

322452(14)**B. E. (Fourth Semester) Examination,
April-May 2019****(New Scheme)****(CSE Branch)****DISCRETE STRUCTURES****Time Allowed : Three hours****Maximum Marks : 80****Minimum Pass Marks : 28**

Note : Part (a) from each question is compulsory
Attempt any two parts from (b), (c) and (d)
each question

Unit-I**1. (a) Define tautology and contradiction with example 2****322452(14)****PTO****[2]**

(b) Let S be a family of sets which is closed under the Binary operations union ' \cup ', intersection ' \cap ' and complement ' $'$ ' then prove that $(S, \cup, \cap, ')$ is a Boolean Algebra. 7

(c) (i) Explain disjunctive and conjunctive normal forms. 4

(ii) Express the following function into disjunctive normal form : 3

$$(x \cdot y' + x \cdot z')' + x'$$

(d) Construct the switching circuit for the Boolean function

$$f(x, y, z) = x \cdot y + y \cdot (y' + z) \cdot (x' + y \cdot z')$$

Simplify it and draw the equivalent circuit. 7

Unit-II

2. (a) Explain roster and set builder form with an example. 2

(b) If R^{-1} and S^{-1} are inverse of the relation R and S

322452(14)

[3]

respectively then prove that :

7

$$(S \circ R)^{-1} = R^{-1} \circ S^{-1}$$

(c) What is Lattice? In any lattice show that :

7

$$a \vee (b \wedge c) \leq (a \vee b) \wedge (a \vee c)$$

http://www.csvtuonline.com

(d) (i) Define the following :

4

(I) Injective function

(II) Bijective function

(III) Surjective function

(IV) Composition of function

(ii) If $f: R \rightarrow R$ and $g: R \rightarrow R$ are defined by

$$f(x) = x + 2 \text{ and } g(x) = x^2 \quad \forall x \in R. \text{ find}$$

$$f \circ g(x) \text{ and } g \circ f(x).$$

3

Unit-III

3. (a) Define Homomorphism and Isomorphism of group. 2

(b) State and prove Lagrange's theorem. 7

322452(14)

PTO

[4]

(c) Show that the set of all the rational numbers forms an abelian group under composition defined by ?

$$a * b = \frac{ab}{2}$$

(d) Prove that the intersection of two subrings is a subring. 7

Unit-IV

4. (a) Write true or false. 2

(i) Every null graph is regular graph of degree zero

(ii) Every complete graph K_n is a regular graph of degree n .

(b) (i) Define the following : 4

(I) Degree of a vertex

(II) Even and odd vertices

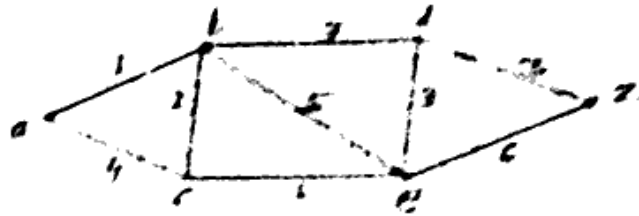
(III) Spanning subgraph

(IV) Bipartite graph

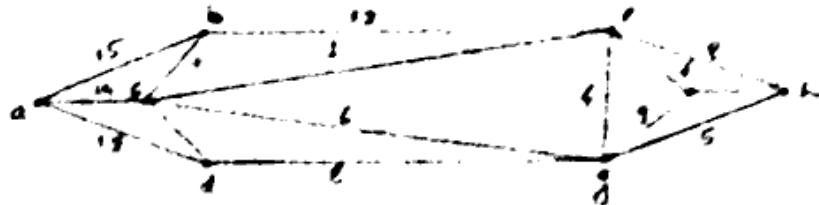
(ii) Prove that number vertices of odd degree in a graph is always even. 3

322452(14)

- (c) Apply Dijkstra's algorithm to graph given below and find the shortest path from a to z .



- (d) Find the minimum spanning tree for the graph shown.



Unit-V

5. (a) Define Pigeonhole principle.

- (b) In a class of 50 students, 20 students play football and 16 students play hockey. It is found that 10 students play both the games. Find the number of students who play neither.

322452(14)

PTO

- (c) Use mathematical induction to prove that

$$(3^n + 7^n - 2) \text{ is divisible by } 8, \text{ for } n \in \mathbb{N}$$

- (d) Use the method of generating function to solve the

$$\text{recurrence relation } a_n = 4a_{n-1} - 4a_{n-2} + 4^n, \quad n \geq 2,$$

$$\text{given that } a_0 = 2 \text{ and } a_1 = 8$$

http://www.csvtuonline.com

Whatsapp @ 9300930012

Your old paper & get 10/-

पुराने पेपर्स भेजे और 10 रुपये पायें,

Paytm or Google Pay से

322452(14)