6. Write notes on the following : **15**

(a) Rooted trees

(b) Graphs and Planar graph.

Unit IV

7. The transition probability matrix of a Markov chain $\{X_n\}$, n = 1, 2, 3..... having 3 states 1, 2 and 3 is : **15**

$$p = \begin{bmatrix} 0.1 & 0.5 & 0.4 \\ 0.6 & 0.2 & 0.2 \\ 0.3 & 0.4 & 0.3 \end{bmatrix}$$

And the initial distribution is $p^{(0)}$ = (0.7, 0.2, 0.1).

Find (i) $P(X_2 = 3)$

(ii) $P(X_3 = 2, X_2 = 3, X_1 = 3, X_0 = 0)$

8. Write notes on the following :

(a) Birth-Death processes

(b) Random variables. **15**

No. of Printed Pages : 04 Roll No. .....

AA583

M. Tech. EXAMINATION, May 2019

(First Semester)

(B. Scheme) (Re-appear Only)

(CSE)

CSE505B

MATHEMATICS FOUNDATIONS OF COMPUTER SCIENCE

Time : 3 *Hours*] [*Maximum Marks :* 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit.

Unit I

1. (a) Prove that : **7**

$A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$

(b) Show that the following statement is ambiguous :

$S \rightarrow aSbS$

$S \rightarrow bSaS$

$S \rightarrow \in$ **8**

2. (a) Define Well formed formula. Explain about Tautology with example. **8**

(b) Explain in brief Type-3 languages with examples. **7**

Unit II

3. (a) Solve the recurrence relation : **8**

$$a_{r+2} - 3a_{r+1} + 2a_r = 0$$

with the initial conditions $a_0 = 2$, $a_1 = 3$.

(b) Define Cosets. Prove that in a group the inverse of any element is unique. **7**

4. (a) Let G = {–1, 0, 1}. Verify that G forms an abelian group under addition. **8**

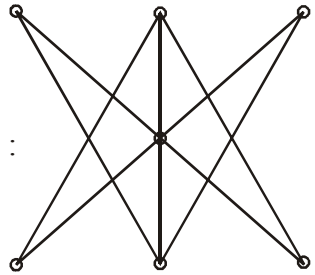
(b) With the help of suitable examples, explain what are rings. **7**

Unit III

5. (a) Illustrate the procedure to determine the minimal spanning tree from a weighted graph. Support your illustration using an example. **8**

(b) Show that the graphs G1 and G2 are isomorphic by defining a 1–1 correspondence between the vertex sets and the edge sets. **7**

G1 :



G2 :