Total No. of Questions—**8**] [Total No. of Printed Pages—**4**

Seat No.	

[5252]-171

S.E. (Infor. Tech.) (First Semester) EXAMINATION, 2017

DISCRETE STRUCTURE

(2012 COURSE)

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

N.B. : (*i*) Answer Q. No. **1** *or* Q. No. **2**, Q. No. **3** *or* Q. No. **4**, Q. No. **5** *or* Q. No. **6**, Q. No. **7** *or* Q. No. **8**.

(*ii*) Draw neat diagrams must be drawn wherever necessary.

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

(*iv*) Assume suitable data, if necessary.

1. (*a*) What are different logical connections ? Define all logical connections with the help of proper example. [6]

(*b*) P.T. $\frac{1}{4} + \frac{1}{4.7} + \frac{1}{7.10} + ... + \frac{1}{(3n-2)(3n+1)} = \frac{n}{3n+1}$ [6]

Or

2. (*a*) A survey of 70 high school students revealed that 35 like folk music, 15 like classical music, and 5 like both. How many of the students surveyed do not like either folk or classical music ? [6]

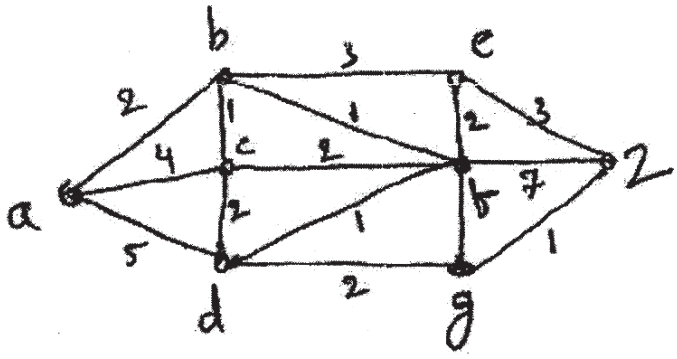
(*b*) What is an equivalent relation ? Identify whether the given relation is an equivalent relation where

A = {1, 2, 3, 4), R = {(1, 1), (1, 2), (2, 1), (2, 2), (3, 1), (3, 3), (1, 3), (4, 1) (4, 4,). Also find the equivalent classes. [6]

P.T.O.

3. (*a*) What is monoid ? Show that the algebraic system (A, +) is a monoid, where A is set of integers and + is a binary operation giving addition of two integers. [6]

(*b*) Find the shortest path from *a* to *z*, using Dijkstra's Algorithm. [6]



Or

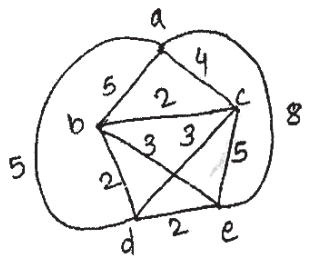
4. (*a*) Show that the graph G and G* are isomorphic G = (V, E) and G* = (V*, E*) given by : [6]

G = ({a, b, c, d}, {(a, b), (a, d), (b, d), (c, d), (c, b), (b, c)}).

G* = ({(1, 2, 3, 4}, {(1, 2), (2, 3), (3, 1), (3, 4), (4, 3), (4, 2)}).

(*b*) (*i*) Define Graph Coloring. [2]

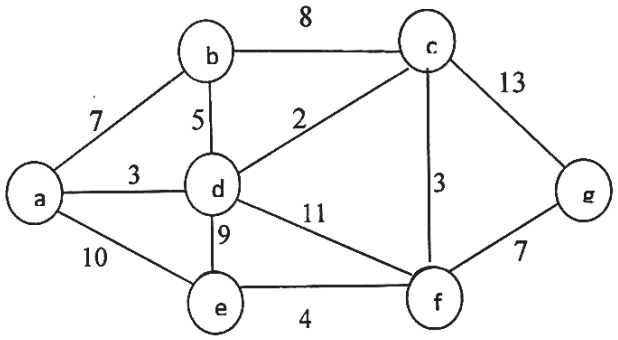
(*ii*) User nearest neighbor method to find Hamiltonian circuit starting from *a*, find its weight. [4]



5. (*a*) For the following set of weight, construct the optimal binary prefix tree. For each of the weight in the set, give the corresponding prefix code. [6]

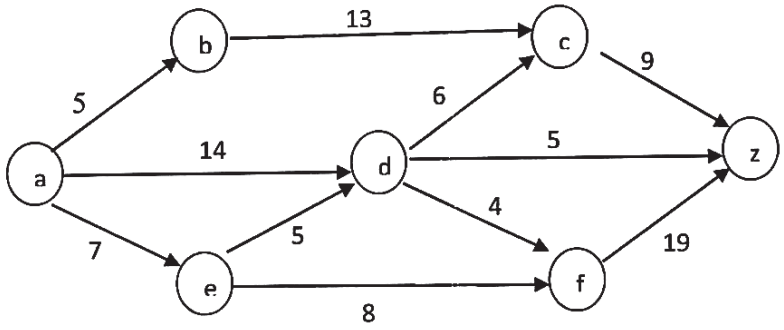
3, 5, 19, 2, 12, 8, 16, 7

(*b*) Determine the minimum spanning tree using prims algorithm for the following graph : [6]



Or

6. (*a*) A find maximum flow in the following transport network. [6]



(*b*) Represent the following expression as : [6]

(1) A binary tree

(2) Postfix Notation

(3) Prefix Notation.

((a + b)*c)/((d – e) ^f)

7. (*a*) How many auto license number plates can be created with 3 alphabets followed by 4 digits if : [4]

(1) Repetition of both alphabets and numbers is allowed.

(2) Repetition of both alphabets and number is not allowed.

(*b*) In how many ways can five examinations be scheduled in a week so that no two examinations scheduled on same day considering Sunday as holiday ? [3]

(*c*) A committee of 5 members is to be formed from a group of 7 men and 6 women. What is the probability that :

(1) At least 3 women are part of the committee.

(2) All committee members are either men or women. [6]

Or

8. (*a*) Out of 15 employees in a software company, a group of 5 employees is to be sent for for 'Linux Administration and Networking' training of one month. [7]

(1) In how many ways can the 5 employees be selected ?

(2) What if there are 2 employees who refuse to go together for training ?

(3) What if there are 2 employees who want to go together i.e. either they go together or they do not go for training ?

(*b*) Two cards are drawn at random from an ordinary deck of well shuffled 52 cards. Find the probability that : [6]

(1) First cards drawn is ace and second cards drawn is face card of spade.

(2) Both are spades.