

<b>F-6220</b>
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<b>Sub. Code</b>
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<b>7BITA3</b>
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**U.G DEGREE EXAMINATION, NOVEMBER 2021**

**Information Technology**

**Allied : DISCRETE MATHEMATICS**

**(CBCS – 2017 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** questions.

1. What is Conjunction?
2. Define Bi Conditional statements
3. What is Valid Formulae?
4. Write the inference rules for Modus Ponens and Modus Tollens
5. What is Sub graph?
6. Describe Cycles.
7. What is Cut set?
8. Define Cut vertices.
9. Clarify the term Sub lattice
10. Define an equivalence relation with an example.

**Part B****(5 × 5 = 25)**

Answer **all** questions choosing either (a) or (b).

11. (a) Prove  $(P \wedge Q) \rightarrow P$  is a tautology using the equivalences.

Or

- (b) Show that  $(P \rightarrow Q) \wedge (Q \rightarrow P)$  is logically equivalent to  $P \Leftrightarrow Q$ .
12. (a) Show that  $R \vee S$  is a valid conclusion from the premises  $C \vee D, C \vee D \rightarrow \neg H, \neg H \rightarrow (A \wedge \neg B)$  and  $(A \wedge \neg B) \rightarrow (R \vee S)$ .

Or

- (b) Express  $(x' + y + z')(x' + y + z)(x + y' + z)$  is disjunctive normal form.
13. (a) Prove that a graph  $G$  is disconnected if and only if its vertex set  $V$  can be partitioned into two nonempty subsets  $V_1$  and  $V_2$  such that there exists no edge in  $G$  whose one end vertex is in  $V_1$  and the other in  $V_2$ .

Or

- (b) Give an example of connected graph which is Eulerian but not Hamilton.
14. (a) Prove that an undirected simple graph is a tree if and only if there is a unique path between any pair of its vertices.

Or

- (b) Prove that in graph  $G$ , the number of vertices of Odd degree is always even.

15. (a) Show that every chain is a Lattice.

Or

- (b) Prove that the relation 'congruence modulo  $m$ ' over the set of positive integers is an equivalence relation.

**Part C**

(3 × 10 = 30)

Answer any **three** questions.

16. What is Equivalence? Write the Laws of Equivalences.
17. Prove that  $P, P \rightarrow Q, Q \rightarrow R \rightarrow R$
18. A given connected graph  $G$  is an Euler Graph if and only if all vertices of  $G$  are of even degree.
19. Find the minimum spanning tree using Prim's Algorithm.
20. Show that the Demorgan laws holds in a complemented distributive lattice.
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