Roll No. ..... Total Pages : 4

10396/NH

CS/2110

DISCRETE MATHEMATICS-I

Paper-II

Semester-V

Syllabus-(Dec-19)

Time allowed : 3 Hours] [Maximum Marks : 40

Note : Candidates are required to attempt two questions each from Section A and B. Entire Section C is compulsory.

SECTION-A

1. Prove that distinct equivalence classes of a set form a partition of the set. 6

2. In a survey of 60 people, it was found that 25 read Newsweek magazine, 26 read Fortune, 34 read Times magazine, 9 read both Newsweek and Fortune, 11 read both Times and Newsweek , 8 read both Times and Fortune, 3 read all three magazines. Find :

   (i) The number of people who read at least one of the three magazines.

   (ii) The number of people who read exactly one magazine. 6

3. (i) Use Pigeonhole principle to show that if there are 5 colors to paint 1000 houses then at least 200 houses would be of same color. 3

   (ii) Let $w = a^2bcd$, find all the subwords of w, which of them are initial segments. 3

4. (i) State and prove associative law for lattices. 3

   (ii) Write all the elements and draw the Hasse diagram of D_{24}, the divisors of 24. 3

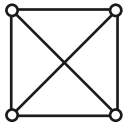
Section-B

5. (i) State and prove Handshaking theorem of graph theory. 3

(ii) Prove that a tree with n vertices has n–1 edges. 3

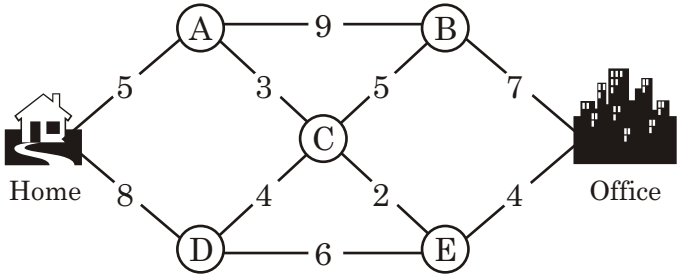
6. Prove that a graph has an Euler circuit iff all the vertices are of even degree. 6

7. State and Prove Euler's formula and verify the same for the following graph 6



K_4

8. Use Dijkstra's algorithm to find the shortest path from Home to Office. 6



SECTION-C

9. (i) Define regular graph with suitable example.

(ii) Define Partial order relation with a suitable example.

(iii) If u=abccaabb, v=abcccbab are any two words in alphabet A={a b, c} then find uv.

(iv) Prove that K_5 is non planar

(v) In how many ways letters of the word DISCRETE can be arranged?

(vi) Find the probability of obtaining exactly two tails in toss of three coins.

(vii) Define Finite State machine.

(viii) State Travelling Salesman Problem. 8×2=16