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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 :

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 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 \ B ⌘B \ 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 $\sim p \wedge q$ stands for ?

f) Show that maximum number of edges in a single graph with h 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 = $\begin{matrix} 7 & -2 \\ 2 & 6 \end{matrix}$

X – Y = $\begin{matrix} 3 & 0 \\ 2 & 3 \end{matrix}$ |

j) Define sample and multigraph with an example.

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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 = $\{x : x \text{ is multiple of } 2, x \in N\}$

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

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

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

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 $[(p \downarrow q) \times (q \downarrow r)] \Rightarrow (p \downarrow r)$ 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 $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ a & b & -1 \end{bmatrix}$ 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 $S(k) - 7s(k-1) + 10\,S(k-2) = 6 + 8k$ with $S(0) = 1$ and $S(1) = 2$.

7. Use the principle of mathematical Induction to prove that

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

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