Or

How many people among 200,000 people are born at the same time (hour, minute, seconds) ?

19. Show that every chain is a distributive lattice.

Or

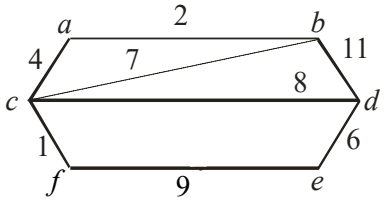
Solve the recurrence relation :

$$a_n - 4a_{n-1} = 6.4^n,\ a_0 = 1.$$

20. Define Euler Circuit and Hamiltonian circuit with suitable examples.

Or

Find a minimal spanning tree for the graph shown in figure :



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BCA EXAMINATION, 2026

(Second Semester)

(Re-appear Only)

(2019-20 Onwards)

DISCRETE MATHEMATICS

Time : 3 *Hours*] [*Maximum Marks :* 80

Before answering the question-paper, candidates must ensure that they have been supplied with correct and complete question-paper. No complaint, in this regard will be entertained after the examination.

Note : All questions are compulsory.

Section A **1×12=12**

1. Let A = {3, – 6}, B = {$x : x^3 + 3x - 18 = 0$}. Is A = B ? Simplify it.

2. Define comparable elements.

3. What is Strict Partial Ordering ?

4. Write the contrapositive of the statement "If it rains, then the rood is wet."

5. What is a Tautology ?

6. Let A = $\{a, b, c\}$ be a finite set find all permutations on A.

7. Define Disjunctive Normal Form (DNF).

8. Define Homogeneous Recurrence Relation.

9. Define principle of Duality in Lattice.

10. Define Bipartite Graph.

11. Define Euler's formula for connected planar graph.

12. Draw a Binary Tree to Represent :

$(2 - (3 \times x)) + ((x - 3) - (2 + x))$.

Section B 3×4=12

13. Explain De-Morgan's law for sets with example.

14. Using truth table show that :

$$p \leftrightarrow q \equiv (p \rightarrow q) \wedge (q \rightarrow p).$$

15. Find the solution of the recurrence relation :

$$a_0 = 1,\ a_n = a_{n-1} + 2.$$

16. Draw all simple graphs with vertices $\{u, v, x, y\}$ and two edges, one of which is $\{u, v\}$.

Section C 4×6=24

17. Explain the operations on sets using Venn diagrams.

Or

Define Equivalence Relation. Show that the relation R = $\{(a, b) : a - b$ is divisible by $3\}$ is an equivalence relation.

18. Explain Universal and existential quantifiers with example.

24. Show that the complete graph K_5 and complete bipartite graph $K_{3,3}$ are not planar.

Or

Define a tree and explain its properties. Prove that a tree with n vertices has $(n-1)$ edges.

❖❖❖❖❖❖❖

Section D **4×8=32**

21. Explain binary and partial order relations with example.

Or

Define function. Explain identity, inverse and composite function with suitable examples.

22. Explain predicates, arguments and rule of inference with example. Also write algorithm to test the validity of arguments.

Or

State and prove the Pigeonhole principle as well as Generalized Pigeonhole Principle.

23. Explain different types of lattices and draw Hasse Diagrams for each.

Or

Find the particular solution of the recurrence relation :

$$a_n - a_{n-1} - 2a_{n-2} = 2n^2.$$

Also, find total solution.