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Total No. of Pages : 02

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BCA / DCA / B.Sc.(IT) (Sem.-1)

MATHEMATICS – I

Subject Code : BSIT/BSBC-103

M.Code : 10045

Date of Examination : 14-01-2023

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

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

SECTION-A

1. Write briefly:

a) Explain with illustration :

i) Symmetric Matrix

ii) Skew symmetric Matrix

iii) Transpose of a Matrix

iv) Unitary Matrix

b) Let  $A = \{1, 2, 3, 4, 5, 6\}$   $B = \{2, 4, 6, 8\}$  then show that  $A \setminus B \cap B \setminus A$ .

c) Define Recurrence relation with example.

d) Solve  $S(k) - 2S(k-1) + S(k-2) = 0$  where  $S(0) = 1, S(1) = 2$ .

e) If  $p$  stands for the statement, "I do not like coffee" and  $q$  stands for the statement, "I like tea". Then what does  $\sim p \cap q$  stands for ?

f) Show that maximum number of edges in a single graph with  $n$  vertices is  $\frac{n(n-1)}{2}$ .

g) Find all the partitions for set  $A = \{a, b, c\}$ .

h) Explain the concept of propositions over a universe.

i) Find  $X$  and  $Y$  if  $X + Y =$   $\begin{bmatrix} 7 & 2 \\ 2 & 6 \end{bmatrix}$

$X - Y =$   $\begin{bmatrix} 3 & \\ 0 & \end{bmatrix}$

j) Define sample and multigraph with an example.

SECTION – B

2. a) A college awarded 38 medals in Foot-ball, 15 in basket ball and 20 medals in cricket. If there medals went to a total of 58 men and only three men got medals in all the three sports, how many received medal in exactly two of the three sports?

b) Let  $A = \{x : x \text{ is multiple of } 2, x \in \mathbb{N}\}$

$B = \{x : x \text{ is multiple of } 5, x \in \mathbb{N}\}$

$C = \{x : x \text{ is multiple of } 10, x \in \mathbb{N}\}$

Then find  $A \cap (B \cup C)$ ,  $(A \cap B) \cap C$ ,  $A \cap (B \cap C)$ .

3. a) Test the validity of :

Unless we control population, all advances resulting from planning will be nullified but this must not be allowed to happen. Therefore we must somehow control population.

b) Prove that  $[(p \rightarrow q) \times (q \rightarrow r)] \rightarrow (p \rightarrow r)$  is a tautology,

4. a) If  $A = \begin{bmatrix} 0 & 1 & 2 \\ 2 & 3 & 4 \\ 4 & 5 & 6 \end{bmatrix}$  and  $k_1 = 1, k_2 = 2$  then verify that  $(k_1 + k_2) A = k_1 A + k_2 A$ .

b) If  $A = \begin{bmatrix} 4 & 0 & 0 \\ 0 & 1 & 0 \\ a & b & 1 \end{bmatrix}$  then determine  $A^2$

5. Prove that an undirected graph possesses a Eulerian circuit if and only if it is connected and has its vertices of even degree.
6. a) Prove that associativity holds over conjunction by using propositional calculus.  
b) Solve  $S(k) - 7s(k-1) + 10S(k-2) = 6 + 3k$  with  $S(0) = 1$  and  $S(1) = 2$ .
7. Use the principle of mathematical Induction to prove that

$$1.3 + 2.4 + 3.5 + \dots + n(n+2) = \frac{n(n+1)(2n+7)}{6} \text{ for any natural number } n.$$

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet willlead to UMC against the Student.