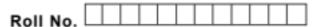


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Total No. of Pages : 02

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M.Sc. (Chemistry) (Campus) (2015 to 2017) (Sem.-1) MATHEMATICS Subject Code : CHL-405M M.Code : 51207

Time : 3 Hrs.

Max. Marks : 70

INSTRUCTIONS TO CANDIDATES :

- 1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
- SECTION-B contains SIX questions carrying FIVE marks each and students have to attempt ALL questions.
- SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Answer briefly :

- Let u = 2i j + k and w = i + 2k are two vectors' find the cross product v × w and dot product u.w.
- 2. Find the gradient of scalar point function $\phi_1(x, y, z) = x^2yz$ at the point (1, -1, 2)

3. Find X and Y if
$$X + Y = \begin{bmatrix} 1 & 3 \\ 2 & -4 \end{bmatrix}$$
 and $X - Y = \begin{bmatrix} 10 & -3 \\ 5 & 4 \end{bmatrix}$.

- 4. Define a Hermitian matrix.
- 5. Find $\frac{dy}{dx}$ where $y = 2 \cos \sqrt{x}$.
- 6. Evaluate the integral $\int (x^5 + 1)^7 x^4 dx$.
- 7. Solve the differential equation $\frac{dy}{dx} = (1+x^2)(y-1)$.
- 8. Write down the differential equation of a harmonic oscillator.
- 9. Find the probability of outcome 10 from two throws of a dice.
- In how many ways a committee consisting of 3 men and 2 men can be chosen from 7 men and 5 women?

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SECTION-B

- If i + j + k, 2i + 5j, 3i + 2j 3k and i 6j k are the position vectors of points A, B, C and D respectively, then find the angle between AB and CD.
- 12. Solve the following system of equations using matrix method.

2x - 3y + 4z = 8, y - 3z = -7, x + 2y + 2z = 11

- 13. Find local maximum and minimum values of the function $f(x) = 3x^4 + 4x^3 12x^2 + 12$.
- 14. Find the general solution of the following differential equation :

 $(x^{2} + y^{2} + x) dx + 2xydy = 0$

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15. Fit least square straight line to the following data points :

16. Find the product of AB where A = $\begin{bmatrix} 1 & 0 & 1 \\ 2 & 4 & 2 \\ 10 & 1 & 3 \end{bmatrix}$ and B = $\begin{bmatrix} 2 & 0 & -1 \\ 0 & 1 & 2 \\ 1 & 2 & 3 \end{bmatrix}$

 Solve the Huckel Molecular – orbital problem for the allyl radical CH₂CHCH₂ in terms of the Huckel parameters α and β:

 $(\alpha - E) c_1 + \beta c_2 = 0$ $\beta c_1 + (\alpha - E) c_2 + \beta c_3 = 0$

$$\beta c_2 + (\alpha - E)c_3 = 0$$

- 18. Find the Fourier series for $f(x) = x + x^2$, $-\pi \le x \le \pi$.
- 19. Evaluate the integral $\int \frac{dx}{(x+1)^2(x-2)}$ by resolving into partial fractions.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.

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