



S-3485

M. Sc. (Sem. I) (Self Fin.)
(IC, PC & EC) Examination

March / April – 2011

Chemistry : Paper - IV

(Instrumental & Chemical Analysis)

Time : 3 Hours]

[Total Marks : 70

Instructions :

(1)

नीचे दशांशक निशानीवाणी विगतो उत्तरवही पर अवश्य लखवी.
Fillup strictly the details of signs on your answer book.

Name of the Examination :
M.Sc. (Sem. 1) (Self Fin.) (IC, PC & EC)

Name of the Subject :
CHEMISTRY - 4

Subject Code No. : 3 4 8 5 Section No. (1, 2,.....) : NIL

Seat No. :

Student's Signature

- (2) All question are compulsory
(3) Figures to **right** indicate full marks of that question
(4) Draw neat diagrams where necessary

1 Answer any **three**.

18

- (a) (1) Describe $\pi \rightarrow \pi^*$ and $n \rightarrow \pi^*$ electronic transitions.
- (2) Explain the terms :- hypsochromic shift.
bathochromic shift.
- (b) (1) Explain the effect of polar solvents in uv absorption spectra of phenol.
- (2) State the selection rules for uv absorption and limitations of Beer - Lambert Law.
- (c) (1) With neat diagram describe in brief the functions of each component of double beam IR spectrophotometer.
- (2) How do you distinguish primary secondary and tertiary amines on the basis of IR spectra ?
- (d) (i) Describe the sampling methods for solids in IR spectroscopy.
- (ii) Explain :- fundamental vibrations and overtones.
- (e) (i) Name the detectors used in IR spectrophotometer and explain working principle any one.

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[Contd...

- (ii) A solution of a compound in ethanol shows an absorbance 0.52 at 286 nm in a cell with a 1.0 cm path length. Its molar absorptivity in ethanol at that wavelength is 12600 mol/L. What is the concentration of compound.

2 Answer any **three**: 18

- (a) (i) Explain spin-spin coupling in NMR with suitable example.
(ii) Name the reference material used in H¹NMR. Give its advantages.
- (b) (i) Explain magnetic anisotropy in benzene.
(ii) Explain chemical shift with its unit and scale. Mention factors affecting chemical shift.
- (c) (i) Discuss in brief principle of mass spectrometry.
(ii) What major fragments are formed in mass spectra of anisole.
- (d) (i) Discuss chemical ionization method.
(ii) explain the terms : base peak ,parent peak and M+1 peak.
- (e) (i) Explain the terms : Larmor frequency and precessional orbit.
(ii) What peaks in mass spectra can distinguish between :
- (i)
$$\begin{array}{c} CH_3 \\ | \\ CH_3 - CH - CH_2 - CH_2 - CH_3 \end{array}$$
 and
- (ii)
$$\begin{array}{c} CH_3 - CH_2 - CH - CH_2 - CH_3 \\ | \\ CH_3 \end{array}$$

3 Answer any **three** : 18

- (a) (i) Discuss the criteria for selecting solid stationary phase in GC.
(ii) Explain the terms :- Resolution and Retention time.
- (b) (i) Give van dempter plot equation and explain the significance of various terms.
(ii) Discuss the kinetic variables affecting zone broadening.
- (c) (i) Describe different types of columns used in GC.
(ii) Discuss the factors affecting the efficiency of the chromatographic column.
- (d) (i) Explain any one sample injection system in GC .
(ii) Describe the working of ECD detector.

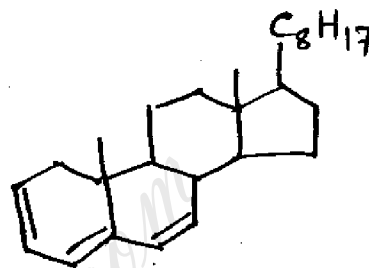
- (e) (i) Describe interfacing of GC-MS.
(ii) Explain the terms :- selectivity factor exclusion limit.

4 Answer any four :

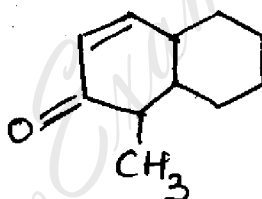
16

- (a) (i) Calculate the λ_{\max} in uv region for the following compounds applying wood ward fisser rules :-

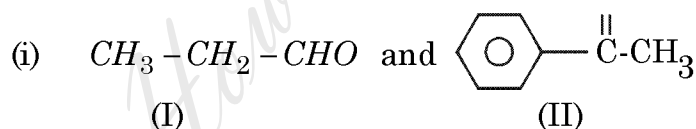
(I)



(II)



- (b) Distinguish between each pair with its appropriate vibrations in IR spectra :



- (ii) Toluene and p-xylene

- (c) Identify the compound from H¹NMR spectral data :-

Molecular formula $C_4H_8O_2$

$\delta = 1.21$ (3H) triplet

$\delta = 1.93$ (3H) singlet

$\delta = 4.03$ (2H) quartet

- (d) What is Mc lafferty rearrangement ? Explain with suitable example.
- (e) Write brief note on :
(i) plate theory of chromatography
(ii) Electrophoresis