



**MBZ-003-028201**

Seat No. \_\_\_\_\_

**P. G. D. S. A. I. T. (P. I.) (Sem. II) (CBCS) Examination**

**April / May - 2018**

**PGDI-201 : Advanced Spectroscopic &  
Thermal Methods of Analysis for Pharma &  
Chemical Products**

**Faculty Code : 003**

**Subject Code : 028201**

Time :  $2\frac{1}{2}$  Hours]

[Total Marks : 70

- Instructions :** (1) All the questions carry equal Marks.  
(2) Attempt five questions in all.

1 Answer the following questions : (any **seven**) **14**

- (1) What information can be obtained from IR Spectrometry ?
- (2) Explain cleavage of C-C bond in Carbonyl compounds.
- (3) Define : Overtone and Fermi-resonance.
- (4) Explain the below terms :
  - (a) Metastable ion
  - (b) Absorption
  - (c) Homolytic cleavage
  - (d) Bathochromic shift
- (5) Explain the principle of DSC.
- (6) What is thermal analysis ? Name the types of thermal analysis.
- (7) Name the methods for multiple heating rates in TGA.
- (8) Draw the schematic diagram of double beam UV-Spectrophotometer and enlist their components.
- (9) Explain : Briagg's rule.
- (10) What are the applications of X-Ray Diffraction ?

- 2** Answer the following questions : (any **three**) **14**
- (1) Explain Hetrolytic  $\alpha$ -cleavage to a heteroatom with a suitable example.
  - (2) Explain the functioning of
    - (a) Analyser
    - (b) Detector
    - (c) Recorder in mass spectrometer.
  - (3) Explain the TGA curve with an example.
  - (4) Give a brief account on the temperature characteristics for qualitative assessment of relative thermal stability of polymers.

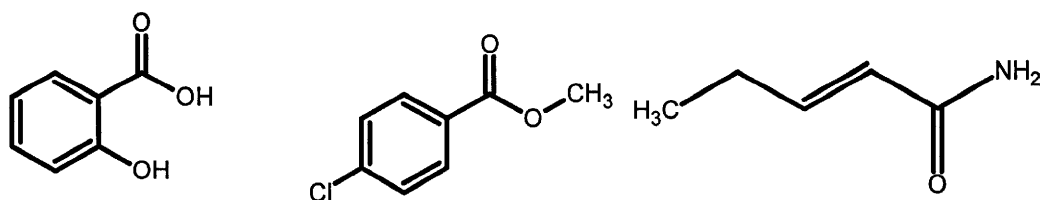
- 3** Answer the following questions : **14**
- (1) Explain McLafferty rearrangement with suitable example.
  - (2) Describe the methods for multiple heating rate in TGA briefly.

**OR**

- 3**
- (1) Discuss X-Ray diffraction methods in detail.
  - (2) Discuss the effect of solvent in UV absorption spectra.

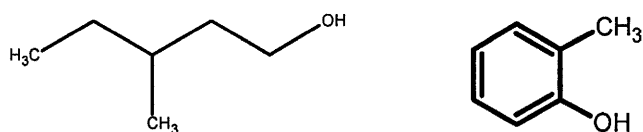
- 4** Answer the following questions : (any **two**) **14**
- (1) Indicate the types of protons and their multiplicity in NMR spectra of following compound :
    - (a)  $\text{ClCH}_2\text{CH}_2\text{CH}_2\text{Cl}$
    - (b)  $\text{CH}_3\text{CH}_2\text{COOCH}(\text{CH}_3)_2$
    - (c) 4 - Chlorotoluene
  - (2) Discuss the difference between X-ray absorption, X-ray fluorescence and X-ray diffraction.

- (3) Write the Characteristics IR frequency for the followings :



5 Answer the following questions : (any two) 14

- (1) Calculate the expected <sup>13</sup>C chemical shifts of the following compounds :



- (2) (a) Give the difference between TGA, DSC and DTA.  
(b) Explain in short : types of thermo-gravimetric.
- (3) Name the fragmentation modes and explain them briefly.

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