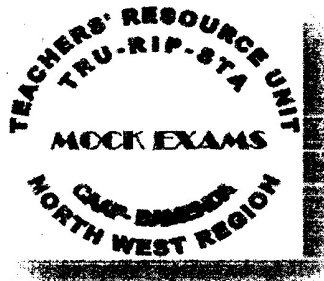


REPUBLIQUE DU CAMEROUN
Paix-Travail-Patrie

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MARCH 2024

The Teachers' Resource Unit and the Regional Inspectorate of Pedagogy, in collaboration with MTA	SUBJECT CODE NUMBER 0765	PAPER NUMBER 1
GENERAL CERTIFICATE OF EDUCATION REGIONAL MOCK EXAMINATION		
CANDIDATE NAME: CANDIDATE NUMBER CENTRE NUMBER:	SUBJECT TITLE PURE MATHEMATICS WITH MECHANICS	
ADVANCED LEVEL		

Time Allowed: One and a half hours
INSTRUCTIONS TO CANDIDATES:

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

1. USE A SOFT HB PENCIL THROUGHOUT THIS EXAMINATION.
2. DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO.

Before the Examination begins:

3. Check that this question booklet is headed "Advanced level -0765 code and subject title PURE MATHEMATICS WITH MECHANICS —G Paper 1".
4. Insert the information required in the spaces above.
5. Without opening the booklet, pull out the answer sheet carefully from inside the front cover of this booklet. Take care that you do not crease or fold the answer sheet or make any marks on it other than those asked for in these instructions.
6. Insert the information required in the spaces provided on the answer sheet using your HB pencil:

Candidate Name, Centre Number, Candidate Number, Subject Code Number, and Paper number

How to answer questions in this examination:

7. Answer ALL the 50 questions in this examination. All questions carry equal marks.
8. Non-programmable calculators are allowed.
9. For each question there are four suggested answers, A, B, C and D. Decide which answer is correct. Find the number of the question on the Answer Sheet and draw a horizontal line across the letter to join the square brackets for the answer you have chosen. For example, if C is your correct answer, mark C as shown below:
 [A] [B] [C] [D]
10. Mark only one answer for each question. If you mark more than one answer, you will score zero for that question. If you change your mind about an answer, erase the first mark carefully, and then mark your new answer.
11. Avoid spending much time on any question. If you find a question difficult, move to the next question. You can come back to this question later.
12. Do all rough work in this booklet using, where necessary, the blank spaces in the question booklet.
13. You must not take this booklet and answer sheet out of the examination room. All question booklets and answer sheets will be collected at the end of the examination.



SECTION A: PURE MATHEMATICS

1. The equation $3x^2 - x + 2 = 0$ has:

- A Real roots
- B Equal roots
- C Complex roots
- D Real and distinct roots

2. If the roots of the equation $2x^2 - 4x + 5 = 0$ are α and β , then the value of $\frac{1}{\alpha^2} + \frac{1}{\beta^2}$ is:

- A $-\frac{4}{25}$
- B $-\frac{2}{5}$
- C $\frac{4}{25}$
- D $\frac{5}{2}$

3. $\frac{x+3}{(x-1)(x^2+1)}$ can be expressed into partial fractions in the form:

- A $\frac{A}{x-1} + \frac{B}{x^2+1}$
- B $\frac{Ax+B}{x-1} + \frac{Cx+D}{x^2+1}$
- C $\frac{A}{x-1} + \frac{B}{x+1} + \frac{C}{x^2+1}$
- D $\frac{A}{x-1} + \frac{Bx+C}{x^2+1}$

4. The range of values of x for which $\frac{3}{4-x} > 2$ is:

- A $\frac{5}{2} \leq x \leq 4$
- B $\frac{5}{2} < x < 4$
- C $x < \frac{5}{2}$ or $x > 4$
- D $x \leq \frac{5}{2}$ or $x \geq 4$

5. Given that

$p(x) = (2x-1)(x-3)(ax+6) + 12x-8$ is exactly divisible by $(x-1)$, the value of a is

- A 1
- B -1
- C 3
- D -4

6. The sum of the first n terms of a series is $S_n = 3n^2 - n$. The n^{th} term of the series is:

- A $6n-4$
- B $7n+4$
- C $-6n+4$
- D $2n-3$

7. The 6th term of a geometric progression is 16 and the 3rd term is 2. First term and the common ratio are respectively:

- A 1 and 3
- B $\frac{3}{2}$ and 2
- C $\frac{1}{2}$ and 2
- D $\frac{1}{2}$ and 3

8. The contrapositive of $p \Rightarrow q$ is:

- A $q \Rightarrow p$
- B $\sim q \Rightarrow \sim p$

C $\sim p \Rightarrow \sim q$

D $\sim p \Rightarrow q$

9. A statement which is logically equivalent to $\sim(p \Rightarrow q)$

A $p \Rightarrow \sim q$

B $\sim p \Rightarrow q$

C $\sim p \Rightarrow \sim q$

D $\sim q \Rightarrow \sim p$

10. The largest coefficient in the expansion of $(1+x)^{10}$ is

- A $\frac{10!}{(5!)^2}$
- B $\frac{10!}{5!}$

- C $\frac{10!}{(5!4!)^2}$
- D $\frac{10!}{5!4!}$

11. The term independent of x in the expansion of

$(2x + \frac{1}{x^2})^6$ is:

- A -240
- B 16
- C 15
- D 240

12. Given that $A(1, 3)$, $B(5, 7)$, $C(4, 8)$ and $D(0, a)$ form a rectangle ABCD, the value of a is:

- A -4
- B 4
- C 3
- D -1

13. Given that the image of $A(3, -3)$ in the line $2y = x + 5$ is $B(a, 5)$, the value of a is:

- A 1
- B 3
- C -1
- D -3

14. A partial ordered relation is:

- A reflexive, symmetric and transitive
- B reflexive, anti-symmetric and transitive
- C an equivalence relation
- D reflexive, symmetric and anti-symmetric

15. Given that $A = \{1, 2, 3, 4, 5, 6, 7\}$ and R is the relation if and only if $x + y$ is even for all $x, y \in A$.

The equivalence class of 1 is:

- A $\{1, 3, 5, 7\}$
- B $\{2, 3, 4, 6, 7\}$
- C $\{3, 5, 7\}$
- D $\{2, 4, 6\}$

16. The function f is defined by $f(x) = \frac{x+3}{x-1}$, $x \neq 1$, $f(f(x))$

- A $\frac{x-1}{x+3}$
- B $\frac{x^2+6x+9}{x^2-2x+1}$
- C x
- D 1

17. The function $g(x) = \begin{cases} 2x-1, & 0 \leq x < 1 \\ 1, & 1 \leq x < 2 \end{cases}$ is periodic with period 5. $g(5.5) =$

- A 11
- B 10
- C 1
- D 0

8. The argument of $z = -3 - 3i$ is:



- A $\frac{\pi}{4}$ C $-\frac{\pi}{4}$
B $-\frac{3\pi}{4}$ D $\frac{\pi}{4}$

19. $\left| \frac{2+2i}{-1+\sqrt{3}i} \right| =$

- A $\sqrt{2}$ C $2\sqrt{2}$
B 2 D 1

20. $\lim_{n \rightarrow \infty} \left(\frac{3n^5 + 2n + 6}{n^5 + 2n^2 + 9} \right) =$

- A 3 C 0
B ∞ D $\frac{1}{3}$

21. If $y = \sin^3 x$, then $\frac{dy}{dx} =$

- A $3 \sin^2 x$ C $\cos^3 x$
B $3 \sin x \cos x$ D $3 \sin^2 x \cos x$

22. The vertical asymptote(s) of the graph of $y = \frac{-2x^2 - 1}{x^2 - 1}$ is (are):

- A $x = 1$ and $x = -1$ C $x = 1$
B $x = 2$ and $x = -2$ D $x = \frac{1}{2}$

$\int x^2 e^{x^3} dx =$

- A $e^{x^3} + C$ C $\frac{1}{3} e^{x^3} + C$
B $2x e^{3x^2} + C$ D $\frac{1}{2} e^{x^3} + C$

23. The general solution of the differential equation $(x-1) \frac{dy}{dx} = x$, where A is a constant, is

- A $y = x + \ln|x-1| + A$
B $y = x - 1 + \ln|x| + A$
C $y = \frac{x}{x-1} + A$
D $y = \ln|x-1| + A$

24. Two variables x and y are connected by the equation $y = ab^x$. A linear equivalence of this equation is:

- A $\ln y = x \ln(ab)$
B $\ln y = x \ln a + \ln b$
C $\ln y = \ln a + b \ln x$
D $\ln y = x \ln b + \ln a$

25. The equations of the asymptotes to the curve $y = \frac{3x^2 - 7}{x^2 + x - 2}$ are:

- A $x = -1, x = 2, y = -3$
B $x = -2, x = 1, y = 3$
C $x = 2, x = -1, y = -3$
D $x = -2, x = -1, y = 3$

26. The values of α and β for which the lines $\mathbf{r} = 3\mathbf{i} - \mathbf{j} + \mathbf{k} + \alpha(\mathbf{i} + 2\mathbf{j} - \mathbf{k})$ and $\mathbf{r} = 4\mathbf{i} + 4\mathbf{j} + \mathbf{k} + \beta(-\mathbf{i} + \mathbf{j} + 2\mathbf{k})$ intersect are:

- A $\alpha = 2$ and $\beta = 1$
B $\alpha = 2$ and $\beta = -1$
C $\alpha = -2$ and $\beta = -1$



D $\alpha = -2$ and $\beta = 1$

27. The value of x for which $e^{\ln x} + \ln e^x = 8$ is:

- A -2 C 4
B 2 D -4

28. $\sum_{r=101}^{200} r =$

- A 99 C 5050
B 100 D 15050

29. A school council commission of 6 members is to be formed from 10 men and 7 women. The number of ways in which this can be done if the commission is to include at least 4 men and 1 woman is:

- A 6174 C 1764
B 4410 D 41

30. The length of the tangent from the point (5, 6) to the circle $x^2 + y^2 + 2x + 4y - 21 = 0$ is:

- A 74 C $\sqrt{74}$
B 10 D $\sqrt{26}$

31. $\frac{\cos 3x - \cos x}{\sin 3x - \sin x} =$

- A $\tan 2x$ C $\cot 2x$
B $-\tan 2x$ D $-\cot 2x$

32. The first approximation to the root of the equation $x^2 = 5$ is $x = 2$. Using the Newton-Raphson method, second approximation to the root of the equation is:

- A 4 C $\frac{4}{9}$
B -1 D $\frac{9}{4}$

33. If $A = \begin{pmatrix} 1 & 2 & x \\ 0 & 1 & 0 \\ 0 & 1 & 1 \end{pmatrix}$, $B = \begin{pmatrix} 1 & -2 & y \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$ and $AB =$ then $x + y =$

- A 0 C 2
B -1 D 1

34. The period of the function $p(x) = \cos\left(\frac{2x}{3}\right)$ is:

- A $\frac{4\pi}{3}$ C 3π
B $\frac{3}{2\pi}$ D 2π

SECTION B: MECHANICS

35. A particle which is moving in a straight line with constant acceleration of 2 ms^{-2} is initially at rest. The distance covered by the particle in the third second of its motion is:

- A 9m C 1m
B 4m D 5m

36. A particle is projected with a speed of 20 ms^{-1} at an angle of elevation of 45° from a point on a level ground. The horizontal range is:

- A 40m C $2\sqrt{2} \text{ m}$
B 10m D $\sqrt{2} \text{ m}$

38. A block of wood of mass 4kg rest on a rough plank inclined at 30° to the horizontal. The coefficient of friction is:

- A $\frac{\sqrt{3}}{2}$ C $\frac{\sqrt{3}}{3}$
B $\frac{1}{2}$ D $\frac{\sqrt{2}}{3}$

39. A particle of mass 3kg is pulled along a rough horizontal surface by a string parallel to the surface. The tension in the string is 60N and the coefficient of friction is $\frac{1}{5}$; taking g as 10ms^{-2} , the acceleration of the particle is:

- A 6ms^{-2} C 60ms^{-2}
B 18ms^{-2} D 0ms^{-2}

40. A particle P of mass 4kg is initially at rest on a smooth plane inclined at an angle of α to the horizontal. It is supported by a light inextensible string which passes over a smooth light pulley at the top of the edge of the plane. The other end of the string supports a particle Q of mass 12kg which hangs freely. Given that the system is in equilibrium, the value of α is:

- A 30° C 60°
B 45° D 75°

41. A car of mass 1000kg is travelling along a straight road against a constant resistance of magnitude 500N. Given that the maximum power output of the engine is 15KW, the velocity of the car is:

- A 3ms^{-1} C 10ms^{-1}
B 5ms^{-1} D 30ms^{-1}

42. An elastic string of natural length 2m is stretched 4cm when a mass of 3kg hangs on it. The modulus of elasticity of the string is: (Take g as 10ms^{-1})

- A 15N C 1500N
B 60N D 120N

43. An elastic string of natural length 1m obeys Hooke's law. When it is stretched from 1m to 2m the energy stored in it is 10J. The energy stored in the string when the stretch is 1.5m is:

- A 32J C 8J
B 4J D 16J

44. Two particles A and B are moving in the same straight line towards one another. The mass of A is 3kg and its speed is $2u$, while the mass of B is 2kg and its speed is u .

Given that the particles coalesce on impact, the common speed of the particles after collision is:

- A $\frac{4u}{5}\text{ms}^{-1}$ C $5u\text{ms}^{-1}$
B $4u\text{ms}^{-1}$ D $\frac{5u}{54}\text{ms}^{-1}$

45. A particle moves along a straight line with acceleration $(1 - v)\text{ms}^{-2}$, where v is the velocity at time t seconds. Given that the particle starts from rest the value of v at time $t = 2$ seconds is:

- A e^{-2} C $1 - e^{-2}$
B $1 - e^2$ D e^2

46. The position vector of a particle of mass 3kg at time t seconds is $\mathbf{r} = [(t^2 + 1)\mathbf{i} - 2t\mathbf{j} + (t^2 - 1)\mathbf{k}]\text{m}$. The magnitude of the velocity of the particle when $t = 1$ is:

- A $\sqrt{2}\text{ms}^{-1}$ C 18ms^{-1}
B 2ms^{-1} D $2\sqrt{3}\text{ms}^{-1}$

47. To an observer moving with velocity $(2\sqrt{2}\mathbf{i} - 4\mathbf{j})\text{ms}^{-1}$ a tanker appears to be moving with a velocity of $(-3\sqrt{2}\mathbf{i} + \mathbf{j})\text{ms}^{-1}$. The magnitude of the velocity of the tanker is:

- A $\sqrt{19}\text{m/s}$ C $3\sqrt{3}\text{m/s}$
B $\sqrt{24}\text{m/s}$ D $\sqrt{3}\text{m/s}$

48. A body of mass 4kg moves with constant angular speed $3\pi\text{rads}^{-1}$ around a horizontal circle of radius 2m. The magnitude of the force acting towards the center of circle is:

- A $12\pi^2\text{N}$ C $36\pi^2\text{N}$
B $72\pi^2\text{N}$ D $24\pi^2\text{N}$

49. The position vectors of the center of gravity of the particles of masses 5kg, 6kg, 3kg and 2kg at particular position vectors $(2\mathbf{i} + \mathbf{j})\text{m}$, $(2\mathbf{i} - \mathbf{j})\text{m}$, $(-3\mathbf{i} + \mathbf{j})\text{m}$, $(\mathbf{i} - 2\mathbf{j})\text{m}$ respectively is:

- A $(\frac{15}{16}\mathbf{i} - \frac{1}{8}\mathbf{j})\text{m}$ C $(2\mathbf{i} - \mathbf{j})\text{m}$
B $(\frac{16}{15}\mathbf{i} - 8\mathbf{j})\text{m}$ D $(\mathbf{i} - \frac{1}{2}\mathbf{j})\text{m}$

50. Two events A and B are such that $P(A) = \frac{1}{3}$, $P(B) = \frac{1}{2}$ and $P(A \cap B) = \frac{1}{9}$, $P(B/\bar{A}) =$

- A $\frac{4}{9}$ C $\frac{1}{2}$
B $\frac{1}{9}$ D $\frac{1}{6}$

STOP

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