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Total No. of Pages: 03

Total No. of Questions: 07

B.Sc.(IT) (2015 & Onward) / BCA (2011 & Onwards) (Sem.– 2)

MATHEMATICS – II

M Code: 10051

Subject Code: BSIT/BSBC-202

Paper ID: [B1114]

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SIX questions carrying TEN marks each and students has to attempt any FOUR questions.

SECTION A

1. a) If $A = \begin{pmatrix} -1 \\ 2 \\ 3 \end{pmatrix}$ and $B = (-2 \ -1 \ -4)$, then verify that $(AB)^T = B^T A^T$, where T stands for transpose.

- b) Find for the value of x for which the matrix $\begin{pmatrix} 1 & -2 & 3 \\ 1 & 2 & 1 \\ x & 2 & -3 \end{pmatrix}$ is a singular matrix.

- c) Find the rank of the matrix $\begin{pmatrix} 2 & 3 & 4 & -1 \\ 5 & 2 & 0 & -1 \\ -4 & 5 & 12 & -1 \end{pmatrix}$

- d) The mean of 200 items was 50. Later on it was found that two items were misread as 92 and 8 instead of 192 and 88. Find out the correct mean.

- e) Differentiate $\sin x^\circ$ with respect to x .

- f) Evaluate $\int e^x \left(\frac{1}{x} - \frac{1}{x^2} \right) dx$.

- g) Obtain the value of the integral $\int_0^{\pi/2} \frac{1}{1 + \cos \theta} d\theta$.

- h) Calculate mean deviation about mean from the following data:

$x:$ 3 9 17 23 27

$f:$ 8 10 12 9 5

- i) State Simpson's $1/3^{\text{rd}}$ and $3/8^{\text{th}}$ rule to evaluate $\int_a^b f(x) dx$.

- j) If $\log_5 (x^2 + x) + \log_5 (x + 1) = 2$, then find the value of x .

SECTION B

2. a) Use Cramer's rule to solve the system of equations:

$$x - 4y - z = 11; 2x - 5y + 2z = 39; -3x + 2y + z = 1 \quad (5)$$

b) Find the inverse of the matrix $A = \begin{pmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{pmatrix}$ (5)

3. a) If $A = \begin{pmatrix} 3 & 2 & 0 \\ 1 & 4 & 0 \\ 0 & 0 & 5 \end{pmatrix}$ then show that $A^2 - 7A + 10I_3 = 0$ (5)

- b) How much will Rs. 20,000 amount to, in 3 years at compound interest if the rates for successive years are 5%, 8% and 10% per year. (5)

4. a) If $x\sqrt{1+y} + y\sqrt{1+x} = 0$, then show that $\frac{dy}{dx} = -\frac{1}{(1+x)^2}$ (5)

- b) Show that of all the rectangles of given area, the square has the smallest perimeter.

5. a) If $x = \frac{1-t^2}{1+t^2}$ and $y = \frac{2t}{1+t^2}$ then find the value of $\frac{dy}{dx}$ at $t = 1$. (5)

b) Evaluate the integral $\int \frac{x^3}{(x-1)(x-2)} dx$ (5)

6. a) Evaluate $\int_0^5 \frac{1}{4x+5} dx$ by using Simpson's 1/3 rule by dividing the range into 10 equal parts, and compare the result. (5)

- b) Differentiate the following w.r.t. x

i) $\frac{e^x + e^{-x}}{e^x - e^{-x}}$ ii) $\log(x + \sqrt{a^2 + x^2})$ (5)

7. a) Goals scored by two teams A and B in a football season were as under:

Number of Goals scored	Number of matches	
In a match	A	B
0	27	17
1	9	9
2	8	6
3	5	5
4	4	3

Test, which team is more consistent in scoring goals. (6)

- b) Find the value of median of the following frequency distribution:

x :	1	2	3	4	5	6	7	8	9	(4)
f :	8	10	11	16	20	25	15	9	6	