

ST. JOSEPH OF NAZARETH HIGH SCHOOL

UGANDA ADVANCED CERTIFICATE OF EDUCATION

INTERNAL MOCK EXAMINATION 2016

SUBSIDIARY MATHEMATICS

TIME: 2HOURS 40 MINUTES

INSTRUCTIONS TO CANDIDATES:

- Answer **all** the **eight** questions in section **A** and any **four** questions from section **B**.
- Any additional question (s) answered will not be marked.
- All working must be shown clearly.
- Each question in section **A** carries **5** marks while each question in section **B** carries **15** marks.
- Begin each answer on a fresh page.
- Graph paper is provided.
- Silent non – programmable scientific calculators and mathematical tables with a list of formulae may be used.
- Where necessary take **$g = 9.8 \text{ ms}^{-2}$**

SECTION A (40 MARKS)

1. Given matrix $\mathbf{B} = \begin{pmatrix} 2 & -3 \\ -2 & 4 \end{pmatrix}$; find \mathbf{A}^{-1} ; the inverse of \mathbf{A} if $\mathbf{A} = \mathbf{B}^2 - \mathbf{B}$
(05 marks)

2. The table below shows cost per kg of some items commonly used by a certain family.

Item	Beans	Posho	Salt	G. nuts	Rice
Cost per kg	3000	2000	500	2600	2200

Using **posho** as the **base price**, calculate the **cost of living** index and comment on your results.
(05 marks)

3. Solve the equation $2 \sec^2 \theta - 3 + \tan \theta = 0$ for values of θ from 0° to 360°
(05 marks)
4. \mathbf{A} and \mathbf{B} are two independent events such that $p(\mathbf{A}) = 0.3$ and $p(\mathbf{B}) = 0.35$ evaluate;
- (i) $p(\mathbf{A} \cap \mathbf{B})$
 (ii) $p(\mathbf{A} \cup \mathbf{B})$
 (iii) $p(\mathbf{A}/\mathbf{B})$

(05 marks)

5. Solve the differential equation $\frac{dy}{dx} = \frac{7x^2 + 1}{8y}$; given that $y = 2$ when $x = 0$

(05 marks)

6. The table below shows the weight of students in a certain class.

Weight (kg)	5 -	10 -	15 -	20 -	25 -	30 -	35 - 40
Cumulative frequency	2	7	15	30	35	38	40

Calculate the variance for the data.
(05 marks)

7. The third term of a geometrical progression (**GP**) is **10** and the **sixth** term is **80**.
Find the sum of the first six terms.
(05 marks)

8. $PQRS$ is a square of side " a ". Forces of magnitude $2N$, $1N$, $\sqrt{2N}$; and $4N$ act along PQ , QR , PR and SP respectively. The direction being in the order of letters. Find the magnitude and direction of the resultant force. (05 marks)

SECTION B (60 MARKS)

(Attempt **any four** questions)

9. The number of customers who visit a certain bank for the days **Monday** to **Friday** were recorded for **three** weeks.

Week	Mon	Tue	Wed	Thur	Fri
I	142	177	213	171	138
II	125	172	191	170	131
III	114	158	192	155	127

- (a) Calculate the **Five – point** moving averages for the data. (06 marks)
- (b) (i) On the same axes; plot the original data and the five – point moving averages. (05 marks)
- (ii) Comment on the trend of the number of customers who visit the bank over the three weeks. (01 mark)
- (iii) Use your graph to estimate the number of customers who will visit the bank on **Monday** in the **Four (IV)** week. (03 marks)
10. The table below shows the percentage preference of nine most popular holiday destinations as sampled by a tour company for two years **2015** and **2016**

Holiday destination	A	B	C	D	E	F	G	H	I
2015 (x)	90	80	78	78	50	40	30	20	10
2016 (y)	79	90	80	60	60	35	30	60	22

- (a) (i) Draw a scatter diagram for the data and comment on the correlation between **x** and **y**.
- (ii) Draw a line of best fit on your scatter diagram
- (iii) Use the line of best fit to find the value of **y** when **x = 45** (08 marks)
- (b) Calculate the **rank correlation** co – efficient. (07 marks)

11. The points ***p***, ***Q*** and ***R*** have position vectors $2\hat{i} + 2\hat{j}$; $\hat{i} + 6\hat{j}$ and $-7\hat{i} + 4\hat{j}$ respectively.
- (a) (i) Find the vectors ***QR*** and ***PQ***
 (ii) Show that triangle ***PQR*** is right – angled at ***Q***. (07 marks)
- (b) Find the angle between ***PR*** and ***PQ***. (08 marks)
12. A sugar factory sells sugar in bags of **mean** weight **50kg** and **variance 6.25kg**. Given that the weights of the bags are normally distributed;
- (a) Find the probability that the weight of any bag of sugar randomly selected lies between **51.5kg** and **53 kg**.
- (b) Calculate the percentage of bags whose weights;
- (i) exceed **54 kg**
 (ii) lies between **46.58 kg** and **55.58 kg**
- (c) Determine the number of bags that will be rejected out **1000 bags** purchased for weighing below **45kg**. (15 marks)
13. (a) Sketch the curve $y = x^2 + 2x - 24$ (10 marks)
- (b) Find the area enclosed by the curve and the ***x*** –axis from ***x* = -4** to ***x* = 4**. (05 marks)
14. A motorist sets of from **town A** and accelerates uniformly for ***T*₁** seconds covering a distance of **500m**. He then travels at a speed of ***V* km/hr** for ***T*₂** seconds covering a further distance of **1000m**. He then decelerates uniformly for ***T*₃** seconds coming to rest at **town B**. If the total time taken is **5 minutes** and that ***T*₁ = 1/2 *T*₃** ;
- (a) Sketch a velocity – time graph.
- (b) Find; ***T*₁**, ***T*₂**, ***T*₃**, ***V*** and distance **AB**” (15 marks)

~END~

SUCCESS IS A STRUGGLE!