Avinashilingam Institute for Home Science and Higher Education for Women
Deemed to be University Estd. u/s 3 of UGC Act 1956, Category A by MHRD (now MoE)
Re-accredited with A++ Grade by NAAC. CGPA 3.65/4, Category I by UGC
Coimbatore - 641 043, Tamil Nadu, India

Continuous Internal Assessment Test I – August 2025

Semester I

Class : I UG **Time : 2 Hours**

Branch : Information Technology **Max. Marks : 60**

23BMAGE5 – Mathematics for Information Technology

Course Outcomes:
CO1: Construct the truth table of a statement formulae
CO2:.Test the validity of a given formula using tautology
CO3: Demonstrate the basic concepts in graph theory
CO4: Identify Eulerian and Hamiltonian graphs
CO5: Apply the concepts of graph theory in networking

Part A **6 x 1 = 6**

Choose the correct answer

1. If P and Q are two propositions, then the disjunction of P and Q is denoted by CO1K1

a. $P \vee Q$ b. $P \wedge Q$ c. $P \rightarrow Q$ d. $P \leftrightarrow Q$

2. If $P \rightarrow Q$ is a conditional statement, then $\neg P \rightarrow \neg Q$ is called CO1K2

a. converse b. inverse c. contrapositive d. conjuction

3. Which one of the following is well-formed formula CO2K2
a) (P∨Q) ∨ P) b) ⌉P∧Q c) ⌉(P∨Q) d) (P → Q
4. P∧~P is a tautology and P ∨~P is a CO2K1

a) contradiction b) tautology c) conjunction d) disjunction
5. The dual of (P ∧ Q) ∨ (⌉Q ∧⌉P) is CO2K2
a) (P∨Q) ∧ (⌉Q ∨ ⌉P) b) (P ∧ Q) ∨ (⌉Q ∧ P)

c) (P ∧ Q) ∨ (Q ∨ ⌉P) d) (P ∧ Q) ∧ (⌉Q ∧ P)
6. A product of variables and their negations is called an CO3K1
a) conjunction b) disjunction c) elementary sum d) elementary product

Part B **3 x 6 = 18**

Answer ALL questions

7. a. Construct a truth table for $P \rightarrow (Q \rightarrow R)$. CO1K3

(or)

7. b. Construct the truth table for (⌉P ∨ Q) ∧ (⌉Q ∨ P). CO1K4

8. a. Verify that $Q \vee (P \wedge \neg Q) \vee (\neg P \wedge \neg Q)$ is a tautology. CO2K3

(or)

8. b. Prove that $P \rightarrow (Q \rightarrow R) \Leftrightarrow P \rightarrow (\neg Q \vee R) \Leftrightarrow (P \wedge Q) \rightarrow R$ by Replacement process. CO2K3

9. a. Show the implication $P \rightarrow (Q \rightarrow R) \Rightarrow (P \rightarrow Q) \rightarrow (P \rightarrow R)$. CO2K2

(or)

9. b. Define the following with example:
i.Adjacent vertices ii. Simple graph iii. Null graph CO3K2

Part C **3 x 12 = 36**

Answer ALL questions

10. a. Establish the truth table for the following formulae:

i. $(R \wedge P) \rightarrow S$

ii. $(P \wedge (Q \wedge R)) \wedge \neg((P \vee Q) \wedge (P \vee R))$ CO1K3

(or)

10. b. i. Construct the truth table for $(P \wedge Q) \rightleftarrows (P \vee Q)$

ii. Write the following statements in symbolic form with statements

P: Naveen is smart

Q: Amal is smart

i. Naveen is smart and Amal is not smart

ii. Naveen and Amal are both smart

iii. Neither Naveen nor Amal are smart

iv. It is not true that Naveen and Amal are both smart CO1K4

11. a. Show the following equivalences (without using truth table).

i. $\neg(P \rightleftarrows Q) <=> (P \vee Q) \wedge \neg(P \wedge Q)$

ii. $(\neg P \wedge (\neg P \wedge R)) \vee (Q \wedge R) \vee (P \wedge R) <=> R$

(or)

11. b. Show that both implication and equivalence are transitive. CO2K3

12.a. i. Obtain disjunctive normal form of $(Q \vee (P \wedge R)) \wedge \neg((P \vee R) \wedge Q)$.

ii. Obtain conjunctive normal form of $\neg(P \vee Q) \rightleftarrows (P \wedge Q)$. CO2K3

(or)

12. b. i. Define the following with example:

a) Graph b) Digraph c)Infinite graph

ii. Define degree of the vertex with example and prove that in any graph, the number of vertices of odd degree is even. CO3K3

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