

SIR ARTHUR LEWIS COMMUNITY COLLEGE
SCIENCE, TECHNOLOGY, INNOVATION AND SUSTAINABILITY

2024 – 2025 ACADEMIC YEAR - SEMESTER I
END OF SEMESTER EXAMINATION

COURSE TITLE : MATHEMATICAL REASONING & LOGIC

COURST CODE : MAT145

LECTURERS : JOHN ESTEPHANE
SHERINE ST OMER

DATE : Thursday 12th December 2024

TIME : 1.00 – 3.00 PM

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		20
1 - 20		
1		3
2		6
3		5
4		6
5		6
6		19
7		11
8		14
TOTAL		90

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

SECTION A

Instructions: *Circle the letter corresponding to the correct answer on the question paper.*

1. A discrete variable is a variable that can assume
 - a. Categorical values only
 - b. Non-numerical values
 - c. Countable value only
 - d. Uncountable value
2. The number of observations is 45 and the value of the arithmetic mean is 15. The sum of all values then is.....
 - a. 3
 - b. 650
 - c. 675
 - d. 60
3. The waiting times (in minutes) for 7 customers at a supermarket are: **4, 9, 5, 15, 11, 12 and 6**. The median of the data is:
 - a. 15
 - b. 11
 - c. 6
 - d. 9
4. If $n(A) = 15$, $n(B) = 20$ and $n(A \cap b) = 8$. What is $n(A \cup B)$?
 - a. 21
 - b. 27
 - c. 23
 - d. 28
5. Which of the following is true about the sample size in relation to the population size?
 - a. It always larger than the population size
 - b. It is always smaller than the population size
 - c. It can sometimes be larger than the population size
 - d. It is always equal to the population size
6. Which one of the following is an example of continuous data?
 - a. Height of men born in January
 - b. Number of flowers on a tree
 - c. Number of chairs in a classroom
 - d. Number of babies born in a year
7. Which statement is the negation of “**If P is a square then P is a rectangle.**”
 - a. If P is not a square, then P is not a rectangle.
 - b. P is a square and P is not a rectangle
 - c. If P is not a rectangle, then P is not a square.
 - d. P is a rectangle and P is a square.
8. The proposition $(P \rightarrow (P \wedge Q))$
 - a. Tautology
 - b. Contradiction
 - c. Contingency
 - d. Absurdity

9. Match List I and List II and choose the correct answer from the code given below.

<i>List I</i>	<i>List II</i>
a) <i>Equivalence</i>	i) $p \rightarrow q$
b) <i>Contrapositive</i>	ii) $p \rightarrow q: q \rightarrow p$
c) <i>Converse</i>	iii) $p \rightarrow q: \sim q \rightarrow \sim p$
d) <i>Conditional</i>	iv) $p \leftrightarrow q$

- a. a) – i), b) – ii), c) – iii), d) – iv)
b. a) – ii), b) – i), c) – iii), d) – iv)
c. a) – iv), b) – iii), c) – ii), d) – i)
d. a) – iii), b) – iv), c) – ii), d) – i)
10. If X , then Y but not Z is represented by which of the following formula in propositional logic.
- a. $(X \wedge Y) \rightarrow \sim Z$
b. $(X \wedge \sim Z) \rightarrow Y$
c. $X \rightarrow (Y \wedge \sim Z)$
d. $Y \rightarrow (X \wedge \sim Z)$
11. How many rows are in the truth table for the compound statement:
 $(p \vee q) \wedge (\sim r \vee s) \vee \sim t$?
- a. 25
b. 32
c. 10
d. 8
12. Let p represent the statement: “Students are happy” and let q represent the statement: “Teachers are happy”. Translate the symbolic compound statement $(p \rightarrow \sim q)$ into words.
- a. The students are happy if and only if the teachers are not happy.
b. Students are happy then teachers are not happy.
c. It is not the case that students are happy, and teachers are not happy.
d. Students are not happy if teachers are not happy.
13. Ali wants to purchase a car and he must pay 20 % excise duty on the price of the car. The price of the car is \$60,000. The total amount Ali must pay is.
- a. \$100000
b. \$62000
c. \$72000
d. \$48000
14. How much will I need to repay in total after 10 years if I borrow \$1200.00 at 7.5% p.a. simple interest.
- a. \$1500
b. \$2111
c. \$1620
d. \$2100
15. \$4000 invested at 5% p.a. compounded quarterly for 8 years would grow to an amount of...
- a. \$7183.42
b. \$4400.00
c. \$5952.52
d. \$6400.00

16. With continuous compounding at 10% for 30 years, the future value of an initial investment of \$2000.00 is closest to ____.
- \$34898.00
 - \$40171.00
 - \$164 500.00
 - \$328282.00
17. An annuity is a(n)
- Level stream of perpetual cash flows
 - Increasing stream of perpetual cash flows
 - Level stream of cash flows occurring for a fixed period.
 - Decreasing stream of perpetual cash flows.
18. If $A = \{1, 2, 3, 4\}$ and $B = \{1, 3, 4, 5, 6\}$, then $n(A \cup B)$ is equal to
- 6
 - 9
 - 20
 - 3
19. In a group of 150 people who all speak French, English or both, 75 can speak French and 90 can speak English. How many can speak both French and English?
- 15
 - 60
 - 25
 - 75
20. In a group of 72 students, 47 have background in electronics, 59 have background in Mathematics and 42 have background in both the subjects. How many students do not have a background in any of the subjects?
- 8
 - 13
 - 25
 - 34

SECTION B

Answer all questions in this section in the space provided.

- What is the simple interest on \$4500.00 at 8% per annum for ten (15) months. [3]
- The simple interest on a sum of money for 5 years at 12% per annum is 600 less than the simple interest accrued on the same sum in 7 years at 10% per annum. Find the sum. [5]

3. Find the total amount when \$25 000.00 is invested at 5% for ten years if the interest is compounded quarterly. [5]

4. Construct a truth table for the statement $p \leftrightarrow (q \rightarrow \sim r)$ [6]

5. Write the inverse, converse, and contrapositive of the statement: **If two angles have the same measure, then the two angles are congruent.** [6]

6. In a series of 20 ‘spot checks’, the following number of passengers were counted at a certain depot.

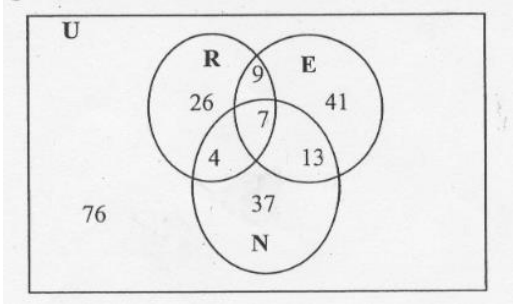
113	129	135	140	135	134	137	138	136	137
139	136	138	132	136	137	133	134	141	140

a. From the figures above determine (i) mean, (ii) mode and (iii) median. [8]

b. Determine the range and quartile deviation for the data above. [6]

c. Draw a stem and leaf diagram for the above set of data [4]

7. Use the diagram below to find the cardinality for each problem. [10]



a. $n(N)$: _____

b. $n[(R \cap E) \cup N]$: _____

- c. $n(E')$: _____

d. $n(E - R)$: _____
- e. $n(U)$: _____

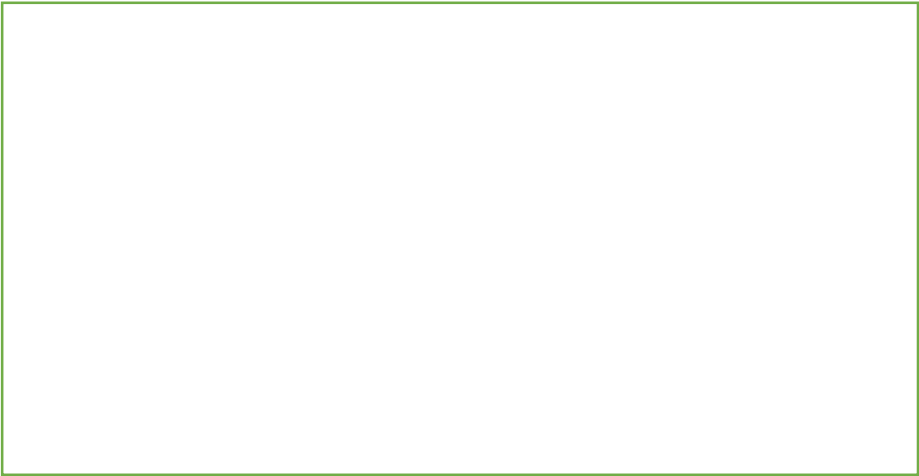
f. $n(R \cap E \cap N)$: _____

8. There were 100 students in the library who responded to how they completed their research paper.

- 15 students only used periodicals
- 32 students used the web and periodicals
- 15 students used books, the web, and periodicals
- 40 students used books and periodicals
- 30 students used the web and books
- 60 students used books
- 7 students did not use the web, nor books, nor periodicals

a. Represent the information with a Venn diagram

[6]



b. How many students used the web in their research?

[2]

c. How many students used books or periodicals?

[2]

d. How many students used only one source?

[2]