October-2015

M.sc.IT Semester – I

Paper No – 2: Discrete Mathematics

Paper Code: 2737

Time: 2:30 Hours Marks: 70

Q.1 (a) If we define a relation S on a set of real numbers R as $_xS_y$ if $x \leq y$. Show that $(S, \leq)$ is partially ordered set (POSET). [7]

(b) Explain following with example: [7]

(i) Lower Bound (ii) Upper Bound

OR

Q.1 (a) Draw Hasse diagram for the following POSETs: [7]

(i) $< P(A), \subseteq >$, where A = {a, b}

(ii) $< S_{30}, D >$, where D denotes the relation of divisor

(b) Explain various properties of Relation. [7]

Q.2 (a) Find (i) $_9P_5$ (ii) $_{10}C_4$ (iii) $\binom{8}{2} + {}_8P_2$ (iv) $5\binom{6}{0}$ [7]

(b) State and prove the formula for r – combination of an n – set. [7]

OR

Q.2 (a) Solve a recurrence relation $a_n = n\, a_{n-1}$ with $a_1=1$. Also find a_{10} using this solution. [7]

(b) How many even numbers of three digits can be formed ? [7]

Q.3 (a) Determine whether following formula is tautology, contradiction or none of them? [7]

(i) $q \wedge (p \vee q) \leftrightarrow q$ (ii) $(p \vee q) \leftrightarrow ((\sim q) \wedge (\sim p))$

Where ~ indicates negation.

(b) Explain with example:(i) Simple statement (ii) Negation of a statement [7]

OR

Q.3 (a) (i) State principle of mathematical induction. [7]

(ii) Write truth tables for (A) conditional (B) bi-conditional statement.

(b) In each of the following cases, verify whether the given conclusion C follows from the given premises H1 and H2. [7]

(i) H1: $\sim p$ H2: $p \leftrightarrow q$ C: $\sim(p \vee q)$

(ii) H1: $p \leftrightarrow q$ H2: q C: p

Q.4 Define the following terms and give one example of each: [14]

(i) Loop (ii) Parallel edges (iii) Incident vertices (iii) Pendent vertex (iv) Circuit (v) Disconnected graph (vi) Tree (vii) Complete graph.

OR

Q.4 (a) (i) Draw a regular graph with 6 vertices which is not a complete graph [7]

(ii) Draw a K5 graph.

(iii) Draw a planner graph.

(b) State and prove Fundamental theorem of graph theory. [7]

Q.5 (a) Prove that there is only one path between every pair of vertices in a tree. [7]

(b) Explain Konigsberg Seven Bridge Problem. [7]

OR

Q.5 (a) Write a short note on Four Color Problem. [7]

(b) Explain with example: How to find centre of a graph? [7]
