BRAINWARE UNIVERSITY

Term End Examination 2018 - 19

Programme – BAMW

Course Name – Discrete Structure

Course Code – BMWC102

(Semester – 1)

Time allotted: 3 Hours   **Full Marks : 70**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group –A

(Multiple Choice Type Question)   10 x 1 = 10

1.   *Choose the correct alternative from the following:*

(i)   An onto function is also known as

    a. Injective function   b. Surjective function

    c. Bijective function   d. None of these

(ii)   If A is a non-null matrix then $(A^T)^T$ is equals

    a. A^T b. A

    c. A^{2T} d. None of these

(iii)   The proposition $p \wedge p$ is equivalent to

    a. ~p   b. p

    c. 1   d. None of these

(iv)   The relation { (1,2), (1,3), (3,1), (1,1), (3,3), (3,2), (1,4), (4,2), (3,4)} is

    a. reflexive   b. asymmetric

    c. symmetric   d. transitive

(v)   What is the cardinality of the set of odd positive integers less than 10?

    a. 10   b. 5

    c. 3   d. 20

(vi)   In an undirected graph the number of nodes with odd degree must be _____
        a. zero
        b. even
        c. odd
        d. prime

(vii)   If $f: A \rightarrow B$ where B = {0,1,4,9} and f is defined by the rule $f(x) = x^2$. For which set A is the one-to-one function
        a. {0,1,2,3}
        b. {−2,0,−1,2}
        c. {−3,−1,0,2,3}
        d. {0,1,4,9}

(viii) A graph with one vertex and no edges is
        a. Multigraph
        b. Null graph
        c. Isolated graph
        d. Digraph

(ix)   If $S = \{\emptyset\}$ then power set of S is _____.

        a. $\{\emptyset\}$
        b. $\emptyset$
        c. $\{\emptyset, \{\emptyset\}\}$
        d. None of these

(x)   A partial ordered relation is transitive, reflexive and
        a. antisymmetric
        b. antireflexive
        c. asymmetric
        d. irreflexive

Group – B

(Short Answer Type Questions)   3 x 5 = 15

Answer any *three* from the following:

2. At a breakfast buffet, 20 people chose coffee and 17 chose juice. 10 people chose both coffee and juice. If each person chose at least one of these beverages, how many people visited the buffet?   [5]

3. What is tautology and contradiction? Give an example of each.   [2.5+2.5]

4. If $g(x) = 9x + 6$ then find $g^{-1}(x)$.
    Hence show that $g^{-1}og(x) = x$.   [2+3]

5. What is complete and regular graph? Give an example of each.   [3+2]

6. What is partial ordered set? Give an example.   [2+3]

Group – C

(Long Answer Type Questions)   3 x 15 = 45

Answer any _three_ from the following:

7. (a) Express the following matrix as a sum of symmetric and skew symmetric matrix.
$$\begin{bmatrix} 2 & 4 & -3 \\ 5 & -2 & 7 \\ -1 & 0 & 3 \end{bmatrix}$$ [5]

   (b) Construct the truth table of $(\sim p \vee q) \rightarrow \sim q$ [5]

   (c) Prove that $(A \cap B)^c = A^c \cup B^c$ [5]

8. (a) If $A = \begin{bmatrix} 3 & 2 \\ 0 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & -3 \\ 1 & 4 \end{bmatrix}$ the prove that $(AB)^{-1} = B^{-1}A^{-1}$
                                                                            [8]
   (b) Using mathematical induction prove that
        $7^{2n} + 16n - 1$ is divisible by 64   [7]

9. (a) What is Bipartite Graph? How it differs from Complete Bipartite Graph?   [3+3]
   (b) Prove that a function f : R → R define by f(x) = 3x + 1 is a bijective mapping.   [6]
   (c) Define connected graph? Give an example.   [3]

10. (a) Find CNF and DNF of the following proposition
        $(p \rightarrow \sim q) \vee (\sim p \vee r)$ [8]
   (b) Define minimal spanning tree and complete graph. Give the example of each.   [4+3]

11. (a) Solve the following System of equation using matrix method:
        $x + 2y + 3z = 10$
        $6x - 4y - 3z = 7$
        $2x - 3y + z = 1$ [8]
   (b) Define power set.   [2]
   (c) If $f(x) = 3x - 5$ and $g(x) = 4x$ then find $f°g(x)$.   [5]