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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR
(AUTONOMOUS)**B. Tech II Year I Semester Regular & Supplementary Examinations Nov/Dec 2018****MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE**

(CSE,CSIT)

Time: 3 hours

Max. Marks: 60

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

- 1 a Using replacement process, Prove that $P \rightarrow (Q \rightarrow P) \Leftrightarrow \neg P \rightarrow (P \rightarrow Q)$ 5 M
- b Use indirect method of proof, to prove that 7 M
 $(\forall x) (P(x) \vee Q(x)) \Rightarrow (\forall x) P(x) \vee (\forall x) Q(x)$

OR

- 2 a Obtain PCNF of $A = (p \wedge q) \vee (\sim p \wedge q) \vee (q \wedge r)$ by constructing PDNF. 6 M
- b Show that $S \vee R$ is a tautologically implied by $(P \vee Q) \wedge (P \rightarrow Q) \wedge (Q \rightarrow S)$ 6 M

UNIT-II

- 3 a Determine A/R, when $A = \{1, 2, 3, 4\}$ and $R = \{(1,1), (1,2), (2,1), (2,2), (3,4), (4,3), (3,3), (4,4)\}$ be an equivalence relation on R. 5 M
- b Prove that the set of all integers Z with the binary operation $*$, defined as $a * b = a + b + 1, \forall a, b \in Z$ is an abelian group. 7 M

OR

- 4 a $f: R \rightarrow R$ such that $f(x) = x(x+1)$ and $g: R \rightarrow R$ such that $g(x) = x/3$ then verify 7M
that $(g \circ f)^{-1} = g^{-1} \circ f^{-1}$
- b The necessary and sufficient condition for a non – empty subset H of a group $(G, *)$ to be a subgroup is $a, b \in H \Rightarrow a * b^{-1}$ 5M

UNIT-III

- 5 a Consider a set of integers from 1 to 250. Find how many of these numbers are divisible by 3 or 5 or 7. Also indicate how many are divisible by 3 or 7 but not by 5 and divisible by 3 or 5. 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 solutions does the equation $x_1 + x_2 + x_3 = 17$ have, subject to the constraints (i) x_1, x_2, x_3 are non-negative integers. (ii) $x_1 \geq 1, x_2 \geq 2$ and $x_3 \geq 3$. 6 M
- b How many ways can the letters of the word “COMPUTER” be arranged. 6 M
(i) How many of them begin with C and end with R.
(ii) How many of them do not begin with C but end with R.

UNIT-IV

- 7 a Using generating function to solve the recurrence relation $a_{n+2} - 2a_{n+1} + a_n = 2^n$, 6 M
with initial conditions $a_0 = 2, a_1 = 1$
- b Solve the recurrence relation $a_n = a_{n-1} + \frac{n(n+1)}{2}$, where $a_0 = 1$ by substitution 6 M

OR

- 8 a Solve $a_n - 9a_{n-1} + 20a_{n-2} = 0$ with initial conditions $a_0 = -3, a_1 = -10$. 5 M
 b 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

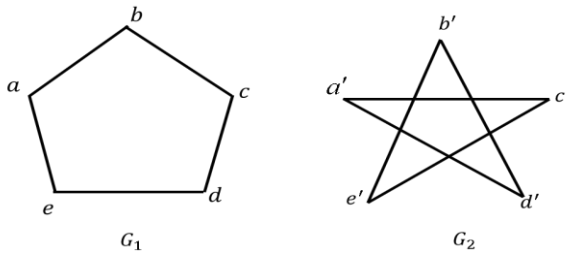
UNIT-V

- 9 a Show that in any graph the number of odd degree vertices is even. 5 M
 b Draw the graph represented by given Adjacency matrix

(i) $\begin{bmatrix} 1 & 2 & 1 \\ 2 & 0 & 0 \\ 0 & 2 & 2 \end{bmatrix}$ (ii) $\begin{bmatrix} 1 & 2 & 0 & 0 \\ 1 & 0 & 1 & 1 \\ 0 & 1 & 2 & 2 \\ 0 & 1 & 2 & 0 \end{bmatrix}$ 7 M

OR

- 10 a Identify whether the following pairs of graphs are isomorphic or not? 7 M



- b Define the following graph with one suitable example for each graph 5 M
 (i) complement graph (ii) subgraph (iii) induced subgraph (iv) spanning subgraph

*** END ***