Code No. 52

FACULTY OF ENGINEERING

B.E. 2/4 (CSE) I – Semester (Backlog) Examination, December 2017
Subject: Discrete Structures

Time: 3 Hours **Max.Marks: 75**

Note: Answer all questions from Part A and any five questions from Part B.

PART – A (25 Marks)

1 Define the law of duality. Obtain the dual for $(P \cap \sim Q) \cap (R \rightarrow Q)$. 3

2 Convert "All apples are not red" to a symbolic form. 2

3 Find the no. of derangements for 1,2,3,4. List all derangements of 1,2,3,4. 3

4 In how many ways can four letters of alphabets "BETTER" be arranged? 2

5 Find the co-efficient of x^{15} in $(x^3+x^4+x^5+....)^5$. 3

6 Find a sequence for the generating function $1/(1-2X)^n$. 2

7 Define lattice. Give an example. 3

8 What is semi group homomorphism? 2

9 What is a Hamiltonian graph? Give an example. 3

10 Find the degree of a complete graph (k_4). 2

PART – B (5x10 = 50 Marks)

11 a) Show the validity of the statement 5

$(\sim p \vee q) \rightarrow r$
$r \rightarrow (s \vee t)$
$\sim s \wedge \sim u$
$\sim u \rightarrow \sim t$
$\therefore p$

b) Prove that for any propositions p, q, r the compound statement 5
$[(p \rightarrow q) \wedge (q \rightarrow r) \rightarrow [p \rightarrow r]$ is a tautology.

12 Let f: $R \rightarrow R$ be defined by 10

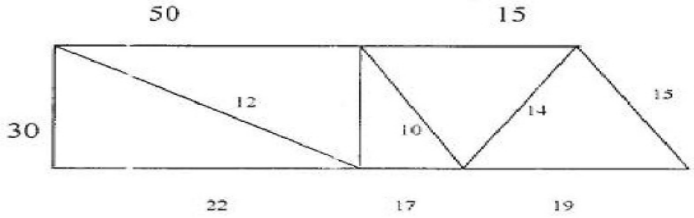
$f(x) = 3x-5, x > 0$
$= -3x+1, x <= 0$

i) Determine f(0), f(-1), f(5/3) and f(-5/3)
ii) Determine $f^1(0)$, $f^1(3)$, $f^1(-6)$, $f^1[-5,5]$

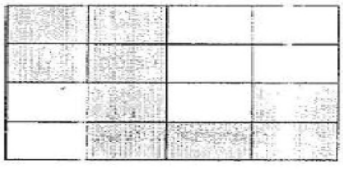
13 Solve the recurrence relation $T(k) - 7T(k-1) + 10T(k-2) = k^2+1$ and T(0)=4, T(1)=17? 10

14 If $<G,*>$ is an Abelian group then prove that $(a*b)^n = a^n*b^n$ for all $n \in N$. 10

15 Explain and apply Prim's algorithm for the figure given below and find minimal cost. 10



16 a) Find the rook polynomial for shaded board. 5



b) For any $n \in Z+$, prove that the integers 8n +3 and 5n+2 are relatively prime. 5

17 a) Prove the following statement by using mathematical induction. 5

$1^2 + 3^2+5^2+ ..... (2n-1)^2 = (n)(2n-1)(2n+1)/3.$

b) If $<G,*>$ is an abelian group then prove that $(a*b)^n = a^n*b^n$ for all $n \in N$. 5

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