



**JB-003-0496003**

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

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

**August – 2019**

**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) In Michelson Interferometer, why G2 plate is known as compensating plate?
  - (2) The initial and final readings of a M.I. screw are 10.7347mm and 10.6903mm as 150 fringes pass. Calculate the wavelength of light used?
  - (3) State and Explain Brewster's law.
  - (4) What is LCD? How polarisation is used in LCD?
  - (5) Describe how a Nicol prism can be used as an analyser.
  - (6) What is the selection rule for L?
  - (7) Explain the splitting of sodium D lines transverse and longitudinal to the applied magnetic field with necessary figures.
  - (8) Explain in short: Lo Surdo's method for effect of electric field on spectral lines.
  - (9) Draw a well labelled diagram of the Raman set up in post laser era.
  - (10) How many fundamental modes of vibration a linear molecule having N atoms can have?

- 2 (A) Write answers of Any **Two** : 10
- (1) Explain principle for the formation of Newton's ring and derive the equation for darker and brighter ring.
  - (2) Describe construction and working of Michelson's Interferometer (M.I.) with its important applications.
  - (3) Deduce an expression for the intensity distribution in fringes for Fabry Perot Interferometer.
  - (4) Write a note on Lummer - Gehrcke plate.
- (B) Write answer of Any **One** : 4
- (1) What is Etalon? Write the steps for standardisation of the meter.
  - (2) Discuss the resolving power of Fabry- Perot interferometer.
- 3 (A) Write answers of Any **Two** : 10
- (1) Discuss Nicol prism in detail.
  - (2) Explain Huygen's theory of double refraction in uniaxial crystal.
  - (3) Write different steps for analysis of polarised light.
  - (4) Write a detailed note on Babinet's compensator.
- (B) Write answer of Any **One** : 4
- (1) What is meant by double refraction? Explain double refraction phenomena in uniaxial crystal.
  - (2) Explain the construction, principle and use of :  
(i) quarter wave plate and (ii) half wave plate.
- 4 (A) Write answers of Any **Two** : 10
- (1) Discuss and explain: Anomalous Zeeman effect.
  - (2) Derive an expression for frequency shift according to Debye's explanation of the Normal Zeeman effect.
  - (3) Write a detailed note: Vector atom model.
  - (4) Write a detailed note: Paschen-Back effect.

- (B) Write answer of Any **One** : 4
- (1) Explain normal Zeeman Effect on the basis of classical electron theory.
  - (2) Explain Stark effect with necessary diagram.
- 5 (A) Write answers of Any **Two** : 10
- (1) Explain the theory of pure rotational spectra of a diatomic molecule treating it as a rigid rotator. Derive the expression for energies.
  - (2) Discuss in detail with suitable example: In what way the IR and Raman spectra are helpful in determining the structure of a molecule
  - (3) Prove that the frequency of a hot band is approximately equal to that of the fundamental band.
  - (4) Explain the spectrum of Harmonic Oscillator. What is zero point energy?
- (B) Write answer of Any **One** : 4
- (1) How the non rigid rotator energy level expression explains the observed microwave spectrum? Draw the necessary diagram.
  - (2) What is the "Rule of mutual exclusion" in Raman spectrum? Explain with examples.
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