Q.P. Code: 16CS507 **R16**

Reg. No: | | | | | | | | | | |

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B. Tech II Year I Semester Supplementary Examinations August-2021

MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

(Common to CSE & CSIT)

Time: 3 hours Max. Marks: 60

(Answer all Five Units **5 x 12 = 60** Marks)

UNIT-I

1 **a** Show that $(\neg P \wedge \neg Q \wedge R) \vee (Q \wedge R) \vee (P \wedge R) \Leftrightarrow R$ **6M**

b Define Quantifiers and types of Quantifiers with examples. **6M**

OR

2 **a** Show that S is a valid conclusion from the premises $p \rightarrow q$, $p \rightarrow r$, $\neg(q \wedge r)$ and $(S \vee p)$. **6M**

b Obtain PCNF of A= $(p \wedge q) \vee (\sim p \wedge q) \vee (q \wedge r)$ by constructing PDNF. **6M**

UNIT-II

3 **a** Let f: A → B, g: B → C, h: C → D then prove that $ho(gof) = (hog)of$. **6M**

b If f: R → R such that f(x) = 2x+1, and g: R → R such that g(x) = x/3 then verify that $(gof)^{-1} = f^{-1}og^{-1}$. **6M**

OR

4 **a** Show that every homomorphic image of an abelian group is abelian. **6M**

b Define and give examples for group, semigroup, subgroup &abelian group. **6M**

UNIT-III

5 **a** How many numbers can be formed using the digits 1, 3, 4, 5, 6, 8 and 9 if no repetitions are allowed? **6M**

b What is the co-efficient of (i) $x^3 y^7$ in $(x+y)^{10}$ **6M**

(ii) x^2y^4 in $(x-2y)^6$

OR

6 **a** Find the minimum number of students in a class to be sure that 4 out of them are born in the same month. **4M**

b How many ways can the letters of the word COMPUTER be arranged? How many of them begin with C and end with R? How many of them do not begin with C but end with R? **8M**

UNIT-IV

7 **a** Solve the recurrence relation $a_r = a_{r-1} + a_{r-2}$ using generating function. **6M**

b Solve the recurrence relation using generating functions $a_n - 9a_{n-1} + 20a_{n-2} = 0$ for $n >= 2$ and $a_0 = -3$, $a_1 = -10$ **6M**

OR

8 **a** Find the generating function for the sequence 1,1,1,3,1,1,..... **3M**

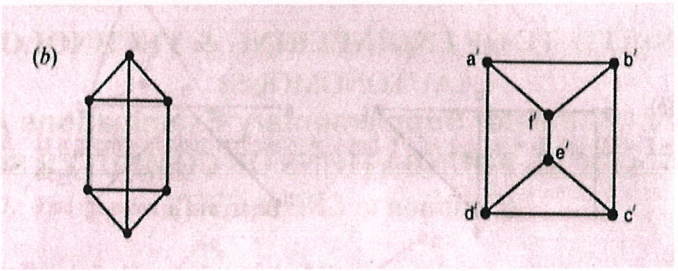
b i)Find the coefficient of x^{20} in $(x^2 + x^3 + x^4 + x^5 + x^6)^5$? **9M**

ii)Determine the sequence generated by the following:

$f(x) = 2e^x + 3x^2$ and $7e^{8x} - 4e^{3x}$.

UNIT-V

9 **a** Show that the two graphs shown below are isomorphic? **6M**



b Explain about the Rooted tree with an example? **6M**

OR

10 **a** Define Spanning tree and explain the algorithm for Depth First Search (DFS) traversal of a graph with suitable example. **8M**

b A graph G has 21 edges, 3 vertices of degree4 and the other vertices are of degree 3. Find the number of vertices in G? **4M**

*** END ***