Total No. of Questions—8] [Total No. of Printed Pages—5

Seat No.	

[5352]-161

S.E. (Computer) (First Semester) EXAMINATION, 2018

DISCRETE STRUCTURES

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Neat diagrams must be drawn wherever necessary.

(*ii*) Figures to the right indicate full marks.

(*iii*) Assume suitable data if necessary.

1. (*a*) There are 3 sets A, B and C where, [4]

A = Whole numbers less than 7

B = Odd numbers greater than or equal to 1 but less than 10

C = Factors of 9

Find $(A \cup B) \cap (B \cup C)$

(*b*) Explain the following with examples : [4]

(*i*) Composite relation

(*ii*) Composition of functions.

(*c*) Using truth table prove that $((p \rightarrow q) \wedge \sim q) \rightarrow \sim p$ is a tautology. [2]

P.T.O.

(*d*) Explain which of the following relations is transitive :

1. $\leq$ on any set of real no's

2. Relation divides on set of positive integers. [2]

Or

2. (*a*) There are 2 sets A, B. use set theory laws to prove $A \cup (B - A) = A \cup B$. [4]

(*b*) Draw the Hasse diagram for the following POSET, where denotes relation divides [{2, 3, 6, 12, 18, 36, 72, 108}; |] [4]

(*c*) Give the definition for : [2]

(*i*) One to one function

(*ii*) Onto function.

(*d*) Explain tautology Vs. satisfiability with an example. [2]

3. (*a*) Explain the following with the help of examples : [6]

(*i*) Algebraic system

(*ii*) Semi-groups

(*iii*) Monoid

(*iv*) Group.

(*b*) Find the chromatic number with the help of graph coloring for : [6]

(*i*) K_5 (complete graph with 5 vertices)

(*ii*) Any complete bipartite graph.

(*iii*) C_4 (cyclic graph with 4 vertices).

Or

4. (*a*) Let ({*a, b,*}, *) be a semi-group where $a * a = b$, show that : [6]

(*i*) $a * b = b * a$

(*ii*) $b * b = b$.

(*b*) Explain the following types of graphs with the help of examples : [6]

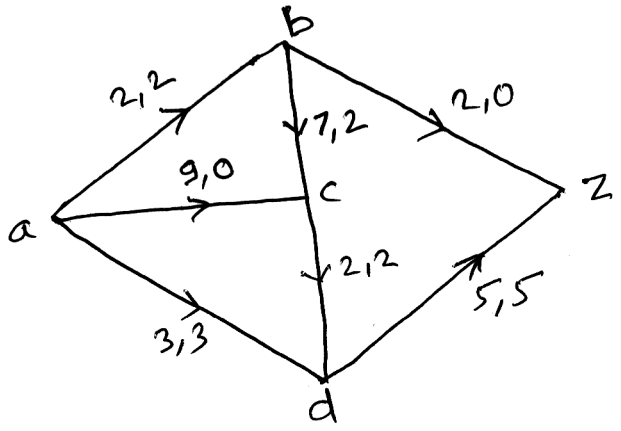
(*i*) Simple graph

(*ii*) Asymmetric diagraph

(*iii*) Symmetric diagraph

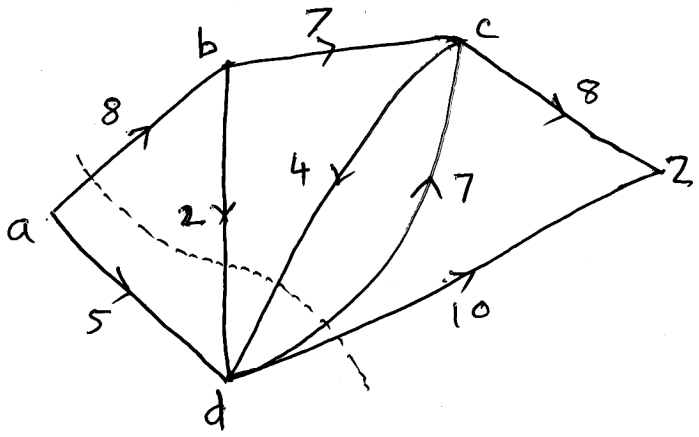
(*iv*) Connceted and disconnected graphs.

5. (*a*) Using labelling procedure, find the max flow for the following transport network. [5]



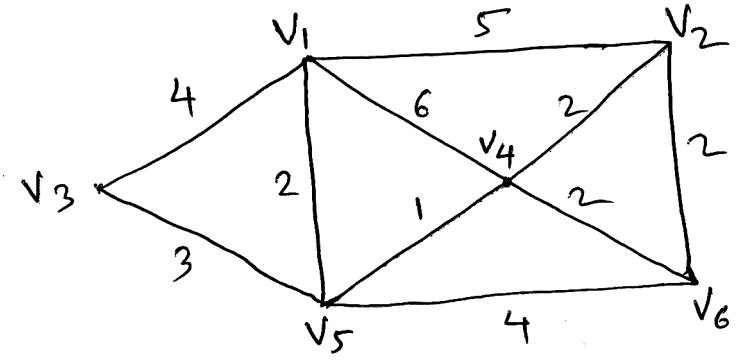
(*b*) Let us consider a hypothetical computer that has an instruction which computes sum of 3 numbers at given instance. Suppose, we want to find sum of 9 numbers x_1, x_2 ,....., x_9. How many (minimum) branch or internal nodes are required if we represent '+' as branch node and numbers as leaf nodes. Justify the answer with the help of tree representation. [4]

(*c*) Find the capacity of the following cut : [4]

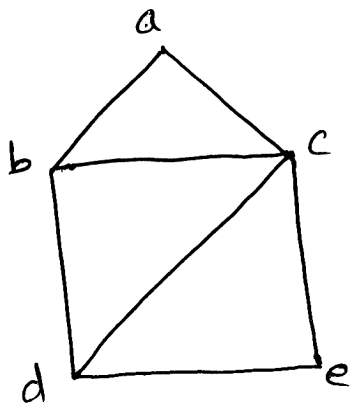


Or

6. (*a*) Build a minimum spanning tree for the following graph using Prim's algorithm. Consider starting vertex as V_1. Explain the procedure with steps. [6]



(*b*) Define spanning tree. Draw at least 3 spanning trees of the following graph, without using any algorithm/procedure. [4]



(*c*) Explain weight of a binary tree with example. [3]

7. (*a*) How many 4 digit even numbers have all 4 digits distinct ? [5]

(*b*) A box contains 3 black, 3 white and 3 red balls. How many ways we can draw 3 balls so that at least one black is included ? [4]

(*c*) How many different salads can be made from 5 different fruits ? Only one fruit can also be used. [4]

Or

8. (*a*) You want to be opener in cricket final match. It depends on who is coach that day. With coach Ravi probability of being opener is 0.5 and with coach Greg it's 0.3. Ravi is coach for 60% time. What is the probability of you being opener for final match ? [5]

(*b*) How many ways we can distribute 6 similar balls in 3 numbered boxes ? [4]

(*c*) If 4 coins are tossed at a time, find probability of getting two heads and two tails. [4]