WALCHAND COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)
Vishrambag, Sangli – 416415

Direct Second Year B.Tech. Computer Science and Engineering
MSE, ODD SEMESTER, AY 2023-24
Discrete Mathematics (6CS201)

MSE

PRN: _____

Date: Monday, 23/10/2023 Time : 8.30 am to 10.30 am

Max Marks: **30**

NB: Verify that you have received question papers with correct course code, branch etc.

a) All questions are compulsory.
b) Writing question number on answer book is compulsory otherwise answers may not be assessed.
c) Assume suitable data wherever necessary.
d) Figures to the right of question text indicate full marks.
e) Mobile phones, smart gadgets and programmable calculators are strictly prohibited.
f) Except PRN anything else writing on question paper is not allowed.
g) Exchange/Sharing of stationery, calculator etc. not allowed.
h) **Show all steps to the solution.**

Number on the right of marks indicates course outcomes (Only for faculty use) Marks

A) Preparing the truth table prove the following logical equivalence: CO1

- $p \leftrightarrow q \equiv (p \wedge q) \vee (\neg p \wedge \neg q)$
- $(p \wedge q) \rightarrow r \equiv p \rightarrow (q \rightarrow r)$

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B) Convert the following into symbolic form and find its truth value CO2

1. 14 is a composite number or 15 is a prime number.
2. Neither 21 is a prime number nor it is divisible by 3.
3. It is not true that 4+3i is a real number.

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C) Find the Conjunctive Normal Form (CNF) and Disjunctive Normal Form (DNF) of following formula: CO3

$$\sim(PVQ) \leftrightarrow (P \wedge Q)$$

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D) Define following with example. CO1

1. Partial Order relation
2. Power set
3. Monoid
4. Algebraic structure
5. Antisymmetric relation

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Q2 **A)** Following relations are defined on set {A, B, C, D}. Identify which properties following relations hold. Justify your answer. CO2

R1={(A,A), (A,B), (B,A), (B,B), (C,D), (D,A), (D,D)}

R2={(B,A)} 5

R3={(A,A), (A,B), (A,D), (B,A), (B,B), (C,C), (D,A), (D,D)}

R4={(B,A), (C,A), (C,B), (D,A), (D,B), (D,C) }

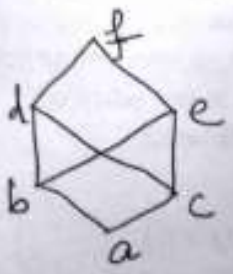
R5= {(A,A), (A,B), (A,C), (A,D), (B,B), (B,C), (B,D), (C,C), (C,D), (D,D)}

B) Prove if the following is group or not: CO2

1.{Z | Z is set of integers}, + 5

2.{ 1,2,3,4,5,6},X_7

C) What is lattice? Check if following hasse diagram is lattice or not. Also, give the partial order relation on which it is drawn. CO3



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