

Code No. : 20437 E Sub. Code : CEMA 52

B.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2023.

Fifth Semester

Mathematics

Major Elective — DISCRETE MATHEMATICS

(For those who joined in July 2021-2022)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

- Which one of the following is not the notation of negation of P
 - $\neg P$
 - NOT P
 - $\sim P$
 - $-P$
- The converse of $P \rightarrow Q$ is _____
 - $Q \rightarrow P$
 - $\neg P \rightarrow \neg Q$
 - $\neg Q \rightarrow \neg P$
 - None of these

- Which one of the following is wrong in lattice?
 - $a \oplus 0 = a$
 - $a \oplus 1 = 1$
 - $a * 1 = 1$
 - $a * 0 = 0$

- The base of the binary number system is _____
 - 10
 - 8
 - 6
 - 2

- The equivalent octal number of the binary 0101 is _____
 - 5
 - 6
 - 7
 - 8

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

- (a) Write a short note on Negation.
Or
(b) Construct the truth table for $(P \vee Q) \vee \neg P$.

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- Which one of the following is not a elementary sum?
 - $\neg P \wedge Q$
 - $\neg Q \vee P$
 - $\neg P \vee Q$
 - $Q \vee \neg P$
- Which one of the following is equivalence?
 - $\neg \neg P \Leftrightarrow P$
 - $P \vee P \Leftrightarrow P$
 - Both (a) and (b)
 - None of these
- The monoid that also satisfy the inverse property is called _____.
 - Group
 - Semigroup
 - Code
 - None of these
- Which one of the following is not an abelian group?
 - $\langle S_n, \circ \rangle$
 - $(I, +)$
 - $(Q, *)$
 - $(Q - \{0\}, *)$
- The $L \cup B\{a, b\}$ is _____.
 - $a * b$
 - $a \oplus b$
 - $a + b$
 - a

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- (a) Explain the principal conjunctive normal form.

Or

- (b) Show that $P \vee Q$ follows from P .

- (a) Define the following :
 - Semigroup
 - Monoid

Or

- (b) Explain the basic notions of Error Corrections.

- (a) Write some properties of lattices.

Or

- (b) Define the following :
 - Distributive lattice
 - Boolean algebra

- (a) Convert $(4057.06)_8$ to decimal.

Or

- (b) Divide $(10110)_2$ by $(110)_2$.

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[P.T.O.]



PART C -- (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Explain the conditional and biconditional statements with examples.

Or

- (b) Show that

$$P \rightarrow (Q \rightarrow R) \Leftrightarrow P \rightarrow (\neg Q \vee R) \Leftrightarrow (P \wedge R) \rightarrow R$$

17. (a) Show that $S \vee R$ is tautologically implied by $(P \vee Q) \wedge (P \rightarrow R) \wedge (Q \rightarrow S)$.

Or

- (b) Show that

$$(x)(P(x) \rightarrow Q(x)) \wedge (x)(Q(x) \rightarrow R(x)) \Rightarrow (x)(P(x) \rightarrow R(x))$$

18. (a) State and prove Lagrange's theorem.

Or

- (b) Explain the group code in detail.

19. (a) State and prove distributive inequalities.

Or

- (b) Explain Gating networks.

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20. (a) Explain the octal number system.

Or

- (b) Explain the Gray Code.

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