Roll No. | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 18

MCA (2015 to 2020) (Sem.–2)

MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

Subject Code : MCA-201

M.Code : 72876

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTIONS-A, B, C & D contains TWO questions each carrying TEN marks each and students has to attempt any ONE question from each SECTION.**
2. **SECTION-E is COMPULSORY consisting of TEN questions carrying TWENTY marks in all.**
3. Use of non-programmable **scientific calculator** is allowed.

SECTION-A

1. Define Simple and Multi-graph. Prove that an undirected graph possesses an Eulerian path if it is connected and has either zero or two vertices of odd degree.

2. a) State and prove Five color theorem.

   b) Explain the shortest path problem and also explain the algorithms used to find shortest path.

SECTION-B

3. a) Show that $A \dot{-} (B \dot{-} C) = (A \dot{-} B) \dot{-} C$.

   b) Define intersection and union of sets. Prove that $A \cup B = A \dot{-} B$ if $A = B$.

4. a) Define Minsets. Let B_1, B_2, B_3 are the subsets of a universal set U. Find all minsets generated by B_1, B_2 and B_3.

   b) Define Partitions of sets. Give all the partitions of {a, b, c, d, e}.

SECTION-C

5. a) Test the validity of: If he works hard then he will be successful. If he is successful then he will be happy. Therefore, hard work leads to happiness.

   b) Prove that disjunction distributes over conjunction.

6. a) Use Mathematical induction to show that $1 + 2 + \bullet\bullet\bullet \ldots \ldots + 2^n = 2^{n-1} - 1$.

   b) Define Quantifiers. Explain different types of quantifiers along with examples.

SECTION-D

7. Solve by Gauss Elimination method : $x - 2y - 6z = 12$, $2x + 4y + 12z = -17$, $x - 4y - 12z = 22$.

8. Solve by matrix inversion method : $x - y + 3z = 2$, $2x + y + 2z = 2$, $-2x - 2y + z = 3$.

SECTION-E

Answer briefly :

9. Define Complete Bipartite graph and give one example.

10. Define Euler and Hamilton graphs.

11. Define Complement of set and give example.

12. Can we say that Cartesian product is commutative? Justify.

13. Define Uncountable set.

14. Define tautologies and contradictions.

15. Prove that $p \wedge q = q \wedge p$.

16. Define Symmetric and Skew-Symmetric.

17. If $A = \begin{bmatrix} 1 & -2 \\ 3 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 3 \\ 1 \end{bmatrix}$

18. Define inverse of a Square matrix and find the inverse of $\begin{bmatrix} 1 & -1 \\ 3 & 4 \end{bmatrix}$

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.