QP CODE: 24802795

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Reg No : .....

Name : .....

I.M.C.A DEGREE EXAMINATION, APRIL 2024

Third Semester

Faculty of Technology and Applied Sciences

Integrated MCA

Core - IMCA3C01 - MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE

2020 Admission Onwards

15CDB7D9

Time: 3 Hours Maximum: 75 Marks

Part A

*Answer any **ten** questions*

*Each question carries **3** marks*

1. Distinguish between the union and intersection of two sets A and B.
2. Define a binary relation.
3. Is the 'divides' relation on the set of positive integers reflexive?
4. Define the term ‘Tautology’.
5. Show that $P \wedge Q \Leftrightarrow Q \wedge P$.
6. Determine whether the conclusion C follows logically from the premises H_1 and H_2.

$H_1 : P \rightarrow Q \quad H_2 : Q \quad C : P$

7. What is mean by isomorphism in graph theory.?
8. What is mean by adjacency matrix?
9. Define walk and path in a graph.
10. What are the operations on graphs
11. Define Binary tree with example.
12. Explain depth first search in tree

(10×3=30 marks)

Part B

*Answer **all** questions*

*Each question carries **9** marks*

13. a) Using Venn diagram prove that:

$(i)\ A \cup (B \cap C) = (A \cup B) \cap (A \cup C).$

$(ii)\ A \cap (B \cup C) = (A \cap B) \cup (A \cap C).$

OR

b) Show that the function $f(x) = x^2$ from the set of all nonnegative real numbers to the set of all nonnegative real numbers, is invertible.

14. a) Determine whether the following formulas are tautologies or contradictions.

$(i)\ \big((\neg P \rightarrow Q) \rightarrow (Q \rightarrow P)\big)$

$(ii)\ \big((P \wedge \neg P) \vee Q\big) \leftrightarrow Q$

OR

b) *Show that* $R \rightarrow S$ *can be derived from the premises* $P \rightarrow (Q \rightarrow S)$, $\neg R \vee P$ *and* Q.

15. a) Expalin

(i) Directed graph

(ii) undirected graph

(iii) complete graph

iv) Regular graph

OR

b) Show that the sum of the degree of the vertices of a graph is equal to twice the number of its edges.

16. a) Prove that the number of edges of a simple graph with w components cannot exceed (n-w)(n-w+1)/ 2.

OR

b) Prove that a connected graph G is an Euler graph if and only if it can be decomposed in to circuits.

17. a) Explain preorder search, inorder search and postorder search with example.

OR

b) What is mean by spanning tree? Explain different spanning tree search.

(5×9=45 marks)