D1BCA2303 (S1)   Reg. No..............................

                                            Name: ....

FIRST SEMESTER DEGREE EXAMINATION, NOVEMBER 2024
(Improvement/Supplementary)
BCA
#### GBCA1C02T: DISCRETE MATHEMATICS

Time: 2 Hours   **Maximum: 60 Marks**

SECTION A: Answer the following questions. Each carries *two* marks.
### (Ceiling 20 Marks)

1. Define cut vertex. Give an example.
2. What is dual graph?
3. Define in-degree and out-degree of the vertices of a directed graph.
4. Construct a truth table for the compound proposition $(p \rightarrow q) \rightarrow (q \rightarrow p)$.
5. Given P={2,3,4,5,6}, state the truth value of the statement $(\exists x \in P)(x + 3 = 10)$
6. Prove $x \cdot (\bar{x} + y) = x \cdot y$, for all x, y belongs to Boolean algebra.
7. Define comparable elements in a poset. Give an example.
8. Comment on conditional statement $p \rightarrow q$.
9. Give an example of a graph which is Hamiltonian but not Eulerian.
10. Define chord of a spanning tree.
11. What do you mean by the center of a tree.
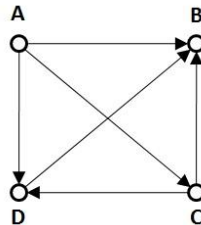
12. Define incidence matrix of a digraph.

SECTION B: Answer the following questions. Each carries *five* marks.
### (Ceiling 30 Marks)

13. Simplify Boolean expression $a'b'c + a.b'c + a'b'c'$ using Boolean algebra identities
14. Determine the least upper bound and greatest lower bound of B = {a, b, c} if they exist, of the poset whose Hasse diagram is shown in figure:
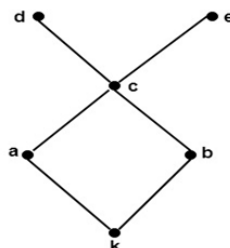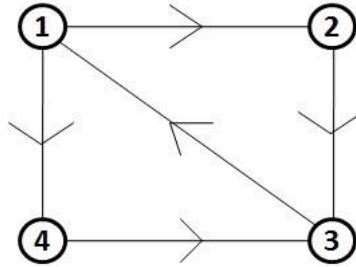

15. Draw K_5 and K_4.
16. Draw two different binary trees with five nodes having only one leaf.
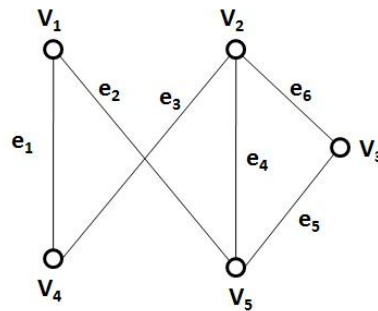
(PTO)

17. Draw all the spanning trees of the graph G shown below
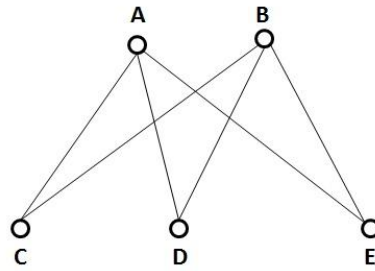
18. Is the directed graph given below strongly connected? Why or why not?

19. Represent the graph by incidence matrix.

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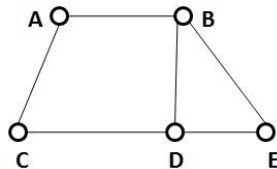**SECTION C: Answer any *one* question. The question carries *ten* marks.**

20. a) If A = {1,3,5,7,8}; B = {5,9,13,17,1,2} and C ={1,3,9,13. Find:

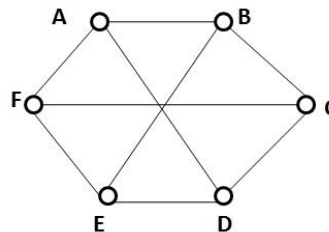   i) $(A-B)YC$, ii) $(A-B)I\ C$, iii)$AY(BI\ C)$, iv) $AI\ (B-C)$, v) $A-(B-C)$

   b) Let A= {0,1,2,3,4,5,6}, B= {0,1,2,3,7,9} find a relation R, where a R b if and only if a + b is a multiple of 2.

21. Find an Euler path or an Euler circuit, if it exists in the following graphs. If it does not exist, explain why?

(1 x 10 = 10 Marks)