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MCR-003-001503 Seat No. _____

B. Sc. (Sem. V) (CBCS) Examination

May / June - 2018

Physics : Paper - 503

(Optics & Spectroscopy)

Faculty Code : 003

Subject Code : 001503

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

Instructions : (1) Give answers of all the questions in given answer sheet.

(2) All questions are compulsory.

(3) Symbols have their usual meaning.

(4) Figure on the right hand side indicates full marks.

1 Answer the following : (Each of one mark) **20**

(1) In Michelson interferometer, circular fringes are obtained when mirror M_1 and M_2 are exactly _____ to each other.

(2) What is the visibility V, in multiple beam interference, when the reflectivity $R = 1$?

(3) Cotton Mouten effect is called _____ type of artificial double refraction effect.

(4) What is the thickness of a thin transparent sheet if obtained with Michelson interferometer?

(5) What is the equation for the visibility of fringes in the case of Michelson interferometer?

(6) $\Delta\mu$ is positive for positive crystal. (True/False)

(7) If the intensity becomes zero twice in on full rotation of a polarizer, then the incident light is _____ polarised.

(8) SEM is an acronym for _____.

(9) Which optical devices are used to change the state of polarization of an incident wave?

(10) Who did put forward the hypothesis of electron spin in 1925?

(11) Mention the values the Orbital magnetic q. no. m_l can have.

(12) Paschen back effect follows $l-s$ coupling. (True/False)

(13) What is the change in the frequency in normal Zeeman effect?

(14) What is responsible for Stark effect?

(15) Which type of molecular spectra falls in far infrared or microwave region?

(16) Which one are the most complex molecular spectra?

(17) Which scattering is responsible for Raman effect?

(18) In Raman spectra if $v_s < v_i, \Delta v$ becomes positive, results in _____ lines.

(19) Intensity of Raman lines is roughly _____. of incident radiation.

(20) In normal Zeeman effect, which component is missing, when observed in parallel direction?

2 (A) Attempt any **three** in brief : **6**

(1) What is the principle of Michelson interferometer?

(2) What is isotropic material?

(3) Mention types of polarized light.

(4) What is LCD?

(5) State the principle of TEM.

(6) Explain polarization by double refraction.

(B) Attempt any **three** : **9**

(1) Discuss the circular fringes obtained in M.I.

(2) What is Lummer and Gehreke plate?

(3) Explain the phase difference arises between e-rays and o-rays.

(4) Explain Pockels effect.

(5) Advantages and disadvantages of AFM.

(6) Mention applications of TEM.

(C) Attempt any **two** : **10**

(1) Explain Multiple Beam interference in detail.

(2) Discuss Febry-Perot Etalon in detail.

(3) Write a note on calcite crystal.

(4) Discuss wave plates in detail.

(5) Explain in detail SEM.

3 (A) Attempt any **three** in brief : **6**

(1) Define the principal quantum number.

(2) What is concept of 'spinning electron'?

(3) What is the molecular spectroscopy?

(4) Explain stokes and anti-stokes lines?

(5) Explain the 'band' in molecular spectra.

(6) Mention any one difference between Raman spectra and IR spectra.

(B) Attempt any **three** : **9**

(1) Explain Space quantization.

(2) What is total magnetic Quantum no.?

(3) Explain Stark effect.

(4) Explain Electronic band spectra.

(5) State the theory of rotational-vibration spectra.

(6) Application of Raman spectra.

(C) Attempt any **two** : **10**

(1) What is Normal Zeeman effect? Explain classical interpretation of it.

(2) Explain vector atom model and Anomalous Zeeman effect.

(3) Explain Paschen-Back effect in detail.

(4) Explain the theory of pure rotational spectra.

(5) Explain the experimental set up of Raman effect.
