R18 Regulation *Subject code:2B4EA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech IV Semester Supplementary Examinations, June 2026

DISCRETE MATHEMATICS

(CSE)

Maximum Marks: 70 Date: 08.06.2026 Duration: 3 hours

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 20 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 (10X2M=20 Marks)		Marks	CO	BTL
1	If A = {1,2,3,4,5,6,7,8,9,10,11,12} and R= { (x,y)/x-y is multiple of 5} find the partition of A	2M	1	L1
2	Let f(X)=x+2 g(x) = x-2, h(x) =3x find i) fog ii) fogoh.	2M	1	L1
3	Define Fibonacci numbers recursively	2M	2	L1
4	Write the properties of gcd	2M	2	L1
5	Construct the truth table of $(P \wedge Q) \rightarrow P$	2M	3	L1
6	Write the rule of modus tollens of predicates	2M	3	L1
7	If aob=a+b+ab $\forall$ a,b$\in$Z S.T (Z,0) is a semi group.	2M	4	L1
8	Define cyclic group with an example.	2M	4	L1
9	Define isomorphism of two graphs.	2M	5	L1
10	Define the following terms with suitable example i) Subgraph ii) Spanning graph	2M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
11	If R denote a relation on the set of all ordered pairs of positive integers by (a,b)R(c,d) iff ad=bc show that 'R' is an equivalence relation.	10M	1	L2
	OR			
12	Let A be any finite set and P(A) be the power set of A.$\subseteq$ be the inclusion relation on the elements of P(A). Draw the Hasse diagrams of (P(A),$\subseteq$) for i) A = {a} ii) A = {a,b} iii) A = {a,b,c} IV) A = {a,b,c,d}	10M	1	L2
13	a) Use Mathematical Induction to show that $1+2+2^2+2^3+\cdots\ldots\ldots\ldots+2^n = 2^{n+1}-1$ b) Write the Procedure for Euclidean algorithm to find gcd of two numbers.	5M 5M	2	L2
	OR			
14	State and Prove Division algorithm theorem using well ordering principle.	10M	2	L2
15	a) With out constructing truth table find PDNF of $\{(P \rightarrow (Q \wedge R)) \wedge (\sim Q \wedge \sim R)\}$	5M	3	L2

	b) Prove the following argument is valid "all dogs are carnivorous " "some animals are dogs" Therefore" some animals are carnivorous".	5M		
	OR			
16	a) Is the following Conclusion is valid derive from contradiction method. $\sim q$ $p \rightarrow q$ $p \vee t$ $\therefore t$	5M	3	L2
	b) Construct PCNF of $(P \Leftrightarrow Q) \rightarrow R$.	5M		
17	a) Show that the fourth roots of unity form a group with respect to multiplication. b) Prove that the identity element of a group "G' is same as identity elements of its subgroup H.	5M 5M	4	L2
	OR			
18	a) Prove that in a group its identity element, inverse element are unique. b) State and prove Lagrange's theorem on cosets.	5M 5M	4	L2
19	a) Define dual and Isomorphism of graphs with example b) State and prove fundamental theorem of graph theory	5M 5M	5	L2
	OR			
20	Explain Eulerian and Hamiltonian graphs with examples, also draw the graphs of the following: i) Eulerian but not Hamiltonian ii)Hamiltonian but not Eulerian	5M 5M	5	L2