Reg. No. | | | | | | | | | | | |

B.M.S COLLEGE FOR WOMEN, AUTONOMOUS

BENGALURU – 560004

SEMESTER END EXAMINATION – JANUARY/FEBRUARY 2023

B.C.A./B.Voc.IT Mathematics- I Semester

DISCRETE STRUCTURES

(NEP Scheme 2021-22 onwards F+R)

Course Code: BCA1DSCT01 **QP Code: 1030**

Duration: 2 ½ Hours **Max. Marks: 60**

I. Answer any SIX Questions: **(6x2=12)**

1. Write the following in Roaster form:
   a. $A = \{x: x\ is\ a\ positive\ even\ integer\ less\ than\ 10\}$.
2. If $A = \{1, 2\}$, B $= \{2,3\}\ and\ C = \{3,4\}$ then find $AX(B \cup C)$.
3. p: A square is a quadrilateral.
4. q: All the sides in a square are equal. Find $\sim p \wedge \sim q$.
5. Construct truth table for $\sim p \vee q$.
6. How many 3 digit numbers can be formed by using the digits 1 to 9 if no digit is repeated?
7. Let A $= \{2,4,6\}$, B=$\{4,6,8\}$ R $\subseteq$ AxB given by $R = \{(2,4), (2,8), (4,4), (6,6), (6,8)\}$ represent the relation by digraph.
8. If A= $\begin{bmatrix} 11 & 6 \\ 12 & -9 \end{bmatrix}$ *and* B=$\begin{bmatrix} -16 & -9 \\ -18 & 16 \end{bmatrix}$ Find 2A X B.
9. Write the characteristic equation of the matrix $\begin{bmatrix} 3 & 1 & 4 \\ 0 & 2 & 0 \\ 0 & 0 & 5 \end{bmatrix}$

II. Answer any SIX questions: **(6x8=48)**

1. a) If U=$\{0,1,2,3,4,5,6,7,8,9\}$ is the universal set, A=$\{2,3,4,8\}$ and B=$\{1,3,4\}$. Verify $(A \cup B)' = A' \cap B'$.
   b) Let $f: R \to R$ is defined by f(x) $= 2x + 5$, prove that f is one - one and onto.

   (5+3)

2. a) Show that the relation is "congruent" to is an equivalence relation on a set T of triangles.
   b) Calculate f(7) for the recursive sequence f(x)=2f(x-2)+3 which has seed value of f(3)=11

   (5+3)

3. a) Show that $\sim(p \to q)$ and $\sim p \wedge q$ are logically Equivalent.
   b) Write the converse, inverse and contrapositive of the following propositions given,
   p:$\sqrt{2}$ is an irrational number
   q: Then number cannot be written in the form of $\frac{m}{n}$ **(5+3)**

4. a) Show that $\sim(p \wedge q) \wedge (q \rightarrow p)$ a tautology.

b) If the compound proposition $p \wedge q \rightarrow r$ is given to be false, find the truth value of p, q & r. **(5+3)**

5.a) If $n_{C_r=56}$, $n_{P_r=336}$, find n and r.

b) From 8 gentlemen and 4 ladies a committee of 5 is to be formed. In how many ways can this be done so as to include at least 1 lady. **(5+3)**

6. a) Explain binary search with an Example.

b) Find the coefficient of x 5 in $(x + 3)^8$ **(5+3)**

7. a) Find the inverse of A = $\begin{bmatrix} 2 & 0 & 1 \\ 5 & 1 & 0 \\ 0 & 1 & 3 \end{bmatrix}$

b) If A = $\begin{bmatrix} 9 & 8 \\ 6 & 7 \end{bmatrix}$ and B = $\begin{bmatrix} 8 & 7 \\ -6 & 5 \end{bmatrix}$

Find $3A' + B$. **(5+3)**

8. a) Solve the system of equations by crammer's rule

3x +y +z = 3, 2x + 2y + 5z =-1, x -3y - 4z = 2.

b) Find the Eigen values for the matrix. $A = \begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$ **(5+3)**

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