

Enrollment No: \_\_\_\_\_

Exam Seat No: \_\_\_\_\_

# C.U.SHAH UNIVERSITY

## Summer Examination-2017

**Subject Name: Optics****Subject Code: 4SC04PHC1****Branch: B.Sc. (All)****Semester: 4****Date: 24/04/2017****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.
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**Q-1 Attempt the following questions: (14)**

- |    |  |   |
|----|--|---|
| a) | State a difference between transmission and reflection gratings      | 1 |
| b) | Write the characteristics of Corpuscles                              | 1 |
| c) | How is Fresnel's diffraction different from Fraunhofer?              | 1 |
| d) | State Fermat's Principle of least time.                              | 1 |
| e) | Give the definition for Zone Plate                                   | 1 |
| f) | Define in general the term Resolving Power                           | 1 |
| g) | State Huygens Principle  | 1 |
| h) | Under what condition Rayleigh's criterion of resolution is achieved? | 1 |
| i) | Give the condition for Diffraction                                   | 1 |
| j) | Give the definition of Interference                                  | 1 |
| k) | Define Grating element   | 1 |
| l) | Define the term Diffraction  | 1 |
| m) | Write the expression for focal length of a zone plate                | 1 |
| n) | Draw the figures for divergent and convergent wavefronts.            | 1 |

**Attempt any four questions from Q-2 to Q-8**

**Q-2 Attempt all questions (14)**

- |    |   |   |
|----|---|---|
| a) | Describe Huygens theory of propagation of wave front in detail.             | 7 |
| b) | Determine the laws of reflection at plane surface using Fermat's principle. | 7 |

**Q-3 Attempt all questions (14)**

- |    |   |   |
|----|---|---|
| a) | Explain the construction of Zone Plate with suitable figures            | 7 |
| b) | State 5 points of difference between Fresnel and Fraunhofer diffraction | 7 |

**Q-4 Attempt all questions (14)**

- |    |   |   |
|----|---|---|
| a) | Explain in detail Fresnel's theory of rectilinear propagation of light. | 7 |
| b) | Write a note on Action of Zone Plate.                                   | 7 |

**Q-5 Attempt all questions (14)**

- |    |   |   |
|----|---|---|
| a) | Explain the theory of Plane transmission grating  | 7 |
| b) | A zone plate has a focal length of 70cm at a wavelength $6000\text{\AA}$ . What is its focal length at $7000\text{\AA}$ ? | 4 |
| c) | Give the expression for resolving power of a telescope; also mention how can  | 3 |



- you improve the resolving power of a telescope?
- Q-6**      **Attempt all questions**      **(14)**
- a) Give the differences between dispersive and resolving power of a grating.      **7**
  - b) Deduce the expression for resolving power of a microscope      **7**
- Q-7**      **Attempt all questions**      **(14)**
- a) Discuss the method of determining wavelength of a spectral line using transmission grating.      **8**
  - b) Differentiate between Zone plate and convex lens      **6**
- Q-8**      **Attempt all questions**      **(14)**
- a) Explain in detail Rayleigh's Criterion for resolution.      **8**
  - b) A grating has 6000 lines per cm. Find the angular separation of two yellow lines of mercury of wavelengths  $5770\text{\AA}$  and  $5791\text{\AA}$  in the second order      **6**

