REPUBLIQUE DU CAMEROUN *Paix-Travail-Patrie* MINISTERE DES ENSEIGNEMENTS SECONDAIRES **CELLULE D'APPUI A L'ACTION PEDAGOGIQUE** ANTENNE RÉGIONALE DU NORD OUEST BP 2183 MANKON BAMENDA TEL 233 362 209 Email : trubamenda@yahoo.co.uk	**REPUBLIC OF CAMEROON** *Peace-Work-Fatherland* MINISTRY OF SECONDARY EDUCATION **TEACHERS' RESOURCE UNIT** REGIONAL BRANCH FOR THE NORTH WEST P.O. BOX: 2183 MANKON BAMENDA TEL 233 362 209 Email : trubamenda@yahoo.co.uk

TEACHERS' RESOURCE UNIT TRU-RIP-STA MOCK EXAMS CIAP BAMENDA NORTH WEST REGION

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MARCH 2022

The Teachers' Resource Unit and the Regional Inspectorate of Pedagogy in collaboration with MTA	SUBJECT CODE NUMBER **0770**	PAPER NUMBER **3**
GENERAL CERTIFICATE OF EDUCATION REGIONAL MOCK EXAMINATION	SUBJECT TITLE **MATHEMATICS WITH STATISTICS**	
ADVANCED LEVEL		

Time Allowed: THREE hours
INSTRUCTIONS TO CANDIDATES

Mobile phones are **NOT ALLOWED** in the examination room.

Full marks may be obtained for answers to ALL questions.

Mathematical Formulae Booklets published by The GCE Board are allowed.

In calculations, you are advised to show all the steps in your working, giving the answer at each stage. Calculators are allowed.

Start each question on a fresh page.

1. (i) The events A and B are such that $P(A) = \frac{1}{2}$, $P(B) = \frac{1}{4}$ and $P(A \cup B) = \frac{13}{24}$.

Find (a) $P(A' \cap B)$
(b) $P(B/A')$

(3, 3) marks

(ii) 25% of the population of a certain village have difficulties in hearing. A laboratory test is carried out and the following observations were made. If someone has difficulties in hearing, the probability that the test result is positive is 95%. If someone does not have difficulties in hearing, the probability that the test result is negative is 90%.
A person is chosen at random from the population and tested.
Find the probability that:

(a) the results are positive.
(b) the person has hearing difficulties and tests negative.
(c) the person has hearing difficulties given that he tests positive.

(2, 2, 3) marks

2. The marks of 113 students in certain Biology exams were recorded as shown below

Marks(x)	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99
Number of students (f)	3	6	11	21	18	14	10	16	9	5

(a) Calculate to 2 decimal places the mean mark and the standard deviation for this data.
(b) Calculate an estimate of the modal mark .
(c) Calculate an estimate of the median mark for this distribution.
(d) For a second set of 200 students, the mean mark was 43.21. If the two sets of students are merged in the same class, find the mean mark of the 313 students.

(3, 4, 2, 2, 2) marks

3. (i) X and Y are two independent random variables.
Prove that for any constant k, $\text{Var}(kX + Y) = k^2\text{Var}(X) + \text{Var}(Y)$. **2 marks**

(ii) The continuous random variable X has probability density function f given by

$$f(x) = \begin{cases} \frac{3}{16}x(4-x), & 2 \leq x \leq 4 \\ 0, & \text{elsewhere} \end{cases}$$

(a) Determine the mode of the distribution.
(b) Calculate the mean of X.
(c) Calculate variance of X.
(d) Show that the median of this distribution lies between the mode and the mean.

(2, 3, 4, 2) marks

4. (i) (a) State two properties of a suitable estimator of population parameter.

(b) From a population of scores, the following sample is drawn;

3, 2, 4, 6, 2.

Use this sample to find unbiased estimates of the mean and the variance of the population of scores.

(2, 3) marks

(ii) A discrete random variable X has a probability distribution as shown in the table below

x	0	2	3
$P(X = x)$	0.4	0.4	0.2

Random samples each of size **TWO** are taken from the distribution of X.

(a) Construct a probability distribution for $\overline{X}$ the mean of all possible samples.

(b) Find the mean and variance of $\overline{X}$

(3, 5) marks

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5. The table below shows the performances of candidates in Commerce and French.

candidate	A	B	C	D	E	F	G	H	I	J
Commerce (x)	25	20	12	15	14	24	20	13	14	10
French (y)	10	14	12	13	6	10	8	5	6	7

Find:

(a) the covariance for the data.

(b) the least square regression line of the performances in French on the performances in Commerce.

(c) the Pearson product moment correlation coefficient for the data and comment on it.

(d) the minimum sum of square residuals of the performances in French on those in statistics.

(2, 6, 3,2)marks

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6. (i) A discrete random variable has probability distribution as shown below

x	0	1	2	3	4
$P(X = x)$	$\frac{3}{25}$	$\frac{3}{20}$	t	$\frac{1}{4}$	k

It is known that $E(X) = \frac{101}{50}$.

Find (a) the values of t and k.

(b) $\mathrm{Var}(X)$.

(4, 3) marks

(ii) The number of vehicles arriving a junction per minute follow a Poisson distribution with mean 1.4.

Find, to three decimal places, the probability that:

(a) exactly two vehicles arrive the junction in one minute.

(b) more than two vehicles arrive the junction in a period of 4 minutes.

(3, 3) marks

TURN OVER

7. (i) The heights of women in a certain village are normally distributed with mean μcm and standard deviation σcm. On the basis of the results obtained from a random sample of 100 women form this village, 95% confidence interval for μ was calculated and found to be $(177.22cm, 179.18cm)$.

Calculate:

(a) the value of the sample mean.

(b) the value of σ.

(5, 3)marks

(ii) A machine is set to produce pack s of sugar with mean weight $1000g$ and standard deviation $8g$. to check the setting, a sample of 36 packs is taken and the mean weight is found to be $997g$. test at the 3% level of significance whether the machine is set too low.

5 marks

8. A Christmas draw Aims to sell 5000 tickets, 50 of which will win a prize. A company buys 200 tickets, let X represent the number of tickets that will win a prize.

(a) Explain why a Poisson approximation is necessary.

(b) Use the Poisson approximation to calculate the probability that at most 3 tickets will win a prize.

(c) Find how many tickets should be bought for there to be a 90% probability of winning at least a prize.

(2, 6, 5) marks