

BC- 301 (Computer Oriented) Mathematics-II

Note: Candidate are required to attempt two questions each from section A and B and the entire section C.

Section A

Q1. Bring to row reduced echelon form and hence find the rank of the following matrix

$$A = \begin{bmatrix} 0 & 0 & 1 & 3 & 1 & 3 \\ 2 & 0 & 4 & 2 & 0 & 4 \\ 1 & 0 & 3 & 0 & 0 & -1 \\ 1 & 0 & 1 & 0 & 0 & -1 \end{bmatrix}.$$

Q2. Use Gauss Jordan method to compute the solution the following system of linear equation:

$$x_1 - 3x_2 + 2x_3 + x_4 = 5$$

$$2x_1 - 5x_2 + 3x_3 + 2x_4 = 9$$

$$3x_1 + x_2 + 2x_3 + 4x_4 = 6$$

$$x_1 + 3x_2 - 2x_3 + 3x_4 = 1$$

Q3. The median and mode of the following wage distribution of 230 employees are known to be Rs. 3350 and Rs. 3400 respectively. Find the values of a , b and c and draw histogram of resulting distribution:

Wage(In thousands)	0-1	1-2	2-3	3-4	4-5	5-6	6-7
No.of Employees	4	16	a	b	c	6	4

Q4. Compute the first four moments of the following distribution about the mean and hence find β_1 and β_2

x	0	1	2	3	4	5	6	7	8
f	1	8	28	56	70	56	28	8	1

Section B

Q1. Using Lagrange's method of multipliers, find the maximum and minimum distances of the points (3, 4, 12) from the sphere $x^2 + y^2 + z^2 = 1$.

Q2. If z is a function of x and y , where $x = e^u + e^{-v}$ and $y = e^{-u} - e^v$, then show that

$$\frac{\partial z}{\partial u} - \frac{\partial z}{\partial v} = x \frac{\partial z}{\partial x} - y \frac{\partial z}{\partial y}.$$

Q3. Evaluate $\int \frac{2x^2 - x + 4}{x^3 + 4x} dx$.

Q4. Use Trapezoidal and Simpson1/3rd rule to calculate $\int_0^1 \frac{1}{1+x} dx$ taking 8 intervals.

Compare the evaluated results with exact solutions.

Section C

Q1. Define symmetric and skew-symmetric matrix with examples.

Q2. Compute the determinant $D = \begin{vmatrix} 1 & -2 & 3 \\ 2 & -1 & 3 \\ 1 & 1 & -3 \end{vmatrix}$.

Q3. Write down two properties of matrix addition.

Q4. Prepare frequency table for the following data set

{11, 20, 41, 21, 15, 17, 17, 18, 13, 21, 15, 19, 14, 13, 11, 10, 21, 14, 15, 21, 11}.

Q5. Define geometric and harmonic mean.

Q6. Find the derivative of $\sqrt{\sin \sqrt{1+x^2}}$.

Q7. Compute the $\frac{dy}{dx}$ when $x = a(\theta - \sin \theta)$ and $y = a(1 - \cos \theta)$.

Q8. Use integration by parts to compute the integral $\int x \sin x \, dx$

Q9. Find the integral $\int \frac{x}{\sqrt{4+x^2}} \, dx$.

Q10. State the Simpson's 3/8 rule.

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