

M.Sc. (Previous) Due Examination, 2020

CHEMISTRY

Paper - V (A) (CHE-405)

(Mathematics for Chemists)

Time Allowed : Two Hours

Maximum Marks : 15

- Note:** (i) No supplementary answer-book will be given to any candidate. Hence the candidates should write the answer precisely in the main answer-book only.
- (ii) All the parts of one question should be answered at one place in the answer book. One complete question should not be answered at different places in the answer book.
- (iii) Attempt three questions in all. All questions carry equal marks.

1. (a) If $\vec{a} = 2\hat{i} + \hat{j} + 3\hat{k}$ and $\vec{b} = 3\hat{i} + 5\hat{j} + 2\hat{k}$ then find $\vec{a} \cdot \vec{b}$ 2½

(b) Find adjoint of the following matrix 2½

$$A = \begin{vmatrix} 3 & 4 & 5 \\ 2 & 3 & 4 \\ 1 & 3 & 6 \end{vmatrix}$$

2. (a) If $A = \begin{vmatrix} 2 & 0 \\ 1 & 7 \end{vmatrix}$ and $I = \begin{vmatrix} 1 & 0 \\ 0 & 1 \end{vmatrix}$ are two matrices such that $A^2 = 9I + mI$, then find the value of m . 2½

(b) Find the eigenvalues of the following matrix 2½

(1)

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3 (a) If $y = 2x^3 - x^4$, then find $\frac{dy}{dx}$. 2%

(b) If $y = \frac{(x-2)}{(x+1)}$, then find $\frac{dy}{dx}$. 2%

4 (a) Examine for continuity at $x = 0$ of the following function

$$f(x) = \begin{cases} x - |x| & ; x \neq 0 \\ 1 & ; x = 0 \end{cases}$$

(b) Prove that $x^3 - 12x^2 + 45x$ has a maximum value at $x = 3$ and minimum value at $x = 5$. 2%

5 (a) Find the integral. 2%

$$\int (1+x)(1+2x) dx$$

(b) Find the integral: 2%

$$\int (3x^2 - 6x^{-5} + 2x^3) dx$$

6 (a) How many 2 digit numbers can be formed from the digits 1, 2, 3, 4, 5 if the digits can be repeated? 2%

(b) A group consists of 4 girls and 7 boys. In how many ways can a team of 5 members be selected if the team has at least one boy and one girl? 2%

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