

Roll No. 

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Total No. of Pages : 02

Total No. of Questions : 09

B.Sc. (Non Medical) (2018 Batch) (Sem.-3)

**OPTICS**

Subject Code : BSNM-303-18

M.Code : 76902

Time : 3 Hrs.

Max. Marks : 50

**INSTRUCTIONS TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying ONE marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A****1. Write briefly :**

- a) What is difference between interference by division of wave front and division of amplitude?
- b) What is a Lloyd's single mirror? Give its importance in studying interference.
- c) Give the formulae for determination of wavelength of sodium light and refractive index of a liquid using Newton's rings experiment.
- d) State Huygens principle.
- e) Differentiate between Fraunhofer and Fresnel diffraction.
- f) Define Malus law.
- g) How polarization is achieved by scattering?
- h) Write few advantages of CO<sub>2</sub> laser in comparison to Ruby and He-Ne lasers.
- i) Differentiate between optical and electrical pumping techniques.
- j) Write the requirements of Holography.

**SECTION-B**

2. Give the construction, working, theory and procedure of Fresnel's biprism for determination of wavelength of light.
3. The distances between the slit and biprism and between biprism and the screen are 50cm each. The angle of biprism is  $179^\circ$  and its refractive index is 1.5. If the distance between successive fringes is 0.0135cm, calculate the wavelength of light.
4. By using a neat diagram, explain the Fraunhofer diffraction at double slit to derive the expression for intensity.
5. How would you obtain plane polarized light? Name various techniques and discuss one out of them which is based on double refraction phenomenon.
6. Define Einstein's coefficients and derive a relationship between them.

**SECTION-C**

7. Using the theory of interference fringes for Young's double slit experiment; derive the conditions for position and spacing of bright and dark fringes. 10
8. a) Discuss the Fresnel diffraction pattern at a straight edge and circular aperture. 5  
b) Define unpolarized and polarized light and show their clear representation. - 3  
c) A glass plate is to be used as a polarizer. Find the angle of polarization for it. Also find the angle of refraction. Given refractive index ( $\mu$ ) for glass = 1.54. 2
9. a) Discuss the construction, working mechanism along with energy diagram of He-Ne laser. 5  
b) A He-Ne laser of wavelength  $6328 \text{ \AA}$  has an internal beam of radius 0.23mm. What would be the beam divergence angle? 5

**NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.**