

**PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(AUTONOMOUS)**

II B.Tech I Semester Supplementary Examinations, June - 2024

MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

(Common to CSE, CSE(AI&ML), CSE(AI), CSE(DS) & IT)

Time: 3 hours

Max. Marks:70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

Q. No.	Questions	BTL	CO	Marks
UNIT – I				
1.	a) Obtain PDNF for $p \rightarrow [(p \rightarrow q) \wedge \sim(\sim q \vee \sim p)]$	K2	CO1	7M
	b) Demonstrate whether ' $(r \vee s)$ ' is a valid inference from the premises. $c \vee d, (c \vee d) \rightarrow \sim h, \sim h \rightarrow (a \wedge \sim b), (a \wedge \sim b) \rightarrow (r \vee s)$	K2	CO1	7M
OR				
2.	a) Verify the validity of the following arguments. 1. All men are mortal, 2. Euler is a man. Therefore, Euler is mortal.	K2	CO1	7M
	b) Verify whether the following are logically equivalent. $\sim (P \vee (\sim P \wedge Q))$ and $(\sim P \wedge \sim Q)$	K2	CO1	7M
UNIT – II				
3.	a) Let R denotes the set of all ordered pairs of positive integers. The relation defined as $(x, y)R(u, v)$ if and only if $xv = yu$. Verify whether the relation 'R' is equivalence	K2	CO2	7M
	b) Let A be a finite set and P(A) is a power set. Let ' \subseteq ' be the set inclusion relation on set $A = \{a, b, c\}$ draw a Hasse diagram for $(P(A), \subseteq)$	K2	CO2	7M
OR				
4.	a) Show that the set of cube roots of unity forms an abelian group with respect to binary operation multiplication	K2	CO2	7M
	b) Verify whether $f: (G, \times) \rightarrow (G^1, \times)$ such that $f(x) = x^{-1} \forall x \in G$ is an isomorphism	K2	CO2	7M
UNIT – III				
5.	a) Find the $\gcd(615, 1080)$ and find the integers u & v such that $\gcd(615, 1080) = 615u + 1080v$	K2	CO3	7M
	b) Using Fermat theorem Evaluate $3^{302} \pmod{5}$	K2	CO3	7M
OR				
6.	a) How many bit strings of length 8 contain (i) an equal number of zeros and ones. (ii) at least four ones.	K2	CO3	7M
	b) Use multinomial theorem to expand $(x + y + z)^4$	K2	CO3	7M

UNIT – IV

7.	a)	Solve the recurrence relation $a_n = 4a_{n-1} + 3n2^n$, $a_0 = 4$ using generating function approach	K2	CO4	7M
	b)	Solve the recurrence relation $a_n = a_{n-1} + n$, $a_0 = 1$ using substitution method.	K2	CO4	7M

OR

8.	a)	Solve the recurrence relation $a_n - 2a_{n-1} + 2a_{n-2}$, $a_0 = 1$, $a_1 = 2$	K2	CO4	7M
	b)	Solve the recurrence relation $a_n - 4a_{n-1} + 4a_{n-2} + 3n + 2^n$, $a_0 = 1$, $a_1 = 1$	K2	CO4	7M

UNIT – V

9.	a)	Test whether the following two graphs are isomorphic. G_1 G_2	K3	CO5	7M
	b)	Prove that a complete graph K_n is planar if and only if $n \leq 4$	K3	CO5	7M

OR

10.	a)	Using Prim's algorithm to find the minimal spanning tree for the following graph. 	K3	CO5	7M
	b)	Determine whether the following graph has Hamiltonian and Euler circuits. 	K3	CO5	7M