

**0781****M. Sc. (Previous) EXAMINATION, 2022****CHEMISTRY****Paper Fifth****[(a) Mathematics/Biology and****(b) Computer for Chemists]***Time : Three Hours ] [ Maximum Marks : 50*

$$\left\{ \begin{array}{l} \text{(a) Maths / Bio. : 20} \\ \text{(b) Computer : 30} \end{array} \right.$$

**Note :** Attempt questions from all Sections as directed.

**Inst. :** The candidates are required to answer only in serial order. If there are many parts of a question, answer them in continuation.

P. T. O.

**[(a) Mathematics for Bio-Students]****(Optional)****Section—A****(Short Answer Type Questions)**

**Note :** All parts of Q. No. 1 are compulsory. Each part carries 1 mark.

1. (A) Define vector and scalar products.
- (B) Find the number of rows and columns in the given matrix :
 
$$[1 \quad 2 \quad 3 \quad 4]$$
- (C) Find the differential coefficient of the given function w. r. t.  $x : x^5$
- (D) Find the value of  ${}^6P_3$ .
- (E) Find the value of  ${}^{20}C_{15}$ .
- (F) Evaluate :

$$\int x^8 dx$$

**Section—B****(Long Answer Type Questions)**

**Note :** Attempt any *two* questions. Each question carries 3 marks.

2. Find the volume of the parallelepiped whose edges are represented by the vectors :

$$a = i - 2j + 3k$$

$$b = 2i + j - 6k$$

$$c = i + 5j + 2k$$

3. If:

$$A = \begin{bmatrix} 1 & 0 \\ 2 & -1 \end{bmatrix}$$

$$B = \begin{bmatrix} 3 & 7 \\ 4 & 8 \end{bmatrix}$$

and

$$C = \begin{bmatrix} -1 & 1 \\ 0 & 0 \end{bmatrix},$$

then find :

- (i)  $7A$   
 (ii)  $-3B$   
 (iii)  $2C$

P. T. O.

4. Find the differential coefficient of the given

w. r. t.  $x$  :

$$5x^4 + 3x^3 + 2x$$

5. Show that  $\sin x (1 + \cos x)$  is maximum when

$$x = \frac{\pi}{3}.$$

**Section—C****(Long Answer Type Questions)**

**Note :** Attempt any *two* questions. Each question carries 4 marks.

6. If  ${}^{20}P_r = 6840$ , find  $r$ .

7. Evaluate the given integral :

$$\int (x^3 + x + 5) dx$$

8. Define order and degree of a differential equation and also find out order and degree of a given differential equation :

$$\left[ 1 + \left( \frac{dy}{dx} \right)^2 \right]^{3/2} = \frac{d^2y}{dx^2}$$

9. If :

$$A = \begin{bmatrix} 2 & 3 & 4 \\ 1 & 2 & 3 \\ -1 & 1 & 2 \end{bmatrix}$$

$$B = \begin{bmatrix} 1 & 3 & 0 \\ -1 & 2 & 1 \\ 0 & 0 & 2 \end{bmatrix},$$

then find AB and BA.

(a) [Biology for Maths Students]

(Optional)

Section—A

(Short Answer Type Questions)

Note : All questions are compulsory. Each question carries 1 mark.

1. (A) What is meant by mutation ?
- (B) What is deoxysugar ?
- (C) Define genetic code.
- (D) What is  $\beta$ -oxidation ?
- (E) Write a short note on Gluconeogenesis.
- (F) What is meant by oxygen revolution ?

**Section—B****(Long Answer Type Questions)**

**Note :** Attempt any *two* questions. Each question carries 3 marks.

2. Explain base pairing via hydrogen bonds in nucleic acids.
3. List essential fatty acids with their structure.
4. Write a note on biological membrane.
5. What is blood group substance ?

**Section—C****(Long Answer Type Questions)**

**Note :** Attempt any *two* questions. Each question carries 4 marks.

6. Differentiate between primary and secondary structure of proteins.

7. Give an overview of amino acids hydrolysis from derivatives of glycolysis and Kreb's cycle.
8. Give rise the structure of prokaryotic and eukaryotic cells and their functions by the comparison of plant and animal cells.
9. Give an account of  $\beta$ -oxidation of fatty acids.

**[(b) Computer for All Students]**

**(Compulsory)**

**Section—A****(Short Answer Type Questions)**

**Note :** All questions are compulsory. Each question carries  $1\frac{1}{2}$  marks.

1. (A) Define characteristics of computer.

- (B) Difference between multiuser and multi-tasking operating system.
- (C) What do you understand by Desktop Publishing Software ?
- (D) Difference between Machine language and Assembly language.
- (E) What is FoxPro software and how is it useful in chemical engineering ?
- (F) Explain the following terms :
- (i) While loop
  - (ii) Basic language
  - (iii) If-else statement
- (G) What is tuple and attribute in database ?
- (H) What is data representation code in computer ?

P. T. O.

## Section—B

## (Long Answer Type Questions)

Note : Attempt any two questions. Each question carries  $4\frac{1}{2}$  marks.

2. What is control statement in C-language ? Define it. <https://www.csjmuonline.com>
3. What is flowchart ? Define its various symbols. Draw flowchart diagram for check input no. is prime or not ?
4. What is operator ? Define any four operators using in C-language with example.
5. Explain the following terms :
  - (i) UNIX O. S. and MS-DOS O. S.
  - (ii) MS-PowerPoint and MS-Excel
  - (iii) Primary Memory and Secondary Memory

## Section—C

## (Long Answer Type Questions)

**Note :** Attempt any *two* questions. Each question carries  $4\frac{1}{2}$  marks.

6. What is DOS ? Define any *three* internal and *three* external commands with syntax.
7. What is MS-Word Software ? How is it useful in computer system ?
8. (i) What is the use of LOTUS software in chemical engineering ?  
(ii) Write code for evaluation of kinetic energy.
9. What are termination statement and iteration statement ? Give *one-one* example of both statements in C-language or Basic language.

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