



S-2604

M. Sc. (Sem. I) Examination
March / April – 2011
Chemistry : Paper - IV
(Instrumental & Chemical Analysis)

Time : 3 Hours]

[Total Marks : 70

Instructions :

(1)

नीचे दशांशके निशानीवाणी विगतो उत्तरवही पर अवश्य लपवी. Fillup strictly the details of signs on your answer book.	Seat No. :
Name of the Examination :	<input type="text"/>
<input type="text" value="M. Sc. (Sem. 1)"/>	<input type="text"/>
Name of the Subject :	<input type="text"/>
<input type="text" value="Chemistry : Paper - 4"/>	<input type="text"/>
Subject Code No. : <input type="text" value="2"/> <input type="text" value="6"/> <input type="text" value="0"/> <input type="text" value="4"/>	<input type="text" value="Student's Signature"/>
Section No. (1, 2,.....) : <input type="text" value="Nil"/>	

- (2) All questions are **compulsory**.
(3) Figures to **right** indicate full marks of that question.
(4) Draw neat diagram or figures where necessary.

- 1 (a) Answer any **three** : 18
- (i) Explain $\pi \rightarrow \pi^*$ and $n \rightarrow \pi^*$ electronic transitions giving examples.
(ii) Explain the effect of polar solvents in UV absorption.
- (b) (i) State and explain Lambert Beer's Law. What are its limitations?
(ii) Why the increase in polarity of a compound shifts $\pi \rightarrow \pi^*$ bands to longer wavelength but $n \rightarrow \pi^*$ and $n \rightarrow \sigma^*$ bands to shorter wavelength?
- (c) (i) Explain the factors which influence the vibrational frequency of a particular functional group. Give examples.
(ii) Why does chloroform give prominent bands in the main region of IR spectrum while carbon tetrachloride does not?
- (d) (i) How can you distinguish the type of H-bonding involved in a compound by IR spectrum?
(ii) Describe sampling methods in IR spectroscopy.

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[Contd...

- (e) (i) Which of the following two compounds will have higher λ_{\max} and why?
 $\text{C}_6\text{H}_5\text{-CH=CH-C}_6\text{H}_5$ and $\text{C}_6\text{H}_5\text{-CH}_2\text{-CH=CH-CH}_2\text{-C}_6\text{H}_5$
I II
- (ii) Explain the terms : Inductive, mesomeric and conjugation effects in IR spectroscopy.

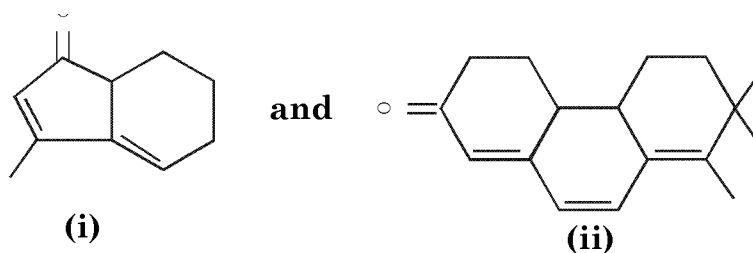
- 2 (a) Answer any **three** : 18
- (i) Explain the basic principle of separation in TLC.
(ii) In what way TLC is superior to other chromatographic techniques?
- (b) (i) Describe three methods of preparation of TLC plate.
(ii) Explain five applications of TLC.
- (c) (i) Mention five widely used stationary phase with its common trade name and applications in GC.
(ii) Explain the working principle of FID detector used in GC.
- (d) (i) Describe direct method of spot detection in a thin layer chromatography.
(ii) Describe SCOT and WCOT columns used in gas chromatography. Which is better? Why?
- (e) (i) Describe the method for injection of samples in GC.
(ii) Write notes on coating materials in TLC and mobile phase in GC.

- 3 Answer any **three** : 18
- (a) (i) Distinguish between accuracy and precision with suitable data of an example.
(ii) Explain how do you perform Q test?
- (b) (i) What are systematic and random errors? Explain with examples.
(ii) Explain significance of confidence limit with illustration.
- (c) (i) When do you perform t-test? What information is obtained?
(ii) State difference between mean and median with data of analysis.
- (d) (i) What is the use of least square method? How do you perform it to obtain data points?
(ii) Explain factors that can minimize errors.
- (e) (i) Describe the properties of normal distribution curve.
(ii) Explain the terms : methodical error and propagation error.

4 Answer any **four** :

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(a) Calculate λ_{\max} for the given structures :



(b) Distinguish between each pair in IR spectra :

(i) Cis and trans butene

(ii) Alkyl nitrile and benzonitrile

(c) (i) Discuss the nature of interaction forces on stationary phase for solute.

(ii) Explain elutropic series.

(d) (i) Draw a neat diagram of instrumentation of GC. Mention function of each components.

(ii) Write note on temperature programming.

(e) In an experiment, the percentage of copper in a sample had the following results :

$$\bar{x} = 15.30$$

$$S = 0.10$$

$$n = 4$$

(i) Calculate the 90% confidence interval of the mean if $t = 2.353$.

(ii) Calculate 99% confidence interval of the mean if $t = 5.841$.
