

CHE-504**Spectroscopy, Computers and
Mathematics/Biology**

M. Sc. CHEMISTRY (MSCCH-12/13/16/17)

First Year, Examination, 2018

Time : 3 Hours**Max. Marks : 80**

Note : This paper is of **eighty (80)** 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 nineteen (19) marks each. Learners are required to answer *two* (02) questions only.

1. (a) Discuss the pentose phosphate pathway and comment on its significance. 6
- (b) What are the selection rules for harmonic and anharmonic oscillations ? 6
- (c) Differentiate the ideal gas equation $PV = nRT$ with respect to T. 7
2. Write in brief the following :
 - (a) Woodward's rules for diene absorption in UV spectra. 5

- (b) Woodward's rules for $\alpha - \beta$ unsaturated ketones in UV spectra 5
- (c) Auxochrome 4
- (d) Acid hydrolysis of protein 5
3. How are carbohydrates classified ? Give an account of the structure and functions of polysaccharides and describe citric and cycle. 19
4. (a) Explain with examples the use of UV-visible spectrophotometry in quantitative estimations. 10
- (b) Explain the following : 3 each
- (i) Chromophores
- (ii) Bathochromic shifts
- (iii) Hypochromic shift

Section-B

(Short Answer Type Questions)

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

1. Compare Prokaryotic and Eukaryotic cell. Describe intracellular organelles and their functions.
2. What is the origin of NMR spectrum and what are the basic components of an NMR spectrometer.
3. The mass spectrum of an unknown compound shows a M^+ ion of m/z 128 :
 - (a) How many formulas are possible if this compound is a hydrocarbon ?

- (b) How many formulae are possible if this compound is oxygen containing ? Also indicate the unsaturation number for each formulae.
4. Explain the functioning of *two* input and output devices.
 5. Calculate the distance between the two points P (x_1 y_1) and (x_2 y_2).
 6. Draw and explain ^1H NMR spectrum of :
 - (a) 1, 1-dibromoethane
 - (b) 1, 3-dichloropropane
 7. How are computers classified ? What are the differences between various types of computers ?
 8. Give an account of Lipoproteins and their biological functions.

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 the correct alternative :

1. Starch converts into maltose and glucose with the help of the following enzymes :
 - (a) Maltose
 - (b) Sucrose
 - (c) Amylase
 - (d) Invertase

2. Power house of the cell is :
- (a) Mitochondria
 - (b) Nucleous
 - (c) Lysosomes
 - (d) Ribosomes
3. Glycogenolysis means :
- (a) breakdown of glycogen to glucose
 - (b) formation of glycogen from glucose
 - (c) formation of pyruvic acid from glucose
 - (d) None of the above
4. Energy is stored in the cell in the form of :
- (a) ADP
 - (b) ATP
 - (c) DNA
 - (d) RNA
5. $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ is the equation of :
- (a) Hyperbola
 - (b) Circle
 - (c) Straight line
 - (d) None of the above
6. Purines are :
- (a) 9-membered two ring compound
 - (b) 6-membered two ring compound
 - (c) 11-membered two ring compound
 - (d) None of the above

7. If $F(x) = a^x$ ($x \in \mathbb{R}$), ($a > 0$), then :
- (a) $F'(x) = a^x \log a$
 - (b) $F'(x) = a \log a$
 - (c) $F'(x) = a \log a^x$
 - (d) None of the above
8. Which of the following is the internal memory of the computer ?
- (a) CPU register
 - (b) Cache
 - (c) Main memory
 - (d) All of the above
9. Which is not spectroscopy ?
- (a) UV-visible
 - (b) IR
 - (c) NMR
 - (d) Mass
10. Cholesterol is synthesized by :
- (a) Liver
 - (b) Spleen
 - (c) Kidney
 - (d) Bone marrow

