AHMEDABAD UNIVERSITY
School of Engineering and Applied Science
2025-2026 Winter

CSE211 Discrete Mathematics
Mid-Term Examination
Saturday February 21 2026. 14:00 – 15:10

Name:	Roll no.	A	U	2							Marks /50

INSTRUCTIONS

1. *Write your name [2 points] and ID [2 points] in the beginning of question paper provided to you.*
2. *You are allowed three A4 sized cheat sheets of handwritten or typed notes. During the exam you are not allowed to exchange or share your cheat sheets.*
3. *No calculators or electronic gadgets allowed.*
4. *This paper has 10 short answer questions. You are required to write your choice along with the*
5. *justification in space provided in the question paper. You are allowed to use rough sheets for scratch work.*

Rest of this page is intentionally blank, and the questions start in the next page.

1. *Among the following four statements, which of them are propositions that are true?* [5 points]

(1) *Mumbai is the capital of India.*

(2) *For all integers* x, $x^2 > x$

(3) $x = y + 1$.

(4) *For all real numbers* X, $X^2 \geq 0$

Answer:

Justification:

2. *Let* p, q *and* r *be the following propositions.* [5 points]

(p): *I attended the CSE211 lectures.*

(q): *I passed the CSE211 exam.*

(r): *I can register for a course in Algorithms.*

Which one of the following statements are equivalent to $\neg(p \wedge q) \vee r$ *?*

A. *If I attended the CSE211 lectures and I passed the CSE211 exam, then I can register for a course in Algorithms.*
B. *I did not attend the CSE211 lectures or I did not pass the CSE211 exam, or I cannot register for a course in Algorithms.*
C. *If I cannot register for a course in Algorithms, then I did not attend the CSE211 lectures or I did not pass the CSE211 exam.*
D. *If I cannot register for a course in Algorithms, then I did not attend the CSE211 lectures and I did not pass the CSE211 exam.*

Answer:

Justification:

3. *Let p, q and r be the following propositions.* *[4 points]*

(p): You get an A on the final exam.

(q): You do every exercise in this book.

(r): You get an A in this class.

Write the logical expression corresponds to the following English statement:

Getting an A on the final and doing every exercise in this book is sufficient for getting an A in this class.

Answer:

Justification:

4. *State the converse of the following conditional statement:* *[4 points]*

I go to the beach whenever it is a sunny summer day.

Answer:

Justification:

5. *How many rows appear in a truth table for the following compound proposition? [4 points]*

$$((q \rightarrow \neg p) \vee (\neg p \rightarrow \neg q)) \wedge r$$

Answer:

Justification:

6. Which of the following logical expressions are tautologies? [6 points]

(1) $p \wedge (\neg p \vee \neg q) \wedge q$
(2) $(p \wedge (p \vee q)) \vee (p \rightarrow r)$
(3) $(p \vee q) \rightarrow (p \wedge q)$

Answer:

Justification:

7. *Let $Q(x)$ be the statement $x + 1 > 2x$. If the domain consists of the integers, which of the following propositions are TRUE?* *[4 points]*

(1) $\exists x Q(x)$
(2) $\forall x \neg Q(x)$

Answer:

Justification:

8. Let x be any student in School of Engineering and Applied Science, and let [4 points]
C(x): x is in your class.
D(x): x has studied calculus.
E(x): x has studied C++.

Write down the logical expression corresponding to these statements:

(1) Everyone is in your class and has studied calculus and C++.

(2) There is someone who is not in your class or has studied calculus and C++.

Answer:

Justification:

9. Let A, B, C and D be sets. Which of the above set expressions is not always TRUE (i.e. sometimes FALSE)? [5 points]

(1) $(A \cup B) - A = (B - A)$
(2) $(A - B) \cup (B - C) \cup (C - A) = (A \cup B \cup C)$
(3) $(A - C) \cap (C - D) = \phi$

Answer:

Justification:

*10. The sum of the first 20 terms of the sequence 1 *4, 2 *5, 3 *6, ... is* *[5 points]*

Answer:

Justification:

Hint: You can use the fact that the sum of $1^2 + 2^2 + \ldots + n^2 = n(n + 1)(2n + 1)/6$ or write each element of the sequence as a difference of two terms leading to a telescopic sequence.