DF-1535
M. Sc. (Sem. III) Examination
March/April – 2016
Physical Chemistry : Paper - II
(Spectroscopy)

Time : 3 Hours] [Total Marks : 70

Instructions :
(1) Fill up strictly the details of your answer books.
Name of the Examination :
M. SC. (SEM. III)
Name of the Subject :
PHYSICAL CHEMISTRY : PAPER - II
Subject Code No. : 1535
Seat No. : Section No. (1, 2,....) : Nil

(2) Attempt all the questions.
(3) Figures to the right - indicate full marks.
(4) Answer of all questions to be written in same answer books.

1. Attempt: (any three) 18

(a) Describe the effect of hydrogen bonding on the positions of IR absorption frequency of a component. Give example. Why water cannot be used as a solvent in IR spectroscopy?
(b) Distinguish between FTIR and Raman spectroscopy.
(c) Draw the schematic diagram of Raman spectrometer and discuss briefly the function of each part of the spectrometer.
(d) Discuss the basic principle of IR spectroscopy. Derive the fundamental equation of IR spectroscopy. Give an account on the selection rule of this spectroscopy.

2. Attempt: (any three) 18

(a) Explain with example the term “splitting of signal”? What are the factors affecting J-values?
(b) Describe with a suitable diagram the working of NMR spectrometer.
(c) What are the advantages and disadvantages of an FT-NMR technique over the conventional NMR technique?
(d) Explain the terms: Coupling constant, spin-spin splitting and shielding mechanism.
3. **Attempt: (any three)**

(a) Explain importance of isotopic peak, base peak and resolution of mass spectra.
(b) Name different methods of ion production. Discuss any two methods.
(c) Describe principal and working of time of flight mass analyzer.
(d) How do you distinguish primary and secondary alcohols by mass spectra?

4. **Attempt: (any four)**

(a) Write note on rotational Raman spectra of linear molecules.
(b) Explain quantum theory in explaining Raman effect.
(c) Write short notes on: Chemical shift and shift reagents.
(d) Explain the spin-lattice relaxation mechanism in NMR spectroscopy.
(e) Give fragmentation pattern of methyl butyrate.