

PART _ A (5x3=15 marks)**Answer any FIVE questions.****Each question carries THREE (3) marks.****Each answer should not exceed ONE (1) page.**

1. Show that $\sim (p \vee q)$ and $\sim p \wedge \sim q$ are logically equivalent.
2. Find the $\gcd(111, 201)$, $\gcd(1529, 14039)$ using Euclidean algorithm.
3. Define Pigeonhole Principle?
4. Represent the following Relation on $\{1, 2, 3, 49\}$ with a matrix.
 $\{(1, 2), (1, 3), (1, 4), (2, 3), (2, 4), (3, 4)\}$
 $\{(1, 1), (1, 4), (2, 2), (3, 3), (4, 1)\}$.
5. Show that K_4 and Q_3 are planar.
6. Define path, circuit, walk with an example.
7. Give an example of preorder and post order Traversals.
8. Define Rooted with an example?

PART - B (4x15=60 marks)**Answer ALL questions.****Each question carries FIFTEEN (15) marks.****Each answer should not exceed SIX (6) pages.**

9. Show that $(p \rightarrow q) \wedge (q \rightarrow r) \rightarrow (p \rightarrow r)$ is a tautology.
(OR)
10. a) Define floor function and ceiling function with examples.
b) Find i) $f \circ f$, ii) $g \circ g$, iii) $f \circ g$, iv) $g \circ f$
where $f(x)=x^2+1$ and $g(x)=x+2$ are functions from \mathbb{R} to \mathbb{R} .
11. Solve the Recurrence Relation $F_{n-1}=F_{n-2} + F_{n-3}$ for $n \geq 0$.
(OR)
12. Explain Warshal's algorithm? Find the Transitive Closure of the relation $\{(b, c), (b, e), (c, e), (d, a), (e, b), (e, c)\}$.
13. State and Prove Euler's Formula.
(OR)
14. Explain the conditions for two graphs to be isomorphic with an example?
15. Define Rooted Tree? What are the applications of Rooted Trees?
(OR)
16. Differentiate the traversing techniques Preorder, Postorder and Inorder with examples?

