

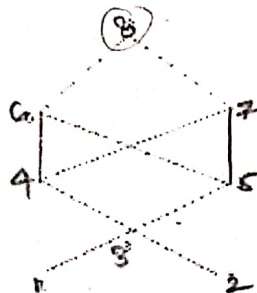
Master Of Computer Applications
MCAC-102
(PG_CBCS_UPSC: 223401102)
Discrete Mathematic
Nov/Dec 2019
For Admissions in 2019

Time: 3 Hours

Max Marks: 70

ATTEMPT ANY SEVEN QUESTIONS

- ✓ 1. ✓ (a) Consider the Poset $A = \{1, 2, 3, 4, 5, 6, 7, 8\}$ under partial order whose Hasse diagram is as shown below. Consider the subsets $B = \{1, 2\}$ and $C = \{3, 4, 5\}$ of A . Find (6)
- (i) All the lower and upper bounds of B and C .
- (ii) $\text{glb}(B)$, $\text{lub}(B)$, $\text{glb}(C)$ and $\text{lub}(C)$



- ✓ (b) Find the validity of the argument given below- (4)

S1: If Gora gets a job and work hard then he will be promoted.

S2: If Gora gets promotion then he will be happy.

S3: Gora is not happy.

Conclusion: Either he will not get the job or he will not work hard.

- ✓ 2. (a) Explain the concept of Monotonicity with a valid example. (4)

- (b) Find the upper bound, lower bound and tight bound range for the following function- (6)

$$f(n) = 3n+2$$

- ✓ 3. (a) Determine the Generating function

$$a_r = \begin{cases} 2^r & \text{if } r \text{ is even,} \\ -2^r & \text{if } r \text{ is odd} \end{cases} \quad (4)$$

- ✓ (b) Prove the following equivalences by using laws of Propositional Algebra. (6)
- (i) $(p \rightarrow q) \rightarrow q = p \vee q$ (✓ $\sim p \vee q$)
- (ii) $p \rightarrow (q \vee r) = (p \rightarrow q) \vee (p \rightarrow r)$
- (iii) $(\sim p \vee q) \wedge (p \wedge (p \wedge q)) = p \wedge q$

4. (a) A document contains letters A to G with frequencies as indicated:

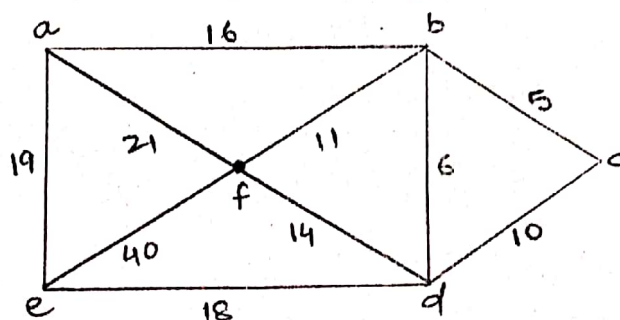
(6)

Characters	A	B	C	D	E	F	G
Frequencies	15	10	1	13	4	12	3

Using Huffman Coding, create the Huffman Tree and also calculate the Huffman code for each character and average code length per character.

(b) Find a Minimum Spanning tree for the given weighted graph-

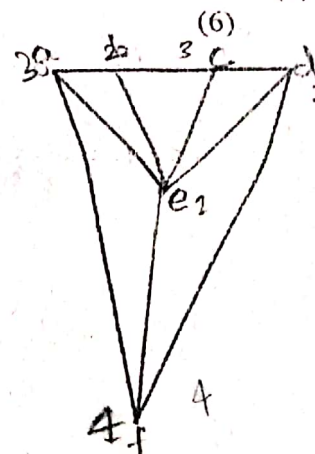
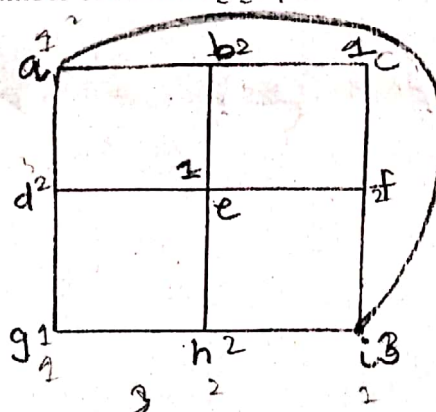
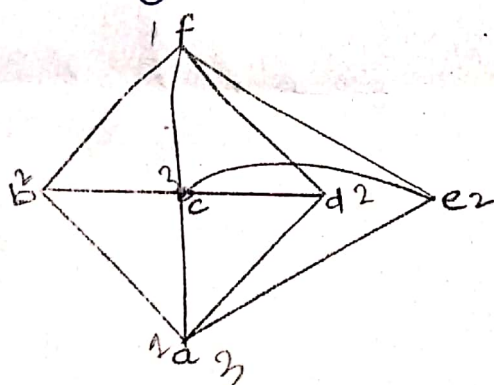
(4)



5. (a) The Indian Cricket team consists of 16 players. it includes 2 wicket keepers and 5 bowlers. In how many ways can a cricket team of eleven be selected if we have to select 1 wicket keeper and atleast 4 bowlers?

(4)

(b) What is the Chromatic number of following graphs-



6. (a) Find the solution of the recurrence relation $a_n = a_{n-1} + 2$, $n \geq 2$ where initial condition $a_1 = 3$.

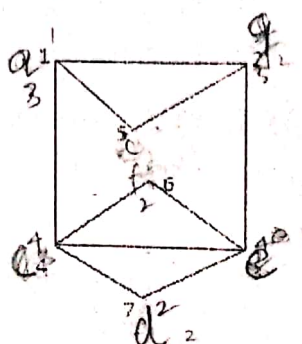
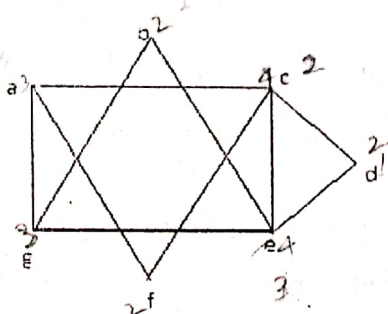
(5)

(b) With the help of an example prove that a connected graph with n vertices and e edges has $e-n+2$ regions.

(5)

7. (a) Check whether the following graphs are Isomorphic or Not. Justify your answer.

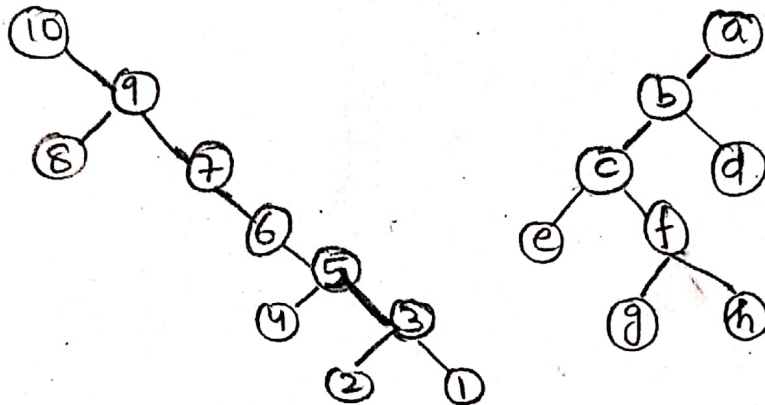
(4)



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isomorphic

(b) Determine the Inorder, Preorder and Postorder traversal of the given Binary Search trees- (6)



8. (a) A function f is defined on the set of integers as follows:

(4)

$$f(x) = \begin{cases} x & \text{if } 0 \leq x < 1 \\ x+2 & \text{if } 1 \leq x < 3 \\ 4x-5 & \text{if } 3 \leq x < 5 \end{cases}$$

- find the domain of the function.
- find the range of the function.
- state whether f is one-one or many-one function.

(b) Define the following terms-

(6)

- Walk
- Euler path
- Hamiltonian path
- Circuit
- Rank and Nullity