# C.U.SHAH UNIVERSITY
## Summer Examination-2016

**Subject Name: Optics and Spectroscopy**

**Subject Code: 4SC05OSC1**                    **Branch: B.Sc(Physics)**

**Semester: 5**          **Date: 27/4/2016**          **Time: 02:30 To 05:30**          **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)** How do straight line fringes occur in Michelson Interferometer?
  **b)** State the formula for bright fringes in Michelson Interferometer.
  **c)** What is Fabry-perot Etalon?
  **d)** State the relation between sharpness of fringes with respect to reflectivity (reflection) in multiple beam interferometer.
  **e)** On which factor does the index of refraction depend?
  **f)** Define: Ordinary beam.
  **g)** Define: Retarder.
  **h)** State the difference between normal Zeeman effect and Anomalous Zeeman effect.
  **i)** Define: Stark effect.
  **j)** Give the effect of magnetic field for L-S coupling.
  **k)** Define: Raman Lines.
  **l)** Give the name of types of rigid rotor.
  **m)** Classify molecule according to Raman Spectroscopy.
  **n)** Which type of molecules do not have a pure rotational spectrum?

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

| | | | |
|---|---|---|---|
| **Q-2** | | **Attempt all questions** | **(14)** |
| | **1** | Explain about the fringes produced in Michelson Interferometer. | **(5)** |
| | **2** | Explain Lummer-Gehreck (L-G) plate with neat and clean diagram. | **(5)** |
| | **3** | Explain only the sequence of successive reflections in multiple beam interferometer (Fabry-Parrot Interferometer) by neat and clean diagram. | **(4)** |
| | | | |
| **Q-3** | | **Attempt all questions** | **(14)** |
| | **1** | Write a note on: Michelson Interferometer. | **(7)** |
| | **2** | Explain the construction and working of Fabry-Parrot Interferometer. State its applications too. | **(7)** |

| **Q-4** | | **Attempt all questions** | **(14)** |
|---|---|---|---|
| | **1** | Explain the polarization by double refraction OR Birefringence with figure. | **(5)** |
| | **2** | Explain the construction of Nicol-prism with necessary diagram. | **(5)** |
| | **3** | Which types of materials are getting used in construction of wave-plates? Why? | **(4)** |

| **Q-5** | | **Attempt all questions** | **(14)** |
|---|---|---|---|
| | **1** | Explain LCD with its neat and clean schematic diagram. Give its applications too. | **(7)** |
| | **2** | Write a note on: Retarder / Wave plate. | **(7)** |

| **Q-6** | | **Attempt all questions** | **(14)** |
|---|---|---|---|
| | **1** | Explain Zeeman effect with diagram needed. | **(7)** |
| | **2** | Explain about the quantum numbers and give their physical interpretation. | **(7)** |

| **Q-7** | | **Attempt all questions** | **(14)** |
|---|---|---|---|
| | **1** | Write a note on: Linear rigid rotor. | **(7)** |
| | **2** | Explain the theory of rotational-vibrational spectra. | **(7)** |

| **Q-8** | | **Attempt all questions** | **(14)** |
|---|---|---|---|
| | **1** | What is non-rigid rotor? Explain. | **(5)** |
| | **2** | Explain about the spherical top molecules. | **(5)** |
| | **3** | State the applications of Raman Effect. | **(4)** |