Code No. 9601

FACULTY OF INFORMATICS

M.C.A. I Year I – Semester (Main) Examination, February 2015

Subject: Discrete Mathematics

Time: 3 Hours **Max. Marks: 80**

Note: Answer one question from each unit. All questions carry equal marks.

Unit – I

1 a) Using the laws of algebras of propositions shown that

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

b) What are quantifiers? Explain the different types of quantifiers.

OR

2 a) Show that for any two sets A and B,

A - (B U C) = (A - B) $\cap$ (A - C) by Venn diagram

b) Reduce the given expression to sum of products form using don't care combinations.

$f(A,B,C,D) = \Sigma\, m(1,3,7,11,15) + \Sigma\, d(0,2,4)$.

Unit – II

3 a) State and prove fundamental theorem of Arithmetic.

b) Show that if any five integers from 1 to 8 are chosen, then at least two of them will have a sum 9.

OR

4 a) Draw the Hasse diagram for the partial ordering

$\{(A,B) \mid A \subseteq B\}$ on the power set p(s) where s = {a,b,c}

b) Show that in a complemented, distributive lattice, the following are equivalent

i) $a \le b$ ii) $a \wedge b' = 0$ iii) $a' \vee b = 1$ iv) $b' \le a'$

Unit – III

5 a) State and prove principles of inclusion – exclusion.

b) Find the number of arrangement of the letter in the word "ACCOUNTANT".

OR

6 a) Find the sequence $\{y_k\}$ having the generating function 'G' given by

$$G(x) = \frac{3}{1-x} + \frac{1}{1-2x}$$

b) Find the sequences corresponding to the ordinary generating function

i) $(3+x)^3$ ii) $3x^3 + e^{2x}$

Unit – IV

7 a) Solve the recurrence relation together with initial conditions

$a_n = 3a_{n-1} - 3a_{n-2} + a_{n-3}$; $a_o = 3$, $a_2 = 3$, $a_3 = 10$

b) Find a general expression for a solution to the recurrence relation

$a_n - 5a_{n-1} + 6a_{n-2} = n(n-1)$ for $n \geq 2$.

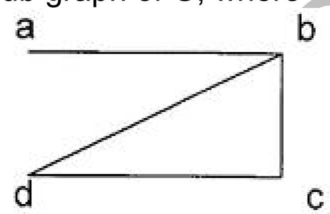
OR

8 a) Solve the recurrence relation $F_{n+2} = F_{n+1} + Fn$ where $n \geq 0$ and $F_o = 0$, $F_1 = 1$.

b) Define cyclic group and then prove set of integers with respect to + i,e(Z,+) is a cyclic group, a generator being 1.

Unit – V

9 a) Define sub graph and the graph G(V,E) shown below, determine whether or not $H(V_1,E_1)$ is a sub graph of G, where



(i) V_1 ={a,b,d} E_1 ={(a,b)(a,d)}

(ii) V_1 ={a,b,c,d} E_1 ={(b,c),(b,d)}

b) Prove that every circuit contains a cycle.

OR

10 a) What is minimal spanning tree? Explain briefly.

b) Represent the expression as a binary tree and write the prefix and postfix form of the expression $A*B-C\uparrow D + E/F$.

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