

Jaypee Institute of Information Technology, Noida
End Term Examination, 2016
B.Tech, 2nd Semester (CSE/IT)

Course Title: Theoretical Foundations of Computer Science Maximum Time: 2 Hrs
Course Code: 15B11CI212 Maximum Marks: 35

Q1. [2 Marks] Let L be a language over $\{0,1\}$ such that each string starts with a 0 and ends with a minimum of two subsequent 1's. Write the regular expression for L .

Q2. [2 Marks] Write grammar for the set of all bit strings made up of a 1 followed by an odd number of 0's

Q3. [2 Marks] Suppose that a connected planar graph has 30 edges. If a planar representation of this graph divides the plane into 20 regions, how many vertices does this graph have?

Q4. [3 Marks] Imagine that you are a wedding planner organizing the rehearsal dinner before a big wedding. There are a total of 16 people attending the rehearsal dinner: A,B,C,.....H are relatives of the bride and groom: I,J,K,.....P are members of the wedding party. Some of these people have serious issues:

- A doesn't get along with F,G, or H,
- B doesn't get along with C, D, or H,
- C does not get along with B, D, E, G, or H,
- D doesn't get along with B, C, or E,
- E doesn't get along with C,D,F, or G,
- F doesn't get along with A,E, or G,
- G doesn't get along with A,C,E, or F,
- H doesn't get along with A,B, or C.

To make rehearsal dinner go smoothly you are instructed to find a way to seat these people so that don't get along must be seated at different tables. How are you going to set up the seating arrangements with so many incompatibility issues to worry about? What is the minimum number of tables you will need?

Q5. [3 Marks] Let R be a relation on the set of ordered pairs of positive integers such that $((a,b),(c,d)) \in R$ if and only if $ad=bc$. Determine whether R is an equivalence relation or a partial ordering.