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Paix-Travail-Patrie

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REPUBLIC OF CAMEROON
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MINISTRY OF SECONDARY EDUCATION

TEACHERS' RESOURCE UNIT
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MARCH 2020

The Teachers' Resource Unit and the Regional Inspectorate of Pedagogy, in collaboration with MTA	SUBJECT CODE NUMBER 0575	PAPER NUMBER 2
GENERAL CERTIFICATE OF EDUCATION REGIONAL MOCK EXAMINATION	SUBJECT TITLE ADD MATHEMATICS	
ORDINARY LEVEL	DATE Thursday 24th March 2020 AFTERNOON	

Time Allowed: TWO and a half hours

INSTRUCTIONS TO CANDIDATES

Mobile phones are NOT ALLOWED in the examination room.

- *Answer ALL questions in section A and ANY Two questions from either section B or section C*
- *Candidates are expected to answer a combination of Section A and section B OR Section A and Section C but NOT a combination of all three.*
- *All necessary working must be shown. No mark will be awarded for answers without brief statements showing how the answers have been obtained*

Calculators are allowed

Section A

(Answer ALL questions in this section)

1.

(i) Given that $(x - 1)$ is a factor of $f(x)$, where $f(x) = x^3 - x^2 - 4x + k$.

a) Find the value of k. (2 marks)

b) Factories $f(x)$ completely. (2 marks)

c) Solve for x, the equation $f(x) = 0$. (1 mark)

(ii) Given that α and β are roots of the equation $x^2 - 5x + 2 = 0$, then

a) State the values of $\alpha+\beta$ and $\alpha\beta$ (1 mark)

b) Find the equation with integral coefficients whose roots are α^2 and β^2 (4 marks)

2. (i) Find the number of permutations of the letters in the word CANDIDATES. (3 marks)

(ii) Find the numerical value of the term independent of x in the expansion of $(x - \frac{2}{x^2})^6$. (4 marks)

3 (i) a) State the common difference of the arithmetical progression (A.P) 1, 4,7, ...

b) Find in terms of n the formula for the nth term of this A.P. (2 marks)

c) Hence, find the 100^{th} term of this A.P (2 marks)

(ii) a) State the first 3 terms of the series $\sum_{r=1}^{\infty} \frac{1}{2^r}$ (2 marks)

b) Evaluate $\sum_{r=1}^{\infty} \frac{1}{2^r}$ (2 marks)

4 (i) The binary operation • is defined on the set G = {0, 1, 2, 3} as a • b = (a + b + 2) mod 4

a) Copy and complete the table below

•	0	1	2	3
0			0	
1		0		
2				3
3	1			

(3 marks)

b) Assuming that the property of associativity holds, shows that (G, •) forms a group. (4marks)

(ii) A linear transformation T is defined as T: (x, y) → (x+2y, 3x-y).

Find the point whose image is (3, 2) under T (3marks)

5. (i) Prove that $\frac{\sin^2 x}{1+\cos x} + \frac{\sin^2 x}{1-\cos x} \equiv 2$ (3 marks)

(ii) Solve for x, $0 \le x \le 360^0$, the equation $\cos(x + 20^\circ) = \frac{1}{2}$ (3 marks)

(iii) The function g(x) is defined as follows : $g(x) = \sin 2x - \cos x$ for 0

a) Copy and complete the table below. (2 marks)

x	0			$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{5\pi}{6}$	π
g(x)	-1				0			

b) Taking 2cm to represent 1 cm on the x-axis and 2cm to represent 1 unit on the y-axis draw the graph of $y = \sin 2x - \cos x$ (2 marks)

c) Hence estimate the maximum value and the minimum value of g(x). (2 marks)

6. (i) Find the range of values of x for which $x^2 + 4x - 5 < 0$ (3 marks)

(ii) Shade so as to leave unshaded the region satisfied by the inequalities: (3 marks)

$y \ge 3, 2x + 2y$

7 ... and L_2

a) ... $(3t - 1)$

... (3 marks)

... (5 marks)

... (3 marks)

8 ... $y = \frac{x^2}{2}$ ... $3x^2 + 1$ ... x-axis and the lines

Section B. MECHANICS.

(Answer any two questions from this section. If you choose this section, then you may not answer questions in section C)

9. (i) Two particles A and B are moving in the plane such that at time t seconds the position vectors A and B are $(t^2i + 2j)$m and $t(2i + 4j)$m respectively.

a) Find the distance of B from the origin when t = 2 seconds (3 marks)

b) Find the velocity of A when t = 3 second. (3 marks)

c) Find the acceleration of A. (2 marks)

(ii) Two particles A and B of equal masses 2kg are travelling along the same level road, toward each other with speed $4ms^{-1}$ and $3ms^{-1}$ respectively.

Given that the particles collide and coalesce, then find

a. Their common speed (3 marks)

b. The impulse experienced by B (3 marks)

c. The loss in Kinetic energy (3 marks)

10. (i) $F_1 = (i - cj)N$, $F_2 = (ci + 2bj)N$, $F_3 = (5i-j)N$, and $F_4 = (bi - 3j)N$. Given that the resultant force of F_1, F_2, F_3 and F_4 is $(4i + bj)N$, then find

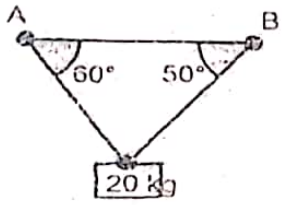
a) The value of c and b. (4 marks)

A fifth force F is added to the system and equilibrium is established. Find

b) The force F. (2 marks)

c) The magnitude and direction of the force F. (4 marks)

(ii) The figure below shows a block of mass 20kg which is suspended in equilibrium by the strings AC and BC. The strings are inclined at 60° and 50° to the horizontal respectively. Find the tensions in the string.



(7 marks)

11. (i) A spherical balloon is being inflated. When the radius of the sphere is 4cm, its radius is increasing at the rate of 0.5cm/s. Find to 3 significant figure, the rate in cm^2/s at which the surface area of a sphere at the instance when the radius is 4cm.

(surface area of a sphere is $4\pi r^2$) (5 marks)

(ii) The point $(\frac{7}{2}, \frac{11}{3})$ is the center from the particles of masses 2kg, 3kg and 7kg acting at the point (5, 2), (-1, 4) and (a, b) respectively, Find the values of a and b

(6marks)

(iii) Find the volume of the solid generated when the area bounded by the curve $y = x^3$, the x- axis and the lines x = 0 and x = 1 is rotated completely about the x - axis.

(6marks)

Section C: STATISTICS

(Answer any two questions in this section. If you choose this section, then you should not choose section B.)

12. The following frequency table shows the mass (to the nearest kg) of 50 girls in a certain class

Mass(x)	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74
frequency	2	12	20	7	4	2	2	1

(a) Draw a cumulative frequency curve for the distribution (5 marks)

(b) Estimate the semi-interquartile range of the masses (4 marks)

(c) The number of girls with masses greater than x kg is 5. Find x (2 marks)

(d) Find the mean, variance of the masses. (4 marks)

13. (a) The probability mass function of a discrete random variable X is given by

$P(X = x) = \frac{x+1}{25}$, where x = 1, 2, 3, 4, 5

a) Copy and complete the table below

x	1	2	3	4	5
$f(x)$	0				$\frac{4}{10}$

(7 marks)

b) Find the mean and variance of x

ii) It is known that $\frac{3}{4}$ of a large batch of seeds will germinate. Given that five seeds are sown, find the probability that

a) None will germinate; (3 marks)

b) At least one seed will germinate; (3 marks)

14. (i) In a certain class of 50 students, 30 are girls. A survey showed that 25% of the girls like Additional Mathematics and 35% of the boys like Additional Mathematics

a) Draw a tree diagram to illustrate the possible outcome; (3 marks)

A student X is chosen at random from the class. Find the probability that

b) X is a boy (1 mark)

c) X is a boy who likes Additional Mathematics (2 marks)

d) X like Additional Mathematics (3 marks)

(ii) Two events A and B are such $P(A) = \frac{2}{5}$, $P(B) = \frac{1}{5}$ and $P(B/A) = \frac{1}{4}$, Find

a) $P(A \cap B)$ and show that the events are independent (4 marks)

b) $P(A \cup B)$ (4 marks)

END