Number of leaves	3	12	7	11	4	3

(a) Display the data on a histogram hence estimate the modal number of leaves. **(09 marks)**

(b) Calculate;

i. The mean length. **(03 marks)**

ii. The Standard Deviation. **(03 marks)**

16. The sales (in thousands of shillings) of a Computer Accessories Company for the period 2002 to 2004 are given in the table below:

	QUARTER			
Year	**1**	**2**	**3**	**4**
2002	1235	1242	1410	1400
2003	1275	1270	1450	1480
2004	1302	1280	1510	1500

a) Calculate the four-point moving averages.

b) On same axes plot graphs of the sales and the moving averages against time. Comment on the general trend of the sales for the three years period.

c) Use your graph to estimate the sales for the 1st quarter of 2005. **(15 marks)**

END

S475/1

Subsidiary

Mathematics

Paper 1

August 2024

2Hrs: 40 Min

MEBU EXAMINATIONS CONSULT

Uganda Advanced Certificate Of Education

MOCK EXAMINATIONS 2024

SUBSIDIARY MATHEMATICS

Duration: 2 Hours: 40 Minutes

INSTRUCTIONS TO CANDIDATES

(i) Answer all eight questions in section A and four questions from section B selecting at least one question from each part.

(ii) Any additional questions answered will not be marked

(iii) All necessary working must be shown clearly

(iv) Graph paper is provided

(v) Silent, non-programmable scientific calculators and mathematical tables with a list of formulae may be used.

SECTION A

Attempt all the questions in this section

1. The third term of an Arithmetic Progression (A.P) is 12 and the seventh term is 32. Find the sum of the first ten terms of the A.P **(05 marks)**

2. Given the matrices $A = \begin{pmatrix} -1 & -3 \\ 1 & 1 \end{pmatrix}$ and $B = \begin{pmatrix} 6 & 3 \\ 2 & 1 \end{pmatrix}$ determine:
   (i) AB **(03 marks)**
   (ii) $2A - B$ **(02 marks)**

3. If $a = 5\boldsymbol{i} - 2\boldsymbol{j}$ and $b = -3\boldsymbol{i} + 7\boldsymbol{j}$, find;
   (b) $2a + b$ **(03 marks)**
   (c) $a \cdot b$ **(02 marks)**

4. Use the matrix method to solve the simultaneous equations: **(05 marks)**
$$3x + y = 5$$
$$3x - 2y = -1$$

5. A committee of 3 boys and 4 girls is to be chosen from a group of 8 boys and 6 girls. How many different committees can be formed? **(05 marks)**

6. Three events A, B and C are such that $P(B) = \frac{3}{5}$, $P(C) = \frac{4}{5}$, $P(C/B) = \frac{9}{20}$ and $P(A \cap C) = \frac{7}{25}$, find
   (b) $P(B \cap C)$ **(03 marks)**
   (c) $P(A/C)$ **(02 marks)**

7. Find the gradient of the curve $y = 2x^3 - 4x^2 + 5x - 6$ at point (-2, 4). **(05 marks)**

8. Given that $X \sim N(72, 225)$, find $P(30 < x \leq 60)$. **(05 marks)**

SECTION B

PART I (Pure Mathematics)

9. (a) Without using tables or calculator, solve for x in;
   i. $9^x \cdot 3^{(x+1)} = 81$ **(04 marks)**
   ii. $2 + 3\log x = \log 0.1$ **(04 marks)**

   b. The function $f(x) = x^4 + ax^3 + bx^2 + 5x + 3$ has a remainder of $(2x + 1)$ when divided by $x^2 + 3x + 2$. Find the values of a and b. **(07 marks)**

10. Given the curve $y = (x - 2)(3 - x)$
    (a) (i) Determine the nature of its stationary points. **(07 marks)**
    ii) Sketch the curve. **(04 marks)**

(b) Find the area enclosed between the curve and the y-axis. **(04 marks)**

11. A circle passes through points (1, -4), (6, 1) and (9, -8). Find
    (i) The equation of the circle. **(09 marks)**
    (ii) The centre and radius of the circle. **(06 marks)**

12. (a) Given that $Z_1 = 2 + 3\boldsymbol{i}$ and $Z_2 = 3 + 4\boldsymbol{i}$ find
    i. $Z_1 Z_2$ **(03 marks)**
    ii. $\left|\frac{Z_1}{Z_2}\right|$ **(06 marks)**

    b. $\int_0^1 x \sin x \, dx$ **(06 marks)**

PART II
(Applied Mathematics)

13. A continuous random variable X has the probability density function (p.d.f).
$$f(x) = \begin{cases} k(4 - x^2); & -2 < x < 2 \\ 0; & Elsewhere \end{cases}$$
    Where k is a constant.
    Determine the;
    (a) Value of k **(05 marks)**
    (b) Expected value $E(x)$ **(05 marks)**
    (c) Variance of X **(05 marks)**

14. (a) A man's chance of hitting a target with each of his shots is $^1/_5$. If he has to fire 5 shots, calculate the probability that;
    i. Exactly 3 shots hit the target **(03 marks)**
    ii. At least 2 shots hit the target **(04 marks)**

    b. In a football tournament, three teams Arsenal, Chelsea and Liverpool had the following results:
    - Arsenal won two matches, drew once and lost one match.
    - Chelsea won two matches and lost two matches.
    - Liverpool won 1 match, drew twice and lost one match.

    The teams are awarded 3 points for a win, 1 point for a draw and no point for a loss.
    (i) Write a 3×3 matrix for the results and a column matrix for the points. **(04 marks)**
    (ii) By matrix multiplication, determine the winner of the tournament. **(04 marks)**

15. The lengths in millimeters (mm) of 40 leaves in an agricultural survey are shown in the table below.

Length (mm)	18.0 – 18.9	19.0 – 19.9	20.0 – 20.9	21.0 – 21.9	22.0 – 22.9	23.0 – 23.9