



R18 Regulation

Subject code:2B4EA

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech IV Semester Supplementary Examinations, December 2025

DISCRETE MATHEMATICS

(Common to CSE & IT)

Maximum Marks: 70

Date: 16.12.2025

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	Let $R = \{ [1,1] [2,2] [3,3] [4,4] [5,5] [1,2] [2,1] [5,4] [4,5] \}$ be the equivalence relation on $A = \{1,2,3,4,5\}$ Find equivalence classes and A/R	2M	1	L1
2	Find the inverse of the function $f(x) = e^x$ defined from R to R^+ .	2M	1	L1
3	Explain about Mathematical Induction	2M	2	L1
4	Explain with an example of pair wise relatively primes	2M	2	L1
5	Construct the truth table of $(PVQ) \rightarrow P$	2M	3	L1
6	Write the rule of modus tollens of predicates	2M	3	L1
7	If $a+b=ab \forall a,b \in Z$ S.T $(Z,0)$ is a semi group.	2M	4	L1
8	Define cyclic group with an example.	2M	4	L1
9	Define Chromatic number of a graph. Explain it through an example.	2M	5	L1
10	Define dual of a planar graph and explain it through an example.	2M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
11	a) Draw the Hasse diagram representing the positive divisors of 45. b) 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.	5M 5M	1	L2
OR				
12	a) Let $X = \{1,2,3,4,5\}$ and relation $R = \{(x,y)/x > y\}$. Draw the graph of 'R' and also give its matrix. b) What is Compatibility relation and Write the procedure to find compatibility blocks.	5M 5M	1	L2
13	a) Describe set of rooted trees recursively. b) Show that if a,b,c are integers such that a/b and a/c then $a/mb+nc$ where m, n are integers.	5M 5M	2	L2
OR				
14	State and Prove Division algorithm theorem using well ordering principle.	10M	2	L2

15	a) Obtain CNF of $((P \rightarrow Q) \wedge \sim Q) \rightarrow \sim P$ b) Obtain DNF of $(Q \rightarrow P) \wedge (\sim P \wedge Q)$	5M 5M	3	L2
OR				
16	a) Find PDNF by constructing the PCNF of $(Q \vee P) \wedge (Q \vee R) \wedge (\sim (P \vee R) \vee \sim Q)$ b) Test for validity of the following argument "No Engineering student is bad in studies" "Anil is not bad in studies" Therefore "Anil is an engineering student"	5M 5M	3	L2
17	a) Construct composition table for the roots of equation $x^4 = 1$ and show that it is a group with respect to operation multiplication. b) Prove that every finite group of order 'n' is isomorphic to permutation group of degree 'n'	5M 5M	4	L2
OR				
18	a) If 'G' is a group then prove that $(a^{-1})^{-1} = a$ b) Prove that $G = \{0, 1, 2, 3, 4\}$ is an abelian group of order 5 with respect to addition modulo 5.	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: a) Eulerian but not Hamiltonian b) Hamiltonian but not Eulerian	5M 5M	5	L2