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

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR

(AUTONOMOUS)

B Tech II Year I Semester Supplementary Examinations November-2020

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**	Explain conjunction and disjunction with suitable examples.	**5 M**
	b	Show that (a) $(\neg P \wedge \neg Q \wedge R) \vee (Q \wedge R) \vee (P \wedge R) \Leftrightarrow R$	**7 M**

OR

2	**a**	Using algebra of propositions, show that $P \Leftrightarrow Q \equiv (P \vee Q) \Rightarrow P \wedge Q$.	**7 M**
	b	Obtain PCNF of $A = (p \wedge q) \vee (\sim p \wedge q) \vee (q \wedge r)$ by constructing PDNF.	**5 M**

UNIT-II

3	**a**	Define a binary relation with an example. Let R be the relation from the set A = {1, 3, 4} on itself and defined by R = {(1, 1), (1, 3), (3, 3), (4, 4)} then find the matrix of R, draw the graph of R.	**6 M**
	b	Prove that the set of all integers Z is an abelian group with the binary operation '*' defined as $a*b = a+b+1,\ \forall a, b \in Z$.	**6 M**

OR

4	**a**	Define primitive recursive function. Show that the function $f(X, Y) = X + Y$ is primitive recursive.	**7 M**
	b	Let $f: A \to B,\ g: B \to C,\ h: C \to D$ then prove that $h \circ (g \circ f) = (h \circ g) \circ f$.	**5 M**

UNIT-III

5	**a**	Find the integral solutions to $x_1 + x_2 + x_3 + x_4 + x_5 = 20$ where each (i) $x_i \geq 2$ (ii) $x_i > 2$.	**6 M**
	b	Obtain the coefficient of $(i)\ x^3 y^2 z^2$ in $(2x - y + z)^9$ $(ii)\ x^6 y^3$ in $(x - 3y)^9$.	**6 M**

OR

6	**a**	How many permutations can be formed out of the letters of word "SUNDAY". How many of these (*i*) Begin with S (*ii*) End with Y (*iii*) Begin with S and end with Y (iv) S & Y always to gather.	**6 M**
	b	Obtain the co-efficient of $(i)\ x^3 y^7$ in $(x+y)^{10}$ $(ii)\ x^2 y^4$ in $(x-2y)^6$.	**6 M**

UNIT-IV

7 **a** Solve $a_n - 9a_{n-1} + 26a_{n-2} - 24a_{n-3} = 0$ for $n \geq 3$ with conditions $a_0 = 0$, $a_1 = 1$ and $a_2 = 10$. **7 M**

b Solve the recurrence relation by substitution $a_n = a_{n-1} + \frac{1}{n(n+1)}$, where $a_0 = 1$. **5 M**

OR

8 **a** Solve $a_n - 4a_{n+1} + 4a_{n-2} = (1+n)^2$ given that $a_0 = 0,\ a_1 = 1$. **5 M**

b Solve the recurrence relation $a_n = a_{n-1} + \frac{n(n+1)}{2}$, where $a_0 = 1$ by substitution. **7 M**

UNIT-V

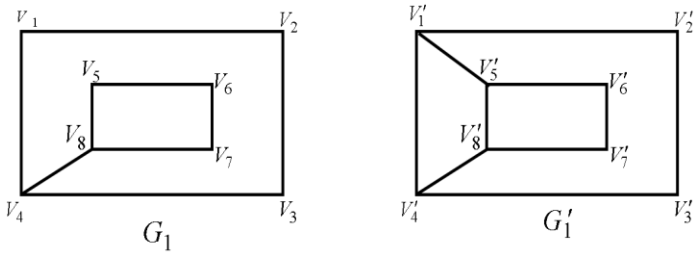
9 **a** Show that the maximum number of edges in a simple graph with n vertices is $\frac{n(n-1)}{2}$. **6 M**

b Suppose a graph has vertices of degree 0, 2, 2, 3 and 9. How many edges does the graph has? **6 M**

OR

10 **a** Define the following graph with one suitable example for each graph **6 M**
(i) complement graph
(ii) sub-graph
(iii) induced sub-graph
(iv) Spanning sub-graph.

b Identify the following pairs of graphs are isomorphic or not? **6 M**



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