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**BCA (Sem. – 4<sup>th</sup>)**  
**MATHEMATICS - II**  
**Computer Oriented Methods**  
**SUBJECT CODE : BC – 301 (Batch 2k3 Onwards)**  
**Paper ID : [B0227]**

Time : 03 Hours

Maximum Marks : 60

**Instruction to Candidates:**

- 1) Section - A is **Compulsory**.
- 2) Attempt any **Four** questions from Section - B.

**Section - A****Q1)****(10 × 2 = 20)**

- a) Define symmetric and skew-symmetric matrix with examples.

b) Compute adjoint of the matrix  $A = \begin{bmatrix} 3 & -1 & 1 \\ 2 & 3 & 1 \\ 3 & 1 & -2 \end{bmatrix}$ .

- c) Write down two properties of matrix multiplication.

- d) Prepare frequency table for the following data set :

{1, 2, 4, 2, 5, 7, 7, 8, 3, 2, 5, 9, 4, 3, 1, 10, 2, 4, 5, 2, 6, 1}

- e) Define geometric and harmonic mean.

- f) Find the derivative of  $\sqrt{x \sin x}$ .

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

- h) Use integration by parts to compute the integral  $\int x e^x dx$ .

- i) Find the integral  $\int \frac{1}{\sqrt{x^2 - a^2}} dx$ .

- j) State the Simpson's 3/8 rule.

**Section – B****(4 × 10 = 40)**

- Q2)** Bring to row reduced echelon form and hence find the rank of the following matrix.

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

**Q3)** Use Gauss elimination method to compute the solution the following system :

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

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

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

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

**Q4)** Calculate the mean and standard deviation for the following table giving the age distribution of 542 members.

Age (in years) :	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80	80 - 90
No. of members :	3	61	132	153	140	51	2

**Q5)** Find the second, third and fourth central moments of the frequency distribution given below. Hence find measure of skewness and measure of kurtosis.

Class Limits :	Frequency
100.0-114.9	5
115.0-119.9	15
120.0-124.9	20
125.0-129.9	35
130.0-134.9	10
135.0-139.9	10
140.0-144.9	5.

**Q6)** If  $z$  is a function of  $x$  and  $y$ , where  $x = e^u + e^{-v}$  and  $y = e^{-u} - e^v$ , then show

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

**Q7)** Use Trapezoidal and Simpson  $1/3^{\text{rd}}$  rule to calculate  $\int_0^3 (2x - x^2) dx$  taking 6 intervals. Compare the evaluated results with exact solutions.

