

Roll No.

Total No. of Pages: 03

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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<sup>rd</sup> and 3/8<sup>th</sup> 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 In a match	Number of matches	
	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	