Roll No. ☐☐☐☐☐☐☐☐☐☐   Total No. of Pages : 02

Total No. of Questions : 07

B.Sc. (IT) (2013 & 2014)   (Sem.–1)
BASIC MATHEMATICS – I
Subject Code : BS-103
Paper ID : [B0402]

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. **Write briefly :**

   (a) Define empty set. Also give an example.

   (b) If A = {3, 5, 7, 9, 11}, B = {7, 9, 11, 13}, C = {11, 13, 15}, then find

   (i) A $\cup$ B (ii) C–B.

   (c) Using Binomial theorem expand $\left(2x + \dfrac{1}{x^2}\right)^5$.

   (d) If $X + Y = \begin{bmatrix} -5 & 2 \\ -8 & 9 \end{bmatrix}$ and $X - Y = \begin{bmatrix} 7 & 3 \\ 9 & 6 \end{bmatrix}$, find matrices of X and Y.

   (e) If $A = \begin{bmatrix} 3 & -2 \\ 4 & -2 \end{bmatrix}$ and $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, find k so that $A^2 = kA - 2I$.

   (f) How many terms are there in the expression of $\left\{(2x + 3y)^2\right\}^8$?

   (g) Find the sum of all three digit numbers, which are divisible by 7.

   (h) What is the sum of the series: $- 64, - 66, - 68, ... , - 100$.

   (i) Find the mean of the following distribution

Class	$0-7$	$7-14$	$14-21$	$21-28$	$28-35$	$35-42$	$42-49$
Frequency	19	25	36	72	51	43	28

   (j) Find the value of sin 15°.

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SECTION-B

2. (a) Prove that $\dfrac{\sin x + \sin 3x}{\cos x + \cos 3x} = \tan 2x$.

    (b) If sec $x = \dfrac{13}{5}$, x lies in fourth quadrant, find the value of other five trigonometric functions.

3. (a) Find the middle terms in the expression of $\left(3x - \dfrac{x^3}{6}\right)^7$.

    (b) Find the coefficient of x^7 in $\left(3x + \dfrac{1}{2x}\right)^{11}$.

4. (a) Find x and y from the following equations:

    $$2\begin{bmatrix} x & 5 \\ 7 & y-3 \end{bmatrix} + \begin{bmatrix} 3 & -4 \\ 1 & 2 \end{bmatrix} = \begin{bmatrix} 7 & 6 \\ 15 & 14 \end{bmatrix}.$$

    (b) Prove that $\begin{vmatrix} b+c & a-b & a \\ c+a & b-c & b \\ a+b & c-a & c \end{vmatrix} = 3abc - a^3 - b^3 - c^3.$

5. (a) Find the minors and cofactors of the determinant $\begin{vmatrix} 2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{vmatrix}.$

    (b) Calculate the mean-, mode and median for the following :

Mid – Value	15	20	25	30	35	40	45	50	55
Frequency	2	22	19	14	3	4	6	1	1

6. (a) Solve $1 + 6 + 11 + 16 + ... + x = 148$.

    (b) Find the sum of $0.4 + 0.44 + 0.444 + 0.4444 + ...$ to n terms.

7. (a) Write the types of sets with example.

    (b) If A = {$x : x$ is a natural number}, B = {$x : x$ is an even natural number}, C = {$x : x$ is an odd natural number} and D = {$x : x$ is a prime number}.

    Find (i) A $\cup$ B (ii) C $\cup$ B (iii) A $\cap$ B $\cap$ D.