency  $6 \times 10^{14}$  Hz is used. Distance between the centres of adjacent fringes is 0.75mm. Calculate the distance between the slits, if the screen is 1.5m away.
- 13) A Soap film of refractive index  $4/3$  and of thickness  $1.5 \times 10^{-4}$  cm is illuminated by white light incident at an angle  $60^\circ$ . The reflected light is examined by a spectroscope in which dark band corresponds to a wavelength of  $5000 \text{ \AA}$ . Calculate the order of the dark band.
- 14) In a newton's rings experiment the diameter of the  $20^{\text{th}}$  dark ring was found to be 5.82mm and that of the  $10^{\text{th}}$  ring 3.36mm. If the radius of the plano-convex lens is 1m. Calculate the wavelength of light used.
- 15) A plane transmission grating has 5000 lines/cm. Calculate the angular separation in second order spectrum of red line  $7070 \text{ \AA}$  and blue line  $5000 \text{ \AA}$ .

**Section-D**

5 x 10 = 50

- 16) Derive an expression for bandwidth of interference fringes.
- 17) Using Huygen's principle, verify the laws of reflection.
- 18) Using Huygen's principle, verify the laws of refraction.
- 19) Discuss the theory of plane transmission grating.
- 20) Explain Raman scattering of light.

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