SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
MCA I Year I Semester Regular Examinations December-2025
MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE

Time: 3 Hours   Max. Marks: 60
(Answer all Five Units 5 x 12 = 60 Marks)

UNIT-I

1	a	Explain the connectives and their truch tables.	CO1	L1	6M
	b	Prove that $[(P \rightarrow Q) \wedge (Q \rightarrow R)] \rightarrow [P \rightarrow R]$ is a tautology.	CO1	L3	6M

OR

2	a	Define Predicates, simple and compound statement function with example.	CO1	L1	6M
	b	Prove that if n is an integer, then $n^2 \geq n$, by proof by cases method	CO1	L2	6M

UNIT-II

3 a Define (i) Equal sets (ii) Empty set (iii) Subset (iv) The size of a set   CO2   L1   6M
(v) Power set (vi) Cartesian Product of two sets

b If $f : R \rightarrow R$ such that $f(x) = 2x+1$ and $g : R \rightarrow R$ such that $g(x) = \dfrac{x}{3}$ CO2   L2   6M

then verify that $(gof)^{-1} = f^{-1}og^{-1}$

OR

4 a Show that if A and B are countable sets, then $A \cup B$ is also countable.   CO2   L2   6M
b Define transitive closures. Let A={ 1,2,3}& R= {(1,2),(2,3),(3,1)}.Find   CO2   L2   6M
the reflexive, symmetric and transitive closures of R, using composition
of matrix relation of R.

UNIT-III

5 a Write the properties of algorithms.   CO3   L1   6M
b Define Big-O Notation with an example.   CO3   L1   6M

OR

6 a Explain mathematical induction and strong induction   CO3   L1   6M
b Show that if n is an integer greater than 1, then n can be written as the   CO3   L2   6M
product of primes by using strong induction method

UNIT-IV

7 a A class consists of 6 girls and 10 boys. If a committee of 3 is chosen at   CO4   L2   6M
random from the class, find the Probability that (i) 3 boys are selected
(ii) Exactly 2 girls are selected.
b Two dice are thrown. Let A be the event that the sum of the point on the   CO4   L2   6M
faces is 9. Let B be the event that at least one number is 6. Find
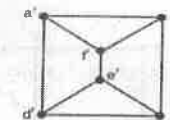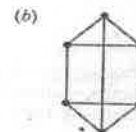(i) P(A∩B) (ii) P(A∪B) (iii) P(A^c∪B^c)

OR

8 A random variable X has the following probability function   CO4   L2   12M

x	0	1	2	3	4	5	6	7
P(x)	0	k	2k	2k	3k	k^2	$2k^2$	$7k^2+k$

Determine (i) k (ii) P(X≥6) and P(0<x<5)

(iii) If $P(X \leq k) > \frac{1}{2}$,find the minimum value of k (iv) Variance

UNIT-V

9 a How many vertices will the graph contains 6 edges and all vertices of   CO5   L2   6M
degree 3.
b Explain about complete graph and Bipartite graph with an example   CO5   L2   6M

OR

10 a Explain graph coloring and chromatic number give an example.   CO5   L2   6M
b Show that the two graphs shown below are isomorphic?   CO5   L2   6M

*** END ***