contradiction or contingency. :—

(i) $(p\wedge q)\to p$

(ii) $(p\vee q)\to(p\wedge q)$

(iii) $(p\wedge q)\to(\sim p\vee\sim q)$ 6

(b) Prove that both the join and meet operation are associative. 6

UNIT V

9 (a) Prove that in a distributive lattice if an element has a complement then this complement is unique. 6

(b) Find the disjunctive normal form of : $(x\vee y)\wedge(x'\vee y')$. 6

10. (a) Let B be set of statements forms closed under operation of conjunction disjunction and negation. Prove that $\langle B, \wedge, \vee, - \rangle$ is a Boolean Algetra. 6

(b) Simplify the following Boolean function. $f(x, y, z) = x\cdot z + [y\cdot(y'+z)\cdot(x'+y\cdot z')]$ 6

First Semester B. C. A. (Part – I) Examination

DISCRETE MATHEMATICS – I

Paper – 1 ST5

P. Pages : 4

Time : Three Hours] [Max. Marks : 60

Note : (1) All questions carry equal marks.
(2) Attempt **one** question from each unit.

UNIT I

1. (a) Define : Constant function, one one function, onto function, composition of two function, Identify function and Equal function. 6

(b) If A, B and C are finite sets, then prove that $|A\cup B\cup C| = |A| + |B| + |C| - |A\cap B| - |B\cap C| - |A\cap C| + |A\cap B\cap C|$. 6

2. (a) Among the integers 1 to 300. Find how many integers are not divisible by 3 nor by 5 and find also how many integers are divisible by 3 but not by 7. 6

(b) Let A and B be countable sets. Then prove that $A\cup B$ is countable. 6

UNIT II

3. (a) Define probability generating function and prove that $E(x) = P'x(1)$. 6

(b) Let A (x), B (x) and C (x) are ordinary generating function. :—

(i) If $C\eta = \alpha a_\eta + \beta b_\eta$ then prove that $((x) = \alpha A(x) + \beta B(x)$.

(ii) If $A(x) = B(x)$, then prove that $a_\eta = b_\eta$ Where α and β are constants. 6

4. (a) Find the coefficient of x^{16} in expression of $(x^2+x^3+x^4+\dots\dots)^5$ 6

(b) Define Ferrer's diagram and conjugate Ferrer's diagram and draw both for 5+4+3+2+1. 6

UNIT III

5. (a) Solve the Fibonacci relation $a_\eta = a_{\eta-1} + a_{\eta-2}$ with the initial condition $a_0=0$, $a_1=1$. 6

(b) Find the homogenous solution of $a_r = 11a_{r-1} + 30a_{r2} = 0$. with initial condition $a_0 = 1$, $a_1 = 2$. 6

6. (a) Find the total solution of the difference equation $a_r - 7a_{r-1} + 10\,a_{r-2} = 6+8r$. with the initial condition $a_0 = 1$, $a_1 = 2$. 6

(b) Define particular solution and find the particular solution of the difference equation $a_r - 6a_{r-1} + 9a_{r-2} = 4$. 6

UNIT IV

7. (a) State duality principle and find the duals of the following :—

(i) $\bar{a} \vee b \geq 1$

(ii) $(a \wedge b) \geq \bar{b}$

(iii) $\bar{a} \leq 0$

(iv) $a \vee b = b \vee a$

(v) $a \geq \overline{(b \vee c)}$ 6

(b) In a lattice L, prove that

(i) $a \vee (a \wedge b) = a \;\forall\; a, b \in L$

(ii) $a \wedge (a \vee b) = a \;\forall\; a, b \in L$. 6

8. (a) Verify the following statements are tautology,