B.Tech(Integrated M.Tech/MBA) 3rd Semester Examination
Jan. 2014

Discrete Structures
Subject Code: CSL-207

Time Allowed: 03 hours.              Maximum Marks: 100

Before answering the question paper the candidate should ensure that they have been supplied the correct question paper. Complaints in this regard, if any, shall not be entertained after the examination.

Note: All questions carry equal marks. Ques. No. 1 is Compulsory and attempt two questions from each section.

Section –A

1(a) Define Multi set, Composition of function, Relation and partition.
(b) Define recurrence relation and homogeneous solution of recurrence relation with example.
(c) Explain ring with example.
(d) Explain Isomorphic graph and Homeomorphic graph, with the help of suitable example. (5 x 4 = 20)

2(a) Let P and Q be the relations on the set A = {1, 2, 3, 4} defined by
P = {(1,2), (2,2), (2,3)(2,4), (3,2)(4,2)(4,3)}
Q = {(2,2), (2,3), (3,2), (3,3), (3,4)(4,1),(4,2)}

Find (i) P o P (ii) P o Q (iii) P o P o Q (5)
(b) Discuss type of relation with example. (10)
(c) Prove De Morgan laws: \((A \cup B)^c = A^c \cap B^c\) (5)

3(a) Classify the following expressions as tautology, contradiction and contingency giving reasons
(i) \(p \sim q\) (ii) \(p \rightarrow (q \rightarrow p)\) (iii) \(p \rightarrow (q \rightarrow p)\) (10)
(b) What do you mean by proposition? Explain fundamental and derived Connectors to combine proposition with example. (10)

4(a) How many permutations can be made out of the letters of the word “BASIC”? How many of these
(i) Begin with B?
(ii) End with C?
(iii) B and C occupy the end places? (10)

(b) In how many ways can we select a software development group of 1 project leader, 5 programmers and 6 data entry operators from a group of 5 projects leaders, 20 programmers and 25 data entry operators? (10)

Section –B

5(a) Determine the particular solution for the difference equation
\[a_r - 2a_{r-1} = 7r^2\] (10)
(b) Solve the recurrence relation:
\[a_r - 7a_{r-1} + 10a_{r-2} = 3^r\]
by the method of generating functions with the initial Conditions \(a_0 = 0\) and \(a_1 = 1\) (10)

6. Define the following terms giving an example of each
(i) Monoid       (ii) Cyclic group    (iii) Coset
(iv) Normal Subgroup       (v) Field (20)

7(a) For any planar graph, prove that \(V - E + R = 2\) where \(V, E, R\) stands for no. of vertices, no. of edges and no. of regions respectively. (10)
(b) What do you mean by spanning tree? Explain Kruskal’s algorithm of finding minimum spanning tree. (10)