PVP 12

Code: EM3T4, IT3T1

II B.Tech - I Semester – Regular Examinations - January 2014

DISCRETE MATHEMATICS

(Common for ECM, IT)

Duration: 3 hours Marks: 5x14=70

Answer any FIVE questions. All questions carry equal marks

1 a) Construct the truth table of the following formula
$\sim(P \vee (Q \wedge R)) \leftrightarrow (P \vee Q) \wedge (P \vee R)$. 7 M

b) Show that $\sim(P \vee (\sim P \wedge Q))$ and $(\sim P \wedge \sim Q)$ are logically equivalent. 7 M

2 Obtain the principal disjunctive and principal conjunctive normal forms of
$(P \rightarrow (Q \wedge R)) \wedge (\sim P \rightarrow (\sim Q \wedge \sim R))$. 14 M

3 a) Find and prove a formula for the sum of first n cubes
$1^3 + 2^3 + \cdots + n^3$
by using mathematical induction. 7 M

b) Show that $S \vee R$ is tautologically implied by
$(P \vee Q) \wedge (P \rightarrow R) \wedge (Q \rightarrow S)$. 7 M

4 a) Find the number of ways of arranging 6 boys and 6 girls in a row. In how many of these arrangements

i. All the girls are together.

ii. No two girls are together.

iii. Boys and girls come alternatively. 7 M

b) How many different strings can be made from the letters in MISSISSIPPI using all the letters? 7 M

5 a) Solve the linear recurrence relation

$H_n = H_n\text{-}1 + (n-1), n \geq 2, H_1 = 0$

of the handshake problem by using substitution method. 7 M

b) Solve the linear recurrence relation by using method of characteristic roots.

$a_n - 7a_{n-1} + 12a_{n-2} = 0$, $n \geq 2$, $a_0 = 2$ and $a_1 = 5$. 7 M

6 a) If R is a relation on the set of integers Z defined by

$R = \{(x, y): x - y \text{ is divisible by } 3\}$

then prove that R is an equivalence relation? 7 M

b) Define a lattice? Show that $(D_8,/)$ is a lattice. where D_8 is the set of all divisors of 8. 7 M

7 a) Write Warshall's algorithm to find the transitive closure of a digraph. 7 M

b) Consider the relation

R={(a,a),(a,b),(a,c), (b,b),(b,d),(c,c),(c,d)}.

Draw digraph for the relation R and represent adjacency matrix? 7 M

8 a) Explain the Konigsberg bridge problem? 7 M

b) Define Hamiltonian and Eulerian graphs? Also give an example of a graph which is Hamiltonian but not Eulerian. 7 M