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

Seat
No.

[4957]-1081

S.E. Information Technology (Semester-I) EXAMINATION, 2016

DISCRETE STRUCTURE

(2012 PATTERN)

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 whenever necessary.

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

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

1.   (*a*)   (*i*)   P(x) : x is even, Q(x) : x is prime number, R(x,y) :
x+y is even. By using above write an English sentence
for each of the following statement given below : [6]

(1) $\forall x\ (\sim Q(x))$

(2) $\exists y(\sim R(y))$

(3) $\sim[x(p(x) \lor q(x))]$

(*ii*)   Construct truth table of $(p \rightarrow q) \leftrightarrow (q \lor \sim p)$

(*b*)   What is an equivalent relation ? Identify whether the given
relation is an equivalent relation where A = {1,2,3,4], relation
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.

Or

2. (*a*) Define function. Let A = B = C = R and let f: A→B, g: B→C be defined by f(a)=a^{-1} g(b)=b^2. Find : **[6]**

      (*i*)   (f(g)(2))

      (*ii*)   (g(f)(2))

      (*iii*) (g(f)(a))

      (*iv*) (f(g)(b))

   (*b*) 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]**

3. (*a*) Define : **[6]**

      (*i*)   Group

      (*ii*)   Abelian group

      (*iii*) Ring

      (*iv*) Isomorphic group

      (*v*)   Submonoid

      (*vi*) Semi-group.

   (*b*) 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), (d, c)}).

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

Or

4. (a) Determine whether the set together with binary operation is a group. If it is group, determine if it is abelian, specify the identity and inverse. {6}

   (i) The set of odd integers under operation of multiplication.

   (ii) Q, the set of all rational numbers under operation of addition.

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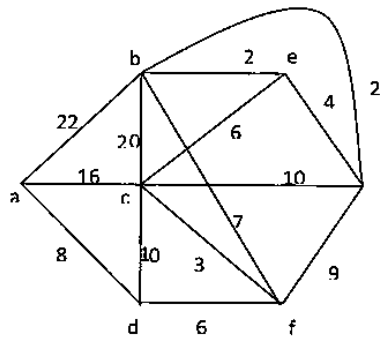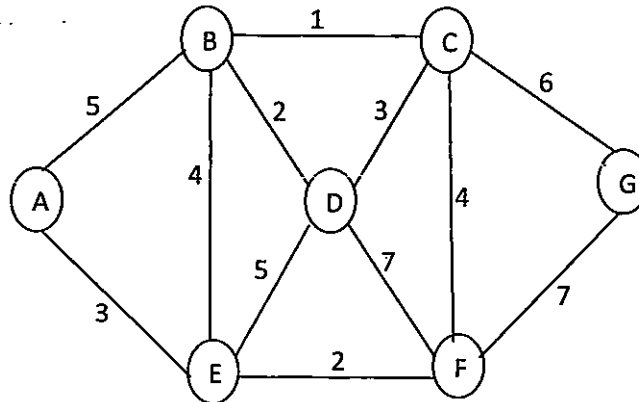

5. (a) Define preorder, postorder and inorder traversal with example. [6]

   (b) Define fundamental circuit. Find fundamental circuit of graph G with respect to given tree T shown below. [6]
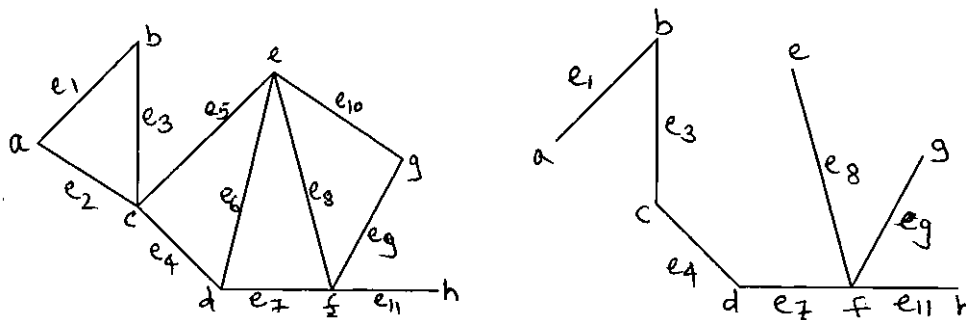
Or

6. (*a*) Determine the minimum spanning tree using Kruskal's algorithm for the following graph : [6]

(*b*) For the following set of weight, construct the optinal binary prefix tree. For each of the weight in the set, give the corresponding prefix code word 8, 9, 10, 11, 13, 15, 22. [6]

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

(*i*) Repetition of both alphabets and numbers is allowed.

(*ii*) Repetition of both alphabets and numbers 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*) Two cards are drawn at random from an ordinary deck of well shuffled 52 cards. Find the probability that : [6]
(*i*) First cast drawn is ace and second card drawn in face card of spade.

(*ii*) Both are spades.

Or

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

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

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

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

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

    (*ii*)   All committee members are either men or women.