Seat No. _____ Enrollment No._____

C. U. SHAH UNIVERSITY

B. Sc. Semester-IVMay-2015 (Summer) Examination

Subject Name:Optics Code:4SC04PHC1 Date: 26/05/2015

Time: 10:30 to 01:30Maximum Marks: 70

Instructions:
1. Attempt all questions.
2. Make suitable assumption wherever necessary.
3. Figures to the right indicate full marks.
4. Draw figure / Diagram wherever necessary.

Section – I Marks

Q-1 a) Draw interference and diffraction pattern. (01)
b) Write types of diffraction of light. (01)
c) Draw electromagnetic wave nature of light. (01)
d) Define optical path. (01)
e) What is interference of light? (01)
f) What is diffraction of light? (01)
g) Define Zone plate. (01)

Q-2 a) Explain construction of Zone plate in detail. (05)
b) Write comparison between Zone plate and convex lens. (05)
c) A Zone plate has a focal length of 70 cm at a wavelength 6000 Å. What is its focal length at λ = 7000 Å. (04)

OR

Q-2 a) Explain Huygen's principle of secondary wavelets. (05)
b) Give difference between: Fresnel and Fraunhoffer diffraction. (05)
c) An object illuminated by 5000Å 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 Fresnal zones in a radius of 5cm of the plate. (04)

OR

Q-3 a) Explain in detail 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)

OR

Q-3 a) Write Fermat's principle in detail and deduce law of refraction from it. (07)
b) Explain in detail Theory of Zone plate and show that a zone plate acts as a converging lens. (07)

Section – II Marks

Q-4 a) What is grating element? (01)

b) What is dispersive power? (01)

c) Define resolving power. (01)

d) What is plan diffraction grating? (01)

e) Write uses of telescope. (01)

f) Write uses of microscope. (01)

g) Write uses of prism. (01)

Q-5 a) Explain how to determine the wavelength of a spectral line by the transmission grating. (05)

b) Compare the prism spectra and grating spectra. (05)

c) In a plane transmission grating the angle of diffraction for the second order principal maximum for the wavelength 5×10^{-5} cm in 30^0. Calculate the number of lines in 1cm of the grating surface. (04)

OR

Q-5 a) Discuss resolving power of prism. (05)

b) Discuss resolving power of grating. (05)

c) How many orders will be visible if the wavelength of the incident radiation is 5000Å and the number of lines on the grating is 2620 in one inch? (04)

Q-6 a) Discuss in detail Frounhofer diffraction at double slit by geometry method. (07)

b) Explain the theory of plane diffraction grating and its condition. (07)

OR

Q-6 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 resolution can increase by different ways? (07)
