# SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY::PUTUR (AUTONOMOUS)
## I MCA I Semester Regular & Supplementary Examinations JAN 2018
## MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

Time: **3 hours**                                                       Max. Marks: **60**

(Answer all Five Units **5X12=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.  Show that $(P \rightarrow Q) \rightarrow Q) \Rightarrow P \vee Q$ without constructing truth table     6M

### OR

2  a.  Define Quantifiers and types of Quantifiers with an example.     6M

   b.  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

### UNIT-II

3  a.  Define an equivalence relation? If R be a relation in the set of integers Z defined by R = $\{(x, y): x \epsilon Z, y \epsilon Z, (x - y)$ is divisible by 6$\}$ then prove that R is an equivalence relation?     6M

   b.  Define Bijective function with 2 examples     6M

### OR

4  a.  On the set Q of all rational numbers operation * is defined by a*b=a+b-ab. Show that this operation on Q forms a commutative monoid     6M

   b.  Show that S={1,2,3,4,5} is not a group under addition & multiplication modulo 6     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.  Out of 9 girls and 15 boys How many different committees can be formed each consisting of 6 boys and 4 girs?     6M

### OR

6  a.  Out of 80 students in a class , 60 play foot ball, 53 play hockey , and 35 both the games. How many students (i) do not play of these games . (ii) play only hockey but not foot ball.     6M

   b.  How many different license plates are there that involve 1,2 or 3 letters followed by 4 digits     6M

## UNIT-IV

7  a.  Solve $a_n = a_{n-1} + 2a_{n-2}$ ,$n > 2$ with the condition $a_0 = 0$ , $a_1 = 1$      6M

    b.  Solve $a_n - 7 a_{n-1} + 10 a_{n-2} = 4^n$

                                                                6M

### OR

8  a.  Solve the recurrence relation $a_n = a_{n-1} + n(n+1)/2$     6M

    b.  Solve $a_n - 5 a_{n-1} + 6 a_{n-2} = 2^n$ ,$n > 2$ with $a_0 = 1$ , $a_1 = 1$,using generating function     6M

## UNIT-V

9  a.  Explain krushkal's algorithm finds a minimal spanning tree with own graph     6M

    b.  Explain complete graph and planar graph     6M

### OR

10  Define the following graph with one suitable examples for each graph
(i) complement graph  (ii) subgraph (iii) induced subgraph (iv) spanning subgraph     12M

**\*\*\* END \*\*\***