PC-8693/MH

CS/2057
PHYSICAL CHEMISTRY -III
(Common for B.Sc., B.Sc. Biotech.)
Semester-VI

Time Allowed : 3 Hours] **[Maximum Marks : 26**

Note :- The candidates are required to attempt two questions each from Section A and B carrying 04 marks each, and the entire Section C consisting of 5 short answer type questions carrying 2 marks each. Attempt five questions in all.

SECTION-A

I. (a) Derive an expression for pure rotational Raman spectra. (2)

(b) What are stokes, antistokes and Rayleigh lines ? Which will be more intense and why ? (2)

II. (a) What do you mean by parity, spin multiplicity and ; Term Symbol ? (2)

(b) Discuss the selection rules for the electronic spectra to take place ? (2)

III. (a) "NaCl and KCl have similar structures but their X-ray diffraction pattern are remarkably different". Discuss. (2)

(b) Explain the terms "proper rotation" and "improper rotation" as used in Crystalography. (2)

(a) Derive an expression for Bragg's equation for X-ray diffraction by crystals. (2)

(b) The reflection from silver crystal was found to occur at $\theta = 22.20°$ by using X-ray of wavelength 154 pm and starting from the glancing angle. Calculate the spacing between the planes of silver atoms ($\sin 22.20° = 0.3778$). (2)

SECTION-B

V. (a) Differentiate between thermochemical reaction and photochemical reaction. (2)

(b) What are the factors responsible for low Quantum yield ? (2)

VI. (a) Discuss Stark-Einstein's law of Photo-chemical equivalence. (2)

(b) Calculate the value of an Einstein of energy for the radiation of wavelength 4200 Å. (2)

VII. (a) Draw neat and labelled Jablonski diagram and discuss various processes taking place in it. (2)

(b) Acertain system absorbs 3×10^{18} quanta of light per second. If 1.506×10^{18} no. of molecules was found to have reacted per sec. Calculate Quantum yield for the process. (2)

VIII. (a) Write a note on "LASERS". (2)

(b) Explain photo sensitization, chemiluminescence and photo inhibitors. Give examples. (2)

SECTION-C
(Compulsory Question)

IX. (a) Which of the following molecules will show Raman . spectra and why ?

CO_2, H_2, HCl, CH_4.

(b) Find the term symbol for H_2^+ ion.

(c) Define and calculate Miller indices for the intercepts made by a plane (2a, 2b, 3c).

(d) Discuss Photochemistry of colours.

(e) Briefly describe the powder method of X-ray : diffraction studies by crystals. (5x2=10)