

C.U.SHAH UNIVERSITY

Summer Examination-2018

Subject Name : Optics

Subject Code : 4SC04PHC1

Branch :B.Sc. (Chemistry)

Semester : 4

Date : 05/05/2018

Time :10:30 To 01:30

Marks :70

Instructions:

- (1) Use of Programmable calculator & any other electronic instrument is prohibited.
- (2) Instructions written on main answer book are strictly to be obeyed.
- (3) Draw neat diagrams and figures (if necessary) at right places.
- (4) Assume suitable data if needed.

- Q-1 Attempt the following questions: (14)**
- a) What is Zone plate? 01
 - b) Define interference of light. 01
 - c) Define diffraction of light. 01
 - d) Draw interference and diffraction pattern of light. 01
 - e) How many types of diffraction of light? 01
 - f) What is optical path? 01
 - g) Draw electromagnetic wave nature of light. 01
 - h) State resolving power. 01
 - i) Write uses of microscope. 01
 - j) What is dispersive power? 01
 - k) Write uses of telescope. 01
 - l) Define plane diffraction grating. 01
 - m) State grating element. 01
 - n) Write uses of prism. 01
- Attempt any four questions from Q-2 to Q-8**
- Q-2 Attempt all questions (14)**
- a) Describe construction of Zone plate in detail. 05
 - b) Differentiate between zone plate and convex lens. 05
 - c) An object illuminated by 5000\AA wavelength of light is placed at 60cm from a zone plate and its image (brightest) is obtained at 30cm from the zone plate. Calculate the number of Fresnel zones in a radius of 5cm of the plate. 04
- Q-3 Attempt all questions (14)**
- a) Distinguish between Fresnel and Fraunhofer diffraction. 05
 - b) Explain Huygen's principle of secondary wavelets. 05
 - c) A zone plate has a focal length of 70 cm at a wavelength 6000\AA . What is its focal length at $\lambda = 7000\text{\AA}$. 04
- Q-4 Attempt all questions (14)**
- a) Explain briefly Fermat's principle and deduce law of reflection from it. 07



- b) Explain Fresnel's explanation of the rectilinear propagation of light and deduce $r_n = \sqrt{n}$. 07
- Q-5 Attempt all questions (14)**
- a) Describe the theory of zone plate. Show that a zone plate acts as a converging lens. 07
- b) Distinguish prism spectra and grating spectra. Discuss resolving power of prism. 07
- Q-6 Attempt all questions (14)**
- a) How to determine the wavelength of a spectral line by the transmission grating? Explain. 05
- b) Discuss resolving power of grating. 05
- c) How many orders will be visible if the wavelength of the incident radiation is 5000\AA and the number of lines on the grating is 2620 in one inch? 04
- Q-7 Attempt all questions (14)**
- a) Explain Frounhofer diffraction at double slit by geometry method. 07
- b) Discuss the theory of plane diffraction grating and its conditions. 07
- Q-8 Attempt all questions (14)**
- a) Write short notes on (1) resolving power of telescope and (2) resolving power of microscope. 07
- b) Discuss Rayleigh's criteria for resolution. How can resolution be increase by different ways? 07

