Roll No. ....

322452(14)

B. E. (Fourth Semester) Examination, April-May 2016

(New Scheme)

(CSE Branch)

DISCRETE STRUCTURES

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

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

Unit-I

(a) Define tautologies and contradictions. 2

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(b) (i) Verify that the proposition $p \Rightarrow (p \vee q)$ is tautology.

(ii) Verify that the proposition $p \wedge (q \wedge \sim p)$ is a contradiction. 7

(c) Prove that in a Boolean algebra B, for any $a \in B$: 7

(i) $(a+b)' = a' \cdot b'$

(ii) $(a \cdot b)' = a' + b'$

(d) Find the logic circuits corresponding to Boolean expressions : 7

$$x'y'z + x'yz + xy'$$

Unit-II

2. (a) Define Equivalence relation. 2

(b) If R and S are equivalence relations on the set A, prove that $R \cap S$ is an equivalence relation. 7

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(c) Prove that : 7

$$A \times (B \cap C) = (A \times B) \cap (A \times C)$$

(d) Define the following terms : 7

(i) Partial order relation

(ii) Lattices

(iii) Composition of function

(iv) Floor function

(v) Ceiling function

Unit-III

3. (a) Define Group codes. 2

(b) Show that the set of all positive rational numbers forms an abelian group under the composition defined

by $a * b = \frac{(ab)}{2}$

(c) State and prove Lagrange's theorem

(d) Define the following terms :

(i) Homomorphism of Groups

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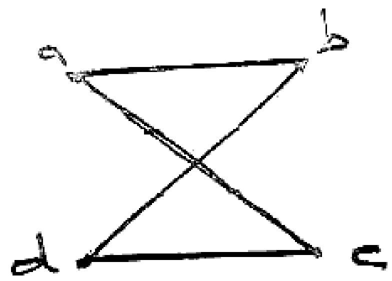
(ii) Isomorphism of Groups

(iii) Subgroup

(iv) Ring

Unit-IV

4. (a) Find the adjacency matrix of the graph. 2



(b) Define the following graphs :

(i) Undirected and directed graph

(ii) Complete graph

(iii) Isomorphic graph

(iv) Paths and circuits

(c) Find a minimal spanning tree of the following graph :

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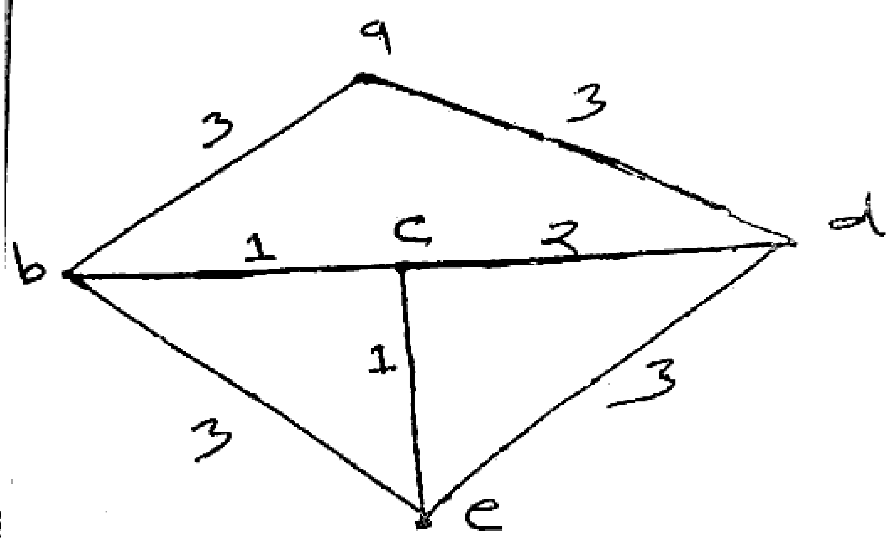
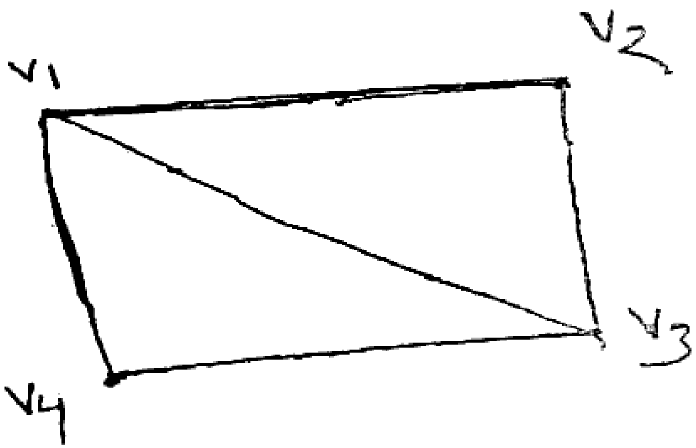
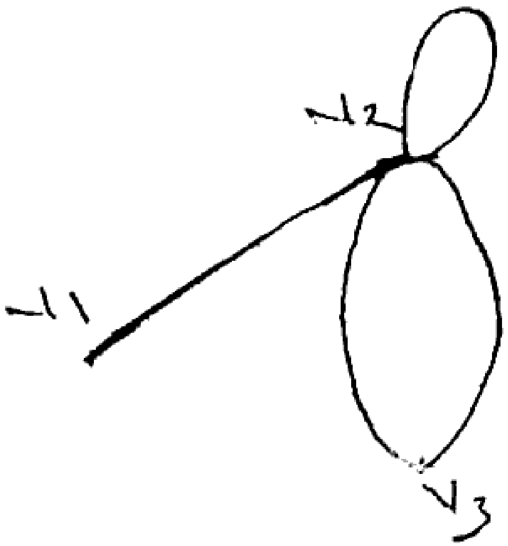


(d) Find the adjacency matrix of each of the following graphs. 7

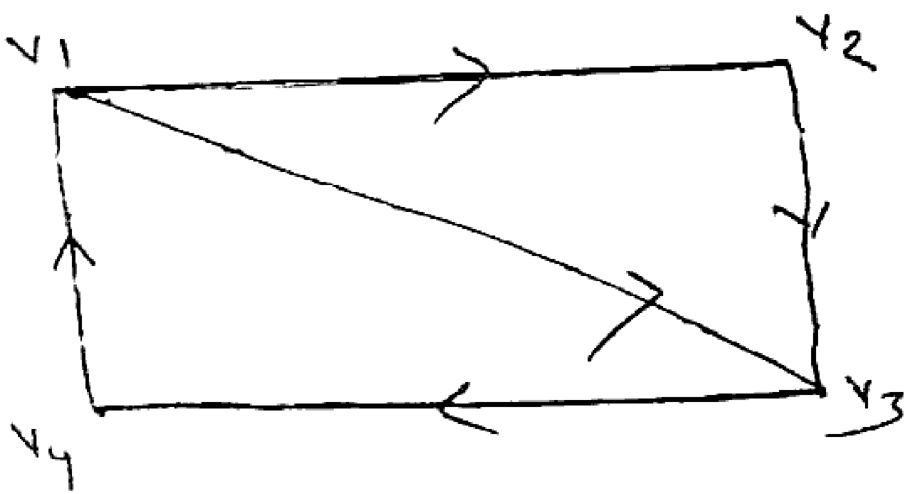


(a)

PTO



(b)



(c)

Unit-V

(a) Write the recurrence relation of the sequence 2

$S = \{5, 8, 11, 14, 17, ...\}$

(b) Use induction to show that : 7

$\lfloor n \geq 2^{n-1}$ for $n \geq 1$.

(c) Solve the recurrence relation 7

$a_n = 4\left(a_{n-1} - a_{n-2}\right)$

(d) How many positive integers not exceeding 500 are divisible by 7 or 11?