



VIT

Vellore Institute of Technology

Fall Semester - 2023~2024

Continuous Assessment Test - I

Programme Name & Branch : B.Tech

Course Code & Name : BMAT205L - Discrete Mathematics and Graph Theory

Slot : A1+TA1+TAA1  
Maximum Marks : 50

Exam Duration : 90 Minutes

Answer ALL the Questions

Each question carries equal marks ( $5 \times 10 = 50$  Marks)

1. Obtain the principal disjunctive and conjunctive normal forms of the statement  $(p \rightarrow (q \wedge r)) \wedge (\neg p \rightarrow (\neg q \wedge \neg r))$

[10 M]

2. Derive  $p \rightarrow (q \rightarrow s)$  using the CP-rule from the premises  $p \rightarrow (q \rightarrow r)$  and  $q \rightarrow (r \rightarrow s)$

[10 M]

3. Show that  $\forall(x) (p(x) \vee q(x)) \implies (\exists x)p(x) \vee (\exists x)q(x)$  by indirect method of proof. [10 M]

4. Show that a non-empty subset  $S$  of  $G$  is a subgroup of  $(G, *)$  iff for any pair of elements  $a, b \in S, a * b^{-1} \in S$

[10 M]

5. Consider the group  $(\mathbb{Z}_6, \oplus_6)$ . (i) Construct the Cayley's table (ii) Find the order of each element (iii) Find the inverse of each element (iv) Write all possible non-trivial subgroups (v) Obtain the left cosets of  $H = \{0, 2, 4\}$  in  $\mathbb{Z}_6$ .

[10 M]

\*\*\*\*\*