NAVRACHANA UNIVERSITY
a UGC recognized University

School: School of Engineering and Technology
Program/s: B.Tech CSE
Year: 2nd   **Semester:** 3rd
Examination: End Semester Examination
Examination year: December-2021

Course Code: CS239   **Course Name:** Discrete Mathematics
Date: 08/12/2021
**Time:** 8:30 am to 10:30 am
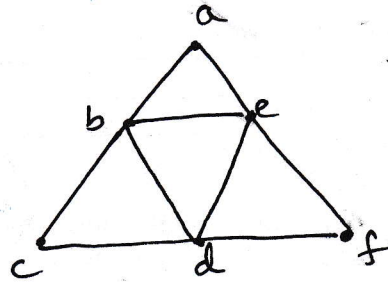
Total Marks: 40
Total Pages: 1

Instructions:

➔ Write each answer on a new page.
➔ Use of a calculator is ~~permitted~~/not permitted.
➔ * COs=Course Outcome mapping. # BTL=Bloom'sTaxonomy Level mapping

Q. No.		Details	Marks	COs*	BTL#
Q.1	i)	List the elements of the set $\{n: n \in N, 2 < n < 7\}$	8		
	ii)	Find x, y if $(x + 1, 6) = (3, x + 2y)$			
	iii)	If $A = \{1,2,3,4\}$, $B = \{a, b, c, d\}$ then find whether the relation $f = \{(3, a), (3, b), (4, c), (5, d)\}$ is a function or not. Justify your answer.		CO1 CO2	BT1, BT2 BT3
	iv)	If $f, g: \mathbb{R} \to \mathbb{R}$ are defined by $f(x) = 3x + 2$ and $g(x) = 5x^2 + 7$, find fog and gof if they exist. Are they equal?			
	v)	If $A = \{1,2,3,4\}$ $B = \{1,4,9,12\}$ and aRb if a divides b, find R and the matrix of R.			
Q.2	i)	$x - 3 = 10$ is a sentence/statement.	8		
	ii)	$p \vee \sim p$ is a tautology. (True/False)		CO3, CO4	BT1, BT2 BT3, BT4 BT5
	iii)	Using the truth table prove that $p \vee (q \wedge r) = (p \vee q) \wedge (p \vee r)$			
	iv)	Prove using method of induction that for n to be an integer, if n^2 is an integer then n is an integer.			
Q.3	i)	Find the general term of the sequence $1, 3, 3^2, 3^3, \ldots.$	8		
	ii)	If the terms of a sequence satisfy $b_n = 2b_{n-1} + 10$, the sequence is linear only/homogeneous only/linear and homogeneous/ neither linear nor homogeneous.		CO5 CO6	BT1 BT2 BT3, BT4
	iii)	Use generating functions to find the number of ways to select 8 balls from a box containing 3 greens, 3 red and 3 black balls.			
	iv)	Find the generating function in the closed form for the sequence 0, 0, 3, 3, 3….			
Q.4	i)	Find the value of $15 \, X_8 \, 7$	8		
	ii)	Consider the operation $a * b = a - b$ in the set of natural numbers N. Is N a semigroup with respect to "*". Justify you answer.		CO7, CO8	BT1 BT2, BT3, BT4
	iii)	Show that the set of positive rational numbers Q^+ forms an abelian group with respect to "*" defined as $a * b = \frac{ab}{2}$			
Q.5	i)	State the Handshake Theorem.	8	CO9 CO10	BT1, BT2 BT3
	ii)	Give an example of a non planar graph.			

iii)   Give statement of Euler's theorem and verify it for the graph given below
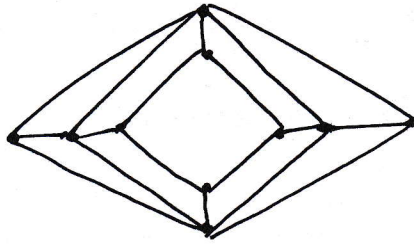
iv)   Define an Eulerian graph and show that the graph given below is Eulerian

***********End of Question Paper***********