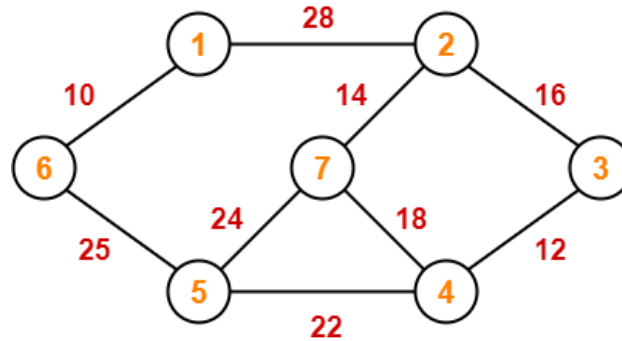


7. A) Explain Prim's Algorithm? Construct the minimum spanning tree (MST) for the given graph using Prim's Algorithm?



B) Define the following with Diagram. (i) Chromatic Number (ii) Euler Path (iii) Euler circuit (iv) Hamiltonian cycle (v) coloring of a graph.

Q.P Code: DS2101PC

Hall Ticket No.:

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NARSIMHA REDDY ENGINEERING COLLEGE

MODEL QUESTION PAPER

(UGC AUTONOMOUS)

II B.Tech I Semester (NR21) Regular Examination, February 2023

DISCRETE MATHEMATICS

(CSE / Common to -CS/DS/AI & ML) Time :3 hours

Maximum marks: 70

- Note:**
- This question paper contains two parts A and B
 - Part A is compulsory which carries 20 marks (10 sub questions are two from each unit carry 2 Marks). Answer all questions in Part A
 - Part B Consists of 5 Units. Answer any one full question from each unit. Each question carries 10 Marks and may have a, b sub questions

Part-A
Answer all questions

(20 Marks)

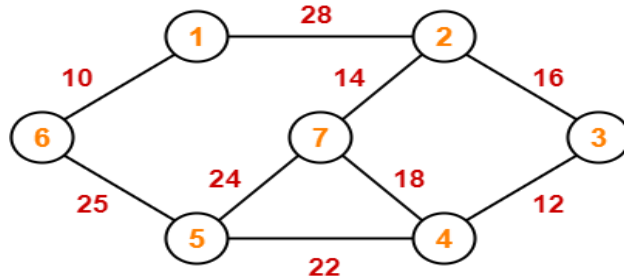
Q.No	Question	M	CO	BL	PO
1)	a. What is the the truth table for $(p \rightarrow q) \vee (\neg p \rightarrow r)$.	2	CO1	L4	PO1,PO2,PO4
	b. Show that 'svr' is tautologically implied by $p \vee q$, $p \rightarrow r$ and $q \rightarrow s$.	2	CO3	L1	PO1,PO2,PO4,PO5
	c. Find fog and gof, where $f(x) = 2x + 3$ and $g(x) = 3x + 2$ are functions from R to R.	2	CO2	L5	PO1,PO2,PO3
	d. Define equivalence relation and POSET.	2	CO1	L1	PO1,PO2,PO4
	e. Prove that for every positive integer n, $9^n - 8n - 1$ is divisible by 64.	2	CO4	L2	PO1,PO2,PO3
	f. Define algorithm and BigO notation	2	CO2	L2	PO1,PO2,PO3
	g. State Bayes theorem and mean of the Discrete Random variable	2	CO3	L1	PO1,PO2,PO4,PO5
	h. Solve the RR $a_n = 5a_{n-1} - 6a_{n-2}$,	2	CO5	L1	PO1,PO2,PO4
	i. Define Graph and Isomorphic.	2	CO5	L1	PO1,PO2,PO4
	j. Define the following with Diagram. (i) Chromatic Number (ii) Euler Path (iii) Euler circuit	2	CO4	L1	PO1,PO2,PO3

Part-B
Answer any five questions All
Questions carry equal Marks

(50 Marks)

Q.No	Question	M	CO	BL	PO
UNIT-I					
2)	a. Define logical connectives, Show that $(p \wedge q) \rightarrow (p \rightarrow q)$ is a Tautology by using truth table.	5	CO1	L5	PO1,PO2,PO4
	b. Show that the Premises, It is not Sunny this A.N and it is colder than yesterday. We will go swimming only if it is sunny. We will go swimming only if it is Sunny, If we do not go swimming, then he will take a canoe trip, and If we take a canoe trip, then we will be home by sunset lead to the conclusion we will be home by sunset.	5	CO1	L2	PO1,PO2,PO4
OR					
3)	a. Show that the premises 'A student in this class has not read the book,' and Everyone in this class passed the first exam' imply the conclusion 'Someone who passed the first exam has not read the book.'	5	CO1	L2	PO1,PO2,PO4
	b. Show that 'svr' is tautologically implied by $p \vee q$, $p \rightarrow r$ and $q \rightarrow s$.	5	CO1	L3	PO1,PO2,PO4
UNIT-II					
4)	a. Describe Hasse diagram? Let $X = \{2, 3, 6, 12, 24, 36\}$, and the relation \leq be such that $x \leq y$ if x divides y. Draw the Hasse diagram of (X, \leq) .	5	CO2	L1,L2	PO1,PO2,PO3
	b. Iff: $R \rightarrow R$ is defined by $f(x) = ax + b$, where $a, b, x \in R$ and $a \neq 0$. Show that f is invertible and find the inverse of f	5	CO2	L3	PO1,PO2,PO3
OR					
5)	a. Prove that the relation Congruent $a \equiv b \pmod{m}$ is an equivalence relation on R.	5	CO2	L4	PO1,PO2,PO3
	b. Find the join, meet and Boolean product of the zero-one matrices $A = \begin{bmatrix} 1 & 1 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 0 & 1 \end{bmatrix}$.	5	CO2	L5	PO1,PO2,PO3
UNIT-III					

6)	a.	Describe the <i>Bubble sort Algorithm pseudo code and Show the steps of bubble sort with 3 2 4 1 5</i>	5	CO 3	L5	PO1,PO2,PO4, PO5
	b.	Using the principle of mathematical induction, prove that $1/(1 \cdot 2) + 1/(2 \cdot 3) + 1/(3 \cdot 4) + \dots + 1/\{n(n+1)\} = n/(n+1)$	5	CO 3	L6	PO1,PO2,PO4, PO5
OR						
7)	a.	Describe the Binary Search Algorithm in pseudo code	5	CO 3	L3	PO1,PO2,PO4, PO5
	b.	Show that for any integer n, $11^{n+2} + 12^{2n+1}$ is divisible by 133.	5	CO 3	L5	PO1,PO2,PO4, PO5
UNIT-IV						
8)	a.	Solve the RR $a_n = 2 a_{n-1} + a_{n-2} - 2 a_{n-3}, a_0 = 3, a_1 = 6$ and $a_2 = 0, n \geq 3$.	5	CO 4	L3	PO1,PO2,PO3
	b.	Two marbles are drawn in succession from a box containing 10 red, 30 white, 20 blue and 15 orange marbles, with replacement being made after each draw. Find the probability that (i) Both are white (ii) First is red and second is white.	5	CO 4	L3,L 4	PO1,PO2,PO3
OR						
9)	a.	What is the probability that a card drawn at random from the pack of cards may be either a queen or a king?	5	CO 4	L3	PO1,PO2,PO3
	b.	Solve the RR $a_n = 4a_{n-1} - 4 a_{n-2} + 3n + 2^n, a_0 = 1, a_1 = 1, n \geq 2$.	5	CO 4	L5	PO1,PO2,PO3
UNIT-V						
10)	a.	Explain Depth First Search Algorithm?	5	CO 5	L2	PO1,PO2,PO4
	b.	Show that the maximum number of edges in a complete bipartiate graphs with n vertices $n^2/4$.	5	CO 5	L2	PO1,PO2,PO4
OR						
11)	a.	Explain Prim's Algorithm? Construct the minimum spanning tree (MST) for the given graph using Prim's Algorithm?	5	CO 5	L5,L 6	PO1,PO2,PO4
	b.	Prove that a connected plane graph with 7 vertices and degree (V) = 4 for each vertex V of G must have 8 regions of degree 3 and one region of degree 4?	5	CO 5	L4	PO1,PO2,PO4



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M – Marks **CO** – Course Outcomes **PO** – Program Outcomes

BL – Bloom's Taxonomy Levels (**L1**–Remembering, **L2**–Understanding, **L3**–Applying, **L4**–Analyzing, **L5**–Evaluating, **L6**–Creating)