R25 Regulation *Subject code: F581PC1*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

M.Tech I Semester Regular Examinations, March 2026

MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

(CSE)

Maximum Marks: 60 Date:02.03.2026 Duration: 3 hours

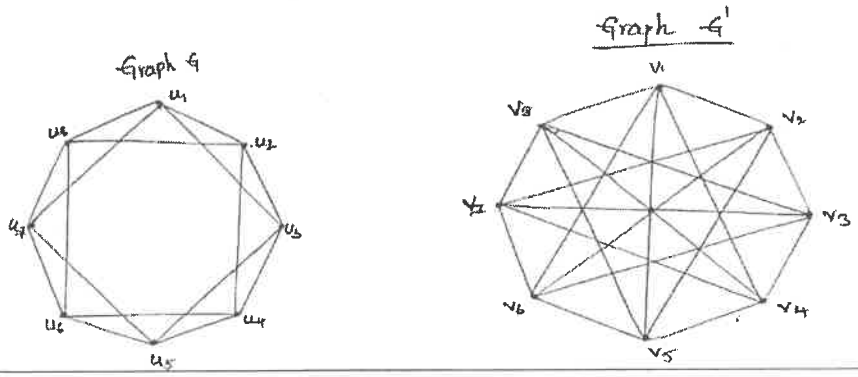
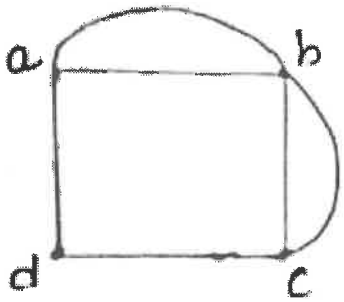
Note: 1.This question paper contains two parts A and B.
2. Part A is compulsory which carries 10 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10X1M=10Marks)		Marks	CO	BTL
1.a	Define the term Predicate.	1M	1	L1
b	Write negation for the statements "If laptop is not working properly then Dr. Kumar can't take the class".	1M	1	L1
c	What is meant by onto function? Give an example.	1M	2	L1
d	Find the transitive closure of the given relation {(1,1),(3,2),(2,3),(3,1),(1,2),(2,3)}	1M	2	L1
e	What is meant by induction hypothesis?	1M	3	L1
f	Define strong induction.	1M	3	L1
g	State Baye's theorem.	1M	4	L1
h	Differentiate expected value and variance.	1M	4	L1
i	What is Hamilton path?	1M	5	L1
j	Define Euler formula for connected planner graph.	1M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
2	a) Show that $P\rightarrow(Q\rightarrow R) \Leftrightarrow P \rightarrow (\neg Q \vee R)$ using equivalent formulas b) Show the following equivalences without constructing truth tables: $\neg (P \wedge Q) \Leftrightarrow (\neg P \vee \neg Q)$	5M 5M	1	L3
	OR			
3	Show hat that $R \wedge (P \vee Q)$ is valid conclusion form set of premises $P \vee Q$, $Q \rightarrow R$, $P \rightarrow M$ and $\tilde{}$ M.	10M	1	L3
4	A. Let $f1(x) = x+4$, $f2(x) = x-4$, and $f3(x) = 4x$ for $x \in R$, where R is the set of real numbers. Find fog and gof. B. Let R = {(b,c),(b,e),(c,e),(d,a),(c,b),(e,c)} be a relation on the set A = {a,b,c,d,e}. Find the transitive closure using Warshall's algorithm .	5M 5M	2	L3
	OR			

5	For the relation R = {(1,3),(1,4),(2,3),(3,1),(3,4)} on the set { 1,2,3,4 }, determine whether it is reflexive, Irreflexive, symmetric, asymmetric, anti-symmetric and transitive or not. Justify your answer.	10M	2	L3
6	a) Write down the recursive algorithm for generating Fibonacci series and explain the process. b) Devise an algorithm for finding the minimum (smallest) value in a finite sequence of integers.	5M 5M	3	L3
	OR			
7	Brief discuss about the complexity of algorithms will be calculated.	10M	3	L4
8	A. A sequence of 10 bits is randomly generated. What is the probability that at least one of these bits is 0? B. Solve the recurrence relation an $-5a_{n-1} +6a_{n-2} = 0$ where $a_0 =2$ and $a_1 =5$, $n\geq 0$.	5M 5M	4	L4
	OR			
9	Explain the concept of divide and conquer with an example.	10M	4	L4
10	Find whether the two given graphs G and G^1 are isomorphic or not. 	10M	5	L4
	OR			
11	Define Euler Path and Euler circuit. Check whether the given graph has Euler path, Euler circuit or neither. 	10M	5	L4