

CSE 204

B. TECH. IIIrd SEMESTER EXAMINATION, 2025-26

BACHELOR OF TECHNOLOGY

(CSE)

Discrete Mathematics

Time : Three Hours]

[Maximum Marks : 75

Note: There are **three** sections (A, B and C) and candidate has to attempt questions from all sections. Marks are indicated against each section.

Section-A

1. Attempt all questions : $5 \times 3 = 15$

(a) If $A = \{3, 5, 7, 9, 11\}$, $B = \{7, 9, 11, 13\}$,
 $C = \{11, 13, 15\}$ find $A \cap (B \cup C)$.

(b) Consider the following interims expression of F :

$$F(P, Q, R, S) = \sum 0, 2, 5, 7, 8, 10, 13, 15$$

The minterms 2, 7, 8 and 13 are 'do not care' terms. The minimal sum of products form for F is _____.

(c) Consider the following propositions :

Premise : "If it does not rain or if it is not foggy, then the sailing race will be held and the lifestyle demonstration will go on".

Premise : "If the sailing race is held, then the trophy will be awarded and the trophy was not awarded".

Conclusion : "It rained".

- (d) Draw a Petersen graph, and check whether it is planar or not (Justify it)
- (e) Draw a complete graph of 5 vertices & find the number of spanning tree in this graph.

Section-B

Note: Attempt all questions : 4×5=20

2. (a) What are recessively defined functions ?

Or

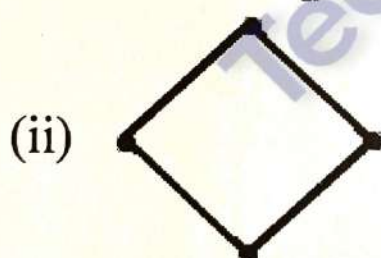
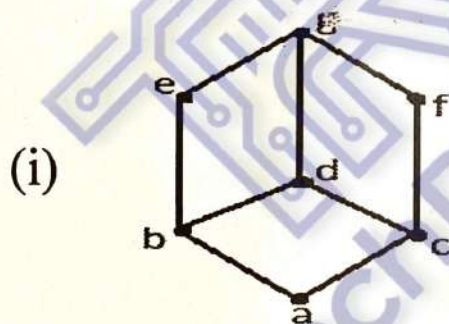
- (b) Describe growth of a function in detail.

3. (a) Consider a partial order relation and convert it into hasse diagram.

$$A = (1, 2, 3, 4, 6, 8, 9, 12, 18, 24)$$

Or

- (b) What is Lattice? Check whether a following Lattice is a "Boolean algebra" or not



4. (a) Differentiate between a Tautology and a contradiction, with an example.

Or

- (b) Check Tautology or a contraction exist in the following :

(i) $[A \wedge (A \rightarrow B)] \rightarrow B$

(ii) $(p \rightarrow q) \rightarrow r$

5. (a) The preorder traversal of BST is 7, 5, 1, 8, 3, 6, 0, 9, 4, 2 are entered in that sequence into a binary search tree that is originally empty. The binary search tree employs a natural number reversal order, with 9 presumed to be the smallest and 0 supposed to be the biggest, The produced binary search tree (in order) traversed in sequence.

Or

- (b) (i) Differentiate between Euler and Hamiltonian graph with an example.
(ii) Given a planar graph with 6 vertices and 9 Edges. Find the number of faces/region.

Section-C

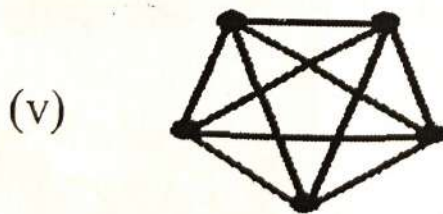
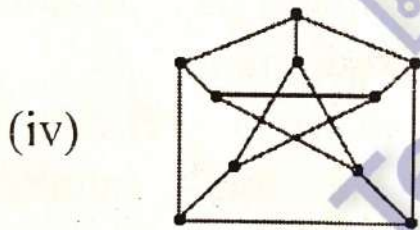
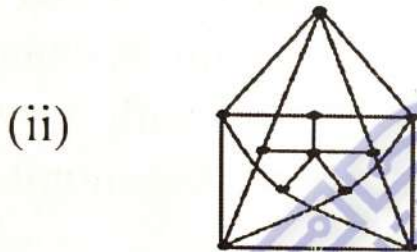
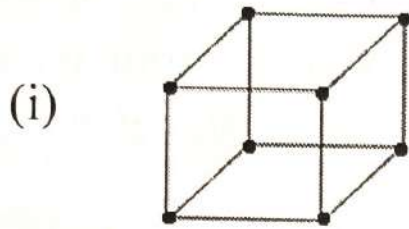
Note: Attempt any two questions : $2 \times 20 = 40$

6. (a) What is function ? Explain its types and also range, domain and co-domain.
(b) Consider the following relations on $\{1, 2, 3, 4\}$. Find the total number of equivalence relations.
7. (a) Use Boolean algebra to simplify the following functions.
(i) $F = AB + (AC)' + AB'C(AB + C)$
(ii) $F = ((XYZ + XY'Z + XYZ'))$
(b) How many different arrangements of the word "PARRAMATTA" are possible ?
8. (a) What is first order logic ? Differentiate between predicates and quantifiers, explain with an example.

(b) Let $Q(x)$ be the statement " $x + 1 > 2x$ ".
domain : all integers.

What is the value of $\forall x Q(x)$?

9. (a) What is graph coloring ? Calculate chromatic number of the following :



(b) Solve the linear recurrence relation with a constant coefficient.

$$a_n + 2a_{n-1} + 4a_{n-2} = 0$$

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