



**SIR ARTHUR LEWIS COMMUNITY COLLEGE
ACADEMIC YEAR (2024/2025) – SEMESTER ONE
END OF SEMESTER ALTERNATE EXAMINATION**

COURSE TITLE : **MATHEMATICAL REASONING & LOGIC**

COURST CODE : **MAT145**

LECTURERS : **JOHN ESTEPHANE
SHERINE ST OMER**

DATE : **15th January 2025**

TIME : **9:00 a.m.**

DURATION : **2 HRS**

STUDENT ID# :

READ THE FOLLOWING INSTRUCTIONS CAREFULLY.

1. Write your student’s ID number on all the work you hand in.
2. This paper consists of two (2) sections, A and B.
3. Section A comprise of 20 objective type questions, circle the letter that best answers the question.
4. Section B comprises of eight (8) questions. Write your answer in the space provided.
5. Write in BLACK or BLUE pen. ***NO WRITING IN PENCIL.***
6. Show all necessary calculations and working.
7. **Only NON-PROGRAMMABLE calculators are permitted.**
8. Do not use correction fluid.

Question	Score	Max. Score
Section A 1 - 20		20
1		8
2		5
3		8
4		8
5		5
6		5
7		8
8		18
TOTAL		85

DO NOT TURN THE PAGE UNTIL YOU ARE TOLD TO DO SO

SECTION A

Instructions: Circle the letter that best answers the question.

1. Which of the following best describes the set of positive integers?
 - a. Infinite
 - b. Finite
 - c. Subset
 - d. Empty

2. What are the four logical connectives?
 - a. conjuncts, disjuncts, conditionals, and negations
 - b. conjunctions, statements, disjuncts, and conditionals
 - c. conjunctions, conditionals, compounds, and disjunctions
 - d. conditionals, disjunctions, negations, and conjunctions

3. Which of the arithmetic mean, median, mode, and geometric mean are resistant measures of central tendency?
 - a. The median and mode only
 - b. The mean and mode only
 - c. The mean only
 - d. The mean and median

4. Which of the following variables is NOT categorical?
 - a. Age of a person
 - b. Choice of a test item: True or False
 - c. Marital Status of a person: single, divorced, married, other
 - d. Gender of a person: Male or Female

5. Two sets are called disjoint if their _____ is the empty set.
 - a. difference
 - b. union
 - c. intersection
 - d. complement

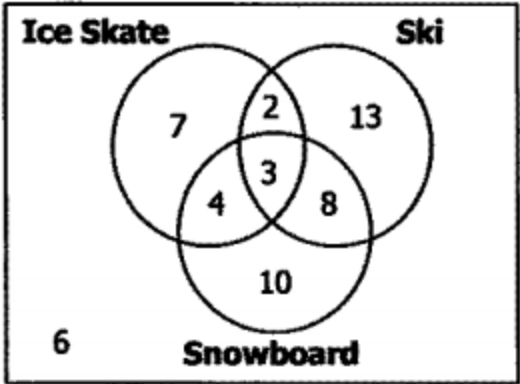
6. How many subsets are in the set $S = \{\text{basketball, football, cricket, netball}\}$?
 - a. 8
 - b. 24
 - c. 32
 - d. 16

7. Find the median of the number of emails received on 7 consecutive days: 11, 13, 17, 13, 23, 25, 19.
 - a. 13
 - b. 23
 - c. 25
 - d. 17

8. What is the simple interest on \$160 for 6 months at 5% per annum is?
 - a. \$4
 - b. \$8
 - c. \$16
 - d. \$48

9. A conditional is symbolized like _____.
- $p \wedge q$
 - $p * q$
 - $p \rightarrow q$
 - $p \vee q$
10. The proposition $(P \rightarrow Q) \wedge (Q \rightarrow P)$ is a _____.
- absurdity
 - tautology
 - contradiction
 - contingency
11. Which of the following best describes an annuity?
- A one-time investment with no future cash flows
 - A series of equal payments made at regular intervals for a specified period
 - A loan with variable interest payments
 - A perpetual increase in cash flow
12. Which of the following lists represents all the elements of the set $S = \{x \mid x = n^2, \text{ where } n \in \mathbb{Z} \text{ and } x < 100\}$?
- 1, 4, 9, 16, 25, 36, 49, 64, 81, 85, 89
 - 0, 1, 4, 9, 16, 25, 36, 49, 64, 81
 - 0, 2, 4, 5, 9, 58, 49, 56, 99, 121
 - 0, 1, 4, 9, 16, 25, 36, 49, 64, 81, 100
13. How much do you need to invest today to receive \$1000 at the end of each year for 15 years, assuming an interest rate of 6% per year?
- \$10,000
 - \$11,255
 - \$12,000
 - \$14,105
14. What is the cardinality of the set of odd positive integers less than 10?
- 10
 - 5
 - 3
 - 20
15. If A and B are two sets such that $n(A) = 15$, $n(B) = 21$, & $n(A \cup B) = 36$ then what is $n(A \cap B)$ equal to?
- 0
 - 2
 - 4
 - 15
16. Let p represent the statement: Students are happy and let q represent the statement: Teachers are happy. Which statement is equivalent to: $\neg(p \vee \neg q)$?
- Students are not happy or teachers are not happy.
 - It is not the case that students are happy and teachers are not happy.
 - It is not the case that students are happy or teachers are not happy
 - Students are not happy and teachers are not happy.
17. Find the future value of a quarterly annuity of \$2,000 at 8% for 4 years compounded quarterly.
- \$32,000.00
 - \$37,278.00
 - \$42,240.00
 - \$36,240.00

3. The following are students' preferences for winter sports were recorded in the categories of Ice Skating (I), Skiing (S), and Snowboarding (B). Find the cardinality for the following:



- a. $n[(I \cap S) \cup B]$: _____

b. $n(S')$: _____

c. $n(B - S)$: _____

d. $n(U)$: _____ [8]
4. Use truth table to prove the following logical equivalence
- $(p \rightarrow r) \wedge (q \rightarrow r) \equiv (p \vee q) \rightarrow r$

[8]

5. If you deposit \$4000 into an account paying 6% annual interest compounded quarterly, how much money will be in the account after 5 years? [5]

6. Using the set of data given below, construct a stem and a leaf diagram. [5]

40	22	50	61	30	58	51	75
58	70	23	59	49	55	63	38
37	57	53	41	60	57	52	77
21	62	32	83	48	73	28	31
48	76	64	39	56	25	42	63

7. In a recent math test, 20 students scored the following marks (out of 100):

78, 85, 92, 73, 88, 90, 85, 76, 91, 84,
75, 82, 85, 89, 90, 77, 83, 88, 84, 86

Calculate the mean, median, mode and range of the scores. [6]

8. AAA Travel surveyed 125 potential customers. The following information was gathered.

- 18 wished to travel to all three destinations
- 34 wished to travel to Hawaii and Las Vegas
- 26 wished to travel to Las Vegas and Disney World
- 23 wished to travel to Hawaii and Disney World
- 68 wished to travel to Hawaii
- 53 wished to travel to Las Vegas
- 47 wished to travel to Disney World

a) Create a Venn diagram to summarize the information. [8]



b) How many did not wish to travel to any of these destinations? [2]

c) How many wished to travel only to Hawaii? [2]

d) How many wished to travel to Disney World and Las Vegas, but not to Hawaii? [2]

e) How many wished to travel to Disney World or Las Vegas, but not to Hawaii? [2]

f) How many wished to only travel to exactly one of these locations? [2]

END OF EXAMINATION