



# PRESIDENCY UNIVERSITY

BENGALURU

Roll No.																			
----------	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

## Make Up Examinations – December 2025

Date: 26 – 12- 2025

Time: 1.00pm to 04.00pm

<b>School:</b> SOCSE	<b>Program:</b> B. TECH	
<b>Course Code:</b> CSE2016	<b>Course Name:</b> Discrete Mathematical Structures	
<b>Semester :</b> MK	<b>Max Marks:</b> 100	<b>Weightage:</b> 50%

CO - Levels	C01	C02	C03	C04	C05
Marks	24	24	28	24	-

### Instructions:

- (i) Read all questions carefully and answer accordingly.
- (ii) Do not write anything on the question paper other than roll number.

### Part A

Answer ALL the Questions. Each question carries 2marks.

10Q x 2M=20M

1.	State which rule of inference is used in the argument: It is below freezing and raining now. Therefore, it is below freezing now."	2 Marks	L1	C01
2.	Write the following statement in symbolic form "nothing is good".	2 Marks	L1	C01
3.	Define Floor and Ceiling Functions.	2 Marks	L1	C02
4.	Define function with an example.	2 Marks	L1	C02
5.	Define partially ordered set with an example.	2 Marks	L1	C03
6.	In the poset $(\mathbb{Z}^+, \setminus)$ , are the integers 2 and 4 are comparable? Are 3 and 5 are comparable?	2 Marks	L1	C03
7.	Define bounded lattice.	2 Marks	L1	C03
8.	Define Boolean algebra with an example.	2 Marks	L1	C03
9.	What are the solutions of the linear congruence $4p \equiv 2 \pmod{5}$	2 Marks	L1	C04
10.	What are the solutions of the linear congruence $5y \equiv 3 \pmod{2}$ .	2 Marks	L1	C04

## Part B

**Answer the Questions.**

**Total Marks 80M**

11.	a.	Construct the truth table of the compound proposition $(p \vee \neg q) \wedge (q \vee \neg r)$ .	10 Marks	L3	CO 1
Or					
12.	a.	Show using a truth table that $(p \vee q) \wedge (\neg p \vee r) \rightarrow (q \vee r)$ is a tautology.	10 Marks	L3	CO 1

13.	a.	Obtain the Principal Disjunctive Normal Form (PDNF) for $p \vee (\neg p \rightarrow (q \vee (\neg q \rightarrow r)))$ using truth table.	10 Marks	L3	CO 1
Or					
14.	a.	Obtain the Principal conjunctive Normal Form (PCNF) for $[(p \wedge q) \vee (\neg p \wedge r)] \vee [(q \wedge r)]$ using truth table.	10 Marks	L	CO

15.	a.	Let A be the set {1, 2, 3, 6}. Which ordered pairs are in the relation, $R = \{(a, b) \mid a \text{ divides } b\}$ , write the corresponding graphical and table representation of the relation.	10 Marks	L3	CO 2
Or					
16.	a.	<p>Consider the following relations on {1, 2, 3, 4}:</p> <p>(a) <math>R_1 = \{(3, 4)\}</math></p> <p>(b) <math>R_2 = \{(1, 1), (1, 2), (2, 1)\}</math></p> <p>(c) <math>R_3 = \{(1, 1), (1, 2), (1, 4), (2, 1), (2, 2), (3, 3), (4, 1), (4, 4)\}</math></p> <p>(d) <math>R_4 = \{(2, 1), (3, 1), (3, 2), (4, 1), (4, 2), (4, 3)\}</math></p> <p>Which of these relations are reflexive, symmetric, antisymmetric and transitive.</p>	10 Marks	L3	CO 2

17.	a.	Let $R = \{(1,2), (3,4), (2,2)\}$ and $S = \{(4,2), (2,5), (3,1), (1,3)\}$ . Find $S \circ S, R \circ (S \circ R), (R \circ S) \circ R, R \circ R$ .	10 Marks	L4	CO 2
Or					
18.	a.	<p>Let <math>A = \{a, b, c\}</math>, and R and S be relations on A whose matrices are as given by <math>M_R = \begin{bmatrix} 0 &amp; 1 &amp; 0 \\ 0 &amp; 1 &amp; 1 \\ 1 &amp; 1 &amp; 0 \end{bmatrix}</math> and <math>M_S = \begin{bmatrix} 0 &amp; 0 &amp; 1 \\ 0 &amp; 1 &amp; 0 \\ 0 &amp; 1 &amp; 1 \end{bmatrix}</math></p> <p>Find the composite relations <math>R \circ S, S \circ R, R \circ R, S \circ S</math> and their matrices.</p>	10 Marks	L4	CO 2

19.	a.	Prove that $(D_{30},  )$ is a distributive lattice where $D_{30}$ is the set of all positive divisors of 30.	20 Marks	L3	CO 3
Or					
20.	a.	Prove that $(P(S), \subseteq)$ is a Boolean algebra where $S = \{a, b, c\}$ .	20 Marks	L3	CO 3

21.	a.	Solve the system of congruences, $y \equiv 2(\text{mod}3), y \equiv 3(\text{mod}5), y \equiv 2(\text{mod}7)$	20 Marks	L3	CO 4
Or					
22.	a.	Use the Chinese remainder theorem to find all solutions to the system of congruences, $x \equiv 2(\text{mod}3), x \equiv 1(\text{mod}4), x \equiv 3(\text{mod}5)$	20 Marks	L3	CO 4