

Unit III

No. of Printed Pages : 05

Roll No.

5. (a) Show that the intersection of two sub-semigroup of a semigroup $(S, *)$ is subsemigroup of $(S, *)$. 8

- (b) Prove that a non-empty subset H of a group G is a subgroup of G iff :

(i) $a, b \in H \Rightarrow ab \in H$

(ii) $a \in H \Rightarrow a^{-1} \in H$ 7

6. (a) Show that intersection of any subgroup of a group G is again a subgroup of G . 8

- (b) Let G be a group such that $(ab)^2 = a^2b^2$ for $a, b \in G$. Then prove that G is abelian. 7

Unit IV

7. (a) Draw all simple graphs with vertices (u, v, x, y) and two edges, one of which is $\{u, v\}$. 8

- (b) If a graph has a Euler circuit, then every vertex of the graph has even degree. 7

M-18D4

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18D4

B. Tech. EXAMINATION, 2022

(Fourth Semester)

(C Scheme) (Main & Re-appear)

CSE

CSE208C

Discrete Mathematics

Time : 3 Hours]

[Maximum Marks : 75

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

Note : Attempt *Five* questions in all.

(1-02/13) M-18D4

P.T.O.

Unit I

1. Define following terms : 15

- (a) Proper subset
- (b) Intersection of two subsets
- (c) Mutually disjoint
- (d) Partition of a set
- (e) Inverse mapping
- (f) Antisymmetric relation
- (g) Countable set.

2. (a) Prove that the set Z of all integers is countable. 5

(b) Let :

$$A = [1, 2, 3], B = \{2, 3, 4, 5\}.$$

Find $A \Delta B$. 5

(c) If :

$$f : A \rightarrow B$$

is a bijective mapping; then $f^{-1} : B \rightarrow A$ is also bijective. 5

Unit II

3. (a) Construct a truth table for the statement form : 7

$$(i) (p \cup q) \cup \sim r$$

$$(ii) p \cup \sim p$$

$$(iii) - p \cup \sim q.$$

(b) If p and q are propositions, then : 8

$$p \leftrightarrow q \circ (p \rightarrow q) \cup (q \rightarrow p)$$

$$\text{Hence } p \leftrightarrow q \circ (\sim p \cup q) \cup (-q \cup p)$$

4. (a) Verify the validity of the following argument : 8

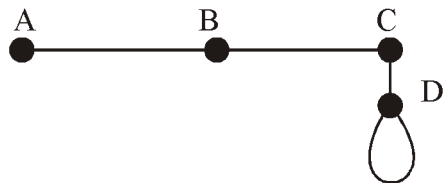
$$(p \rightarrow q)$$

$$p$$

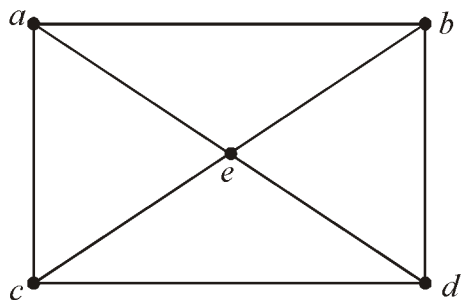
$$\backslash q$$

(b) If there is a gas in the car, then John will go to a store. If John goes to store, then he will get a soda. There is gas in the car. Will John get a soda ? 7

8. (a) Has the graph given in figure a Eulerian path ? 8

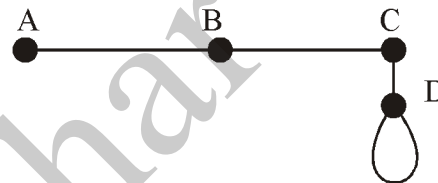


- (b) Does the graph G

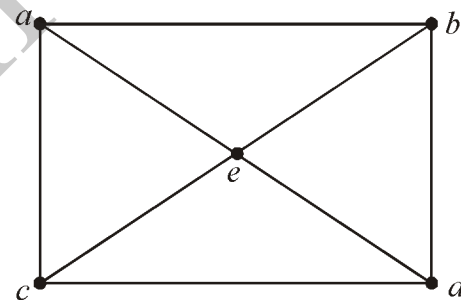


have Hamiltonian circuit ? 7

8. (a) Has the graph given in figure a Eulerian path ? 8



- (b) Does the graph G



have Hamiltonian circuit ? 7