Exam. Code : 105701
Subject Code : 8117

**B.Sc. Information Technology 1st Sem. (Old sylb. 2016)**

**BASIC MATHEMATICS AND STATISTICS**

**Paper—III**

Time Allowed—3 Hours] [Maximum Marks—75

**Note :—** Attempt any **FIVE** questions. All questions carry equal marks.

1. (a) Let A = [1, 3, 4, 5, 6], B = [2, 3, 4, 5, 6, 7] C = [4, 5, 6, 7, 8] find $A \cup (B \cap C)$.

   (b) Define :

   (i) Define set

   (ii) Symmetric difference of set

   (iii) Complement of set, each with the help of example.

2. (a) If A and B are two set such that n(A) = 17, n(B) = 23 and $n(A \cup B) = 38$ find $n(A \cap B)$.

   (b) Let A = [1, 2, 3, 5], B = [4, 6, 9]. Define a relation R from A to B by

   R = [(x, y) = difference between x and y is odd $x \in A, y \in b$]

   Find domain and range of R.

3. (a) Define :

   (i) Inverse relation

   (ii) Anti-symmetric relation

   (iii) Transitive relation.

   (b) Find $\frac{dy}{dx}$ if $y = \frac{e^x}{1 + \tan x}$.

4. (a) If $\sin^2 y + \cos xy = \pi$ find $\frac{dy}{dx}$.

   (b) If $y = (\log x)^{\cos x}$ find $\frac{dy}{dx}$.

5. (a) Evaluate $\int x \cos x \, dx$.

   (b) Evaluate $\int \frac{x}{(x+1)(x+2)} dx$.

6. (a) Solve by matrix method :

$$x + 2y + z = 7$$
$$x + 3z = 11$$
$$2x - 3y = 11.$$

   (b) Evaluate without expanding :

$$\begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix}.$$

7. (a) Find $P(A \cup B)$ if $2P(A) = P(B) = \frac{5}{13}$ and $P(A/B) = \frac{2}{5}$.

(b) A bag contains 4 red and 4 black balls, another bag contains 2 read and 6 black balls, one of two bags is selected at random and a ball is drawn from the bag which is found to be red find the probability that the ball is drawn from the first bag.

8. (a) Find the eigen value of matrix :

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

(b) Verify Caylay Hamilton theorem :

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