

S475/1
Subsidiary
Mathematics
Paper 1
2hrs:40Min

UACE REGISTRATION EXAMINATIONS

SUBSIDIARY MATHEMATICS

PAPER 1

TIME: 2HOURS 40MINUTES

Instructions

Answer all the eight question in Section A and only four questions in Section B

All working must be shown clearly

No paper should be given for rough work

Squared paper and mathematical tables are provided

Silent non-prgrammable scientific calculators may be used.

Where necessary us $g = 9.8ms^{-2}$.

SECTION A (40MARKS)

1. Evaluate; $\frac{\log_6 216 + \log_2 64}{\log_3 243 - \log_{10} 0.1}$. (5marks)
2. In an arithmetic progression (AP) of 21 terms, the 21st Term is 252. Find the sum of the first 16 terms if the first term is 192. (5marks)
3. The matrix $A \begin{pmatrix} 2 & 1 \\ -3 & 0 \end{pmatrix}$ and I is a 2×2 identity marix. Determine the matrix B such that $A^2 + \frac{1}{2}B = I$. (5marks)
4. Solve the equation $2\sin\theta\cos\theta = \tan\theta$ for values of $0^\circ < \theta < 180^\circ$. (5marks)

5. The table below shows a r.v.x with the following probability distribution.

x	1	2	3	4	5	6
$P(X = x)$	k	5k	2k	k	3k	k

Find the;

- i) Value of k (2marks)
- ii) $E(x)$ (2marks)
- iii) $P(X > 4)$ (1marks)

6. Three events A, B and C are such that $P(A) = 0.6$, $P(B) = 0.8$ $P(B/A) = 0.45$ and $P(B \cap C) = 0.28$. Find

- a) $P(A \cap B)$ (2marks)
- b) $P(C/B)$ (3marks)

7. The table below shows the ranks of marks awarded by judge 1 (R_x) and Judge 2 (R_y) to 7 choir groups A to G.

Choir	A	B	C	D	E	F	G
Rank Judge 1 (R_x)	2	4	6	1	5	3	7
Rank Judge 2 (R_y)	2	3	5	1	6	4	7

Calculate Spearman's rank correlation coefficient between the marks awarded by the two judges. Comment on your result. (5marks)

8. A bullet of mass 50g is fired towards a stationary wooden block and enters the block when travelling horizontally with a speed of 500ms^{-1} . The wooden block provides a constant resistance of 36000N. Find how far into the block the bullet will penetrate. (5marks)

SECTION B (60MARKS)

Answer only **4** questions from this section.

9. a) Find the equation of the tangent to the curve $y = 15 - 3x^2$ at the point $(-2, 3)$ (5marks)
- b) The equation of a curve is given by $y = (x + 5)(x - 1)$, Find;
- Co-ordinates and nature of turning point on the curve.
 - y and x intercepts
- c) Sketch the curve. (10marks)
10. The roots of the equation $2x^2 - 6x + 7 = 0$ are α and β . Determine the;
- Values of $(\alpha - \beta)^2$ and $\frac{1}{\alpha^2\beta} + \frac{1}{\alpha\beta^2}$. (12marks)
 - Quadratic equation with integral coefficient whose roots are $(\alpha - \beta)^2$ and $\frac{1}{\alpha^2\beta} + \frac{1}{\alpha\beta^2}$. (3marks)
11. The table below shows the number of students and the marks scored in a test.

Marks	Number of Students
0 - 4	10
5 - 9	7
10 - 14	5
15 - 19	3
20 - 24	7
25 - 29	11
30 - 34	37
35 - 39	20

- Draw a cumulative frequency curve (Ogive) for the data.
 - Use the ogive to estimate the medium mark. (6marks)
- Calculate the
 - Mean mark
 - Standard deviation (9marks)

12. The table below shows the prices (in Ug Shs) of some food items in January, June and December together with the corresponding weights.

Item	Price(in Ug Shs)			Weight
	January	June	December	
Matooke (1 bunch)	15,000	13,000	18,000	4
Meat 91kg)	6,500	6,000	7,150	1
Posho (1kg)	2,000	1,800	1,600	3
Beans (1kg)	2,200	2,000	2,860	2

Taking January as the base month, calculate the;

- a) Simple aggregate price index for June

Comment on your results.

(5marks)

- b) Weighted aggregate price index for December.

Comment on your results

(10marks)

13. A continuous random variable X has a probability density function given by;

$$f(x) = \begin{cases} \frac{kx}{6} & , 1 \leq x \leq 2 \\ 0 & , \text{otherwise} \end{cases}$$

Where k is a constant

- a) Find;

- i) the value of k

(4marks)

- ii) $P(X \geq 1.5)$

(4marks)

- iii) the mean of X, $E(x)$

(3marks)

- b) Sketch the graph of $f(x)$

(4marks)

14. A motorist moving at 90kmh^{-1} decelerates uniformly to a velocity $V\text{ms}^{-1}$ in 10 seconds. He maintains this speed for 30 seconds and then decelerates uniformly to rest in 20 seconds.

- a) Sketch a velocity time graph for the motion of the motorist.

(6marks)

- b) Given that the total distance travelled is 800m, use your graph to calculate the value of V.

(5marks)

c) Determine the two decelerations.

(4marks)

****END ****