

Roll No.

CHE–553

Natural Products, Heterocyclic and Spectroscopy

M. Sc. CHEMISTRY (MSCCH–12/13/16)

Second Year, Examination, 2017

Time : 3 Hours

Max. Marks : 60

Note : This paper is of **sixty (60)** marks containing **three (03)** sections A, B and C. Learners are required to attempt the questions contained in these sections according to the detailed instructions given therein.

Section–A

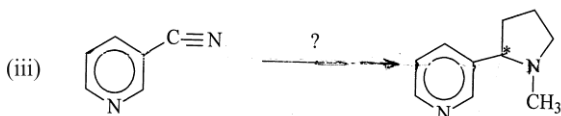
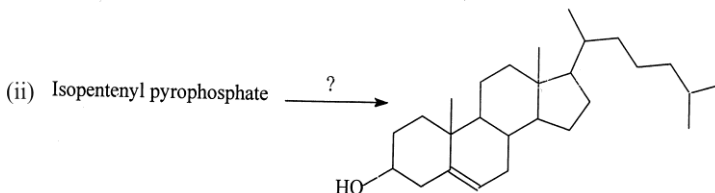
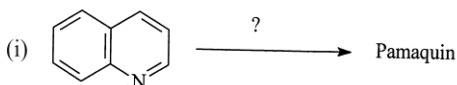
(Long Answer Type Questions)

Note : Section ‘A’ contains four (04) long answer type questions of fifteen (15) marks each. Learners are required to answer *two* (02) questions only.

1. Discuss the synthesis of reserpine.
2. Describe in brief on the following :
 - (i) Metabolism of proteins
 - (ii) Synthesis of isoquinoline and its uses
 - (iii) Optical behaviour of proteins
3. Write short notes on the following NMR experiments/terms used for structural elucidation :
 - (i) COSY test
 - (ii) INADEQUATE

- (iii) DEPT
- (iv) Double resonance
- (v) Lanthanide shift in NMR

4. Complete the following reactions :



Section-B

(Short Answer Type Questions)

Note : Section 'B' contains eight (08) short answer type questions of five (05) marks each. Learners are required to answer *four* (04) questions only.

- What are Prostaglandins ? How are they classified ? Discuss with structures.
- Discuss Kreb's cycle.
- What are alkaloids ? Discuss their classifications and uses.
- Discuss magnetic behaviour of carbon. How this element is useful for structural elucidation by using NMR experiments ? Explain in brief some of the experiments.

5. How does enzyme differ from catalyst ? Discuss the mode of action of enzymes.
6. Write short notes on the following :
 - (i) F^{19} NMR
 - (ii) Rotenoids
7. Discuss synthesis and uses of the following :
 - (i) Isoquinoline
 - (ii) Piperidine
8. What are vitamins ? Describe the mode of actions of various fat soluble vitamins along with their structures.

Section-C

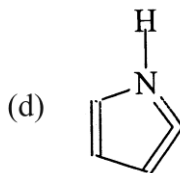
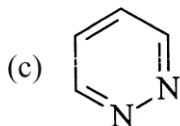
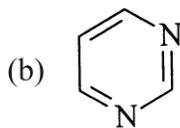
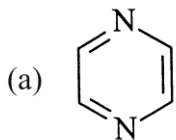
(Objective Type Questions)

Note : Section 'C' contains ten (10) objective type questions of one (01) mark each. All the questions of this section are compulsory.

Choose correct options to answer :

1. Enzymes the having slightly different molecular structures but performing same activities are :
 - (a) Isoenzymes
 - (b) Holoenzymes
 - (c) Apoenzymes
 - (d) Co-enzymes
2. Which one of these is unsaturated fatty acid ?
 - (a) Linolenic acid
 - (b) Myristic acid
 - (c) Palmitic acid
 - (d) Lauric acid

3. The 3D structures of protein can be elucidated :
- (a) Nuclear magnetic resonance
 - (b) Electrophoresis
 - (c) X-ray crystallography
 - (d) (a) and (c)
4. When aniline is treated with glycerol in the presence of sulfuric acid and nitrobenzene we get quinoline. This reaction is called :
- (a) Fischer synthesis
 - (b) Skraup's synthesis
 - (c) Corey-House reaction
 - (d) Hoffmann synthesis
5. Porphin consists of :
- (a) 3 pyrrole rings
 - (b) 4 pyrrole rings
 - (c) 5 pyrrole rings
 - (d) 6 pyrrole rings
6. The structure of pyrazine is :



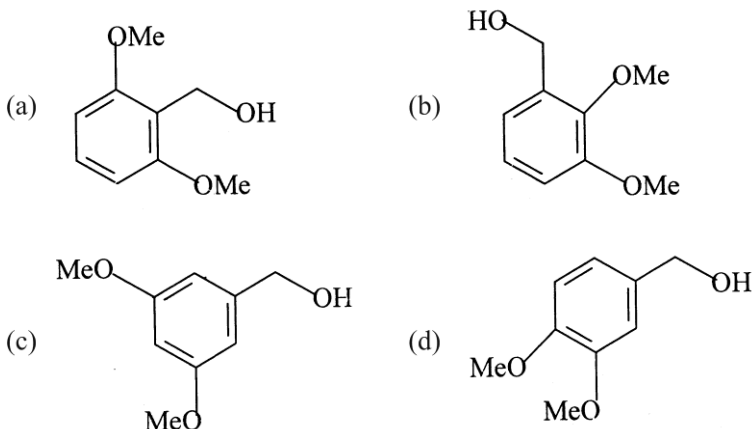
7. In the broad band decoupled ^{13}C NMR spectrum, the number of signals appears for (I) catechol, (II) resorcinol and (III) hydroquinone, respectively are :

(a) 6, 4 and 2
 (b) 6, 6 and 4
 (c) 3, 4 and 4
 (d) 3, 4 and 2

8. In the H^1 NMR spectrum, an organic compound exhibited the following spectral data :

δ 7.2 (1H, dd, $J = 8$ and 1.5 Hz), 6.8 (1 H, d, $J = 1.5$ Hz), 6.7 (1 H, d, $J = 8$ Hz), 4.9 (2H, s), 3.9 (3H,s), 3.85 (3H, s) 3.5 (1H, br, s exchangeable with D_2O).

The compound among the choice given below is :



9. By adding SDS (sodium dodecyl sulphate) during the electrophoresis of proteins, it is possible to :

(a) Determine a protein's isoelectric point

- (b) Determine an enzyme's specific activity
 - (c) Determine the amino acid composition of protein
 - (d) Preserve a protein's native structure and biological activity
10. Which of the following is used as a local anesthetic ?
- (a) Quinine
 - (b) Cocaine
 - (c) Morphine
 - (d) Reserpine