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BCA / DCA / B.Sc.(IT) (Sem.–1)

# MATHEMATICS

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 $X + Y = \begin{bmatrix} 7 & -2 \\ 2 & 6 \end{bmatrix}$

$X - Y = \begin{bmatrix} 3 & 0 \\ \text{[illegible]}2 & 3 \end{bmatrix}$

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

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

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

   Then find A ∪ (B ∩ C), (A ∩ B) ∩ C, A ∪ (B ∪ 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 ($k$) – 7$s$ ($k$ – 1) + 10 S ($k$ – 2) = 6 + 8 $k$ 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 $n$.

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