PVP 14

Code: IT1T4, IT2T7RS

I B.Tech - I Semester – Regular Examinations – November 2015

DISCRETE MATHEMATICS
(INFORMATION TECHNOLOGY)

Duration: 3 hours Max. Marks: 70

PART – A

Answer *all* the questions. All questions carry equal marks

11 x 2 = 22 M

1. a) Check whether the formula $P \to (P \vee Q)$ is a tautology or not?

   b) Construct the truth table for $P \wedge (P \to Q)$.

   c) Write the inverse of the conditional statement " if 2+2=4 then I am not the Prime Minister of India."

   d) Symbolize the statements "All men are mortal" and "Some men are good".

   e) Let $X = \{0,1,2,3,4\}$ and R= $\{(0,1),(0,2),(0,3),(0,4),(1,2),(1,3),(1,4),(2,3),(2,4)\}$.
   Draw the digraph of the relation R on X.

   f) Draw all simple graphs of three vertices.

   g) Define Euler graph and Hamiltonian graph.

   h) How many ways are there to arrange the nine letters in the word "ALLAHABAD" ?

   i) Find P(8,4).

j) Find the generating function of a^n (a is a constant).

k) Solve the recurrence relation $a_n + 5a_{n-1} + 6a_{n-2} = 0$ for $n \geq 2$.

PART – B

Answer any ***THREE*** questions. All questions carry equal marks. 3 x 16 = 48 M

2. a) Show that 8 M

$$\sim(P \wedge Q) \rightarrow (\sim P \vee (\sim P \vee Q)) \Leftrightarrow \sim P \vee Q$$

b) Obtain the principal disjunctive normal form of 8 M
$P \rightarrow ((P \rightarrow Q) \wedge \sim(\sim Q \vee \sim P))$

3. a) Show that $R \wedge (P \vee Q)$ is a valid conclusion from the premises 8 M

$$P \vee Q,\ Q \rightarrow R,\ P \rightarrow M \ \ and \ \sim M$$

b) Let A be a set. Define a relation R on A×A by
$$(a,b)R(c,d) \ \ iff \ \ a+b=c+d.$$
Then prove that R is an equivalence relation on A×A. 8 M

4. a) Let $A = \{1,2,3,4\}$ and let R be a relation on A defined by
$$R = \{(1,1),(1,2),(2,4),(3,2),(4,3)\}.$$
Find the transitive closure of R. 8 M

b) Prove that in any undirected graph there is an even number of vertices of odd degree. 8 M

5. a) In how many ways can a committee of 5 persons be formed from 6 men and 4 women so as to include at least 2 women? 8 M

b) Find the number of integers between 1 and 250 that are divisible by any of the integers 2, 3 and 7. 8 M

6. a) Solve the recurrence relation

$$a_n - 6a_{n-1} + 9a_{n-2} = 0,\ n \geq 2\ and\ \ a_0 = 2, a_1 = 3$$

using generating function. 8 M

b) Solve the recurrence relation

$$a_n - 4a_{n-1} - 12a_{n-2} = 0,\ n \geq 2\ and\ \ a_0 = 4,\ a_1 = \frac{16}{3}$$

using the characteristic roots. 8 M