



**PJ-003-0496003**

Seat No. \_\_\_\_\_

**B. Sc. / M. Sc. (Applied Physics) (Sem. VI)  
(CBCS) Examination**

**August - 2020**

**Experimental Techniques in Physics : Paper - XXII  
(New Course)**

**Faculty Code : 003**

**Subject Code : 0496003**

Time :  $2\frac{1}{2}$  Hours]

[Total Marks : 70

- Instructions :** (1) All questions are compulsory.  
(2) Numbers in the right margin indicate marks.

**1 Attempt any seven short questions : 14**

- (1) Write the conditions for sustained interference of light waves.
- (2) Derive equation for the refractive index of liquid by Newton's ring.
- (3) Describe how a Nicol prism can be used as an analyzer.
- (4) What is LCD ? How polarization is used in LCD ?
- (5) State and explain Mal's law.
- (6) Draw a well labelled diagram of the Raman set up in pre laser era.
- (7) Explain : Spatial quantization.
- (8) What is concept of spinning electron ?
- (9) Explain in short : Lo Surdo's method for effect of electric field on spectral lines.
- (10) What is Raman Effect ?

- 2 (a) Write answers of any **two** : 10
- (1) Describe construction and working of Michelson's Interferometer (M.I). Explain why  $G_2$  phase is known as compensating plate ?
  - (2) Explain the principle of formation of fringes in Fabry Perot interferometer. Deduce an expression for the intensity distribution in fringes for Fabry Perot Interferometer.
  - (3) Explain principle for the formation of Newton's ring and derive the equation for darker and brighter ring.
  - (4) Discuss in detail : Lummer – Gehrcke plate.
- (b) Write answer of any **one** : 4
- (1) (a) Calculate the visibility of the fringes for a reflection of 80% in a multiple beam interferometry.
  - (b) The initial and final readings of a M.I. screw are 10.7347 mm and 10.6903 mm as 150 fringes pass. Calculate the wavelength of light used.
  - (2) Explain the types of fringes observed in Michelson's Interferometer in detail.
- 3 (a) Write answers of any **two** : 10
- (1) Write a detail note on Nicol Prism.
  - (2) Describe theory of production of linearly, elliptically and circularly polarized light.
  - (3) Explain the construction, principle and use of (i) quarter wave plate and (ii) half wave plate.
  - (4) Write on Babinet's compensator.
- (b) Write answer of any **one** : 4
- (1) Write different steps for analysis of polarized light.
  - (2) Explain Huygen's theory of double refraction in uniaxial crystal.

- 4 (a) Write answers of any **two** : **10**
- (1) Explain the quantum numbers associated with the vector model of the model in detail.
  - (2) Write a note on Zeeman effect with Lorentz explanation on the basis of classical electron theory.
  - (3) How Debye explained the normal Zeeman effect ? Derive equation for frequency shift.
  - (4) Explain anomalous Zeeman effect in detail.
- (b) Write answer of any **one** : **4**
- (1) Write a detailed note : Vector Atom Model.
  - (2) Explain the selection rules in conjunction with the vector atom model.
- 5 (a) Write answers of any **two** : **10**
- (1) Write a detailed note : Applications of the Raman Effect in physics.
  - (2) Write a detailed note : Electronic band spectra.
  - (3) Explain theory of the rotation-vibration spectra in detail.
  - (4) Explain the theory of pure rotational spectra in detail.
- (b) Write answer of any **one** : **4**
- (1) What is the importance of Raman Effect ?
  - (2) What is the "Rule of mutual exclusion" in Raman spectrum ? Explain with examples.
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