**Enrollment No: _____ Exam Seat No:_____**

# C. U. SHAH UNIVERSITY

## Summer Examination-2022

**Subject Name : Waves and Optics**

**Subject Code : 4SC04WAO1** **Branch: B.Sc. (Chemistry, Physics)**

**Semester: 4** **Date: 07/05/2022** **Time: 11:00 To 02:00** **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)** What is superposition of wave? 01
**b)** Define: Polarization. 01
**c)** What are the types of wavefront? 01
**d)** State Huygen's principle. 01
**e)** What are the types of interference? 01
**f)** What is Doppler effect? 01
**g)** What is sound wave? 01
**h)** Explain Monochromatic wave. 01
**i)** Define: Positive zone plate. 01
**j)** What is beats? 01
**k)** What is plane diffraction grating? 01
**l)** What is the area of each half period zone? 01
**m)** Draw the construction of Fresnel diffraction. 01
**n)** Whose angle of deviation is minimum? 01

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

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

**a)** Write a note on polarization by reflection. **07**
**b)** Derive an equation of velocity of sound in a solid material. **07**

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

**a)** Discuss Doppler effect in detail. **07**
**b)** Explain the concept of Lissajous figures. **07**

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

**a)** Describe the construction and theory of zone plate. **07**
**b)** Derive Newton's rings and its formation. Explain the interference due to a wedge shaped film and obtain expression for the fringe width. **07**

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| **Q-5** | | **Attempt all questions** | **(14)** |
| | **a)** | Explain interference by reflected light. | **08** |
| | **b)** | Two narrow and parallel slits 0.1 cm apart are illuminated with a monochromatic light of wavelength 589.3 nm. The interference pattern is observed at a distance of 25 cm from the slits. Calculate the fringe width. | **03** |
| | **c)** | What is the radius of the first zone of a zone plate of focal length 0.2 m for a light of wavelength 5000 Å. | **03** |
| **Q-6** | | **Attempt all questions** | **(14)** |
| | **a)** | Briefly explain the Young's double slit experiment. | **07** |
| | **b)** | Explain the image formation in Lloyd's Mirror. | **07** |
| **Q-7** | | **Attempt all questions** | **(14)** |
| | **a)** | Explain in detail the principle, construction and working of a Fresnel biprism with suitable figure. | **07** |
| | **b)** | Explain the Fraunhofer diffraction and intensity pattern at single slit with proper figure. | **07** |
| **Q-8** | | **Attempt all questions** | **(14)** |
| | **a)** | Explain intensity distribution in diffraction pattern due to a single slit and method of integral calculus. | **08** |
| | **b)** | Discuss missing orders in a double slit diffraction method. | **06** |