REPUBLIQUE DU CAMEROUN
Paix-Travail-Patrie

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TEACHERS' RESOURCE UNIT TRU-RIP-ETA MOCK EXAMS CAMEROON NORTH WEST REGION

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REPUBLIC OF CAMEROON
Peace-Work-Fatherland

MINISTRY OF SECONDARY EDUCATION

TEACHERS' RESOURCE UNIT
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MARCH 2022

The Teachers' Resource Unit and the Regional Inspectorate of Pedagogy, in collaboration with MTA	SUBJECT CODE NUMBER **0775**	PAPER NUMBER **1**
GENERAL CERTIFICATE OF EDUCATION REGIONAL MOCK EXAMINATION		
CANDIDATE NAME: .. CANDIDATE NUMBER: CENTRE NUMBER:	SUBJECT TITLE **FURTHER MATHEMATICS**	
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 –0775 Code and Subject title—Further Mathematics 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.**

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1. Cosh(ln2) =

A. $\frac{3}{4}$ B. $\frac{4}{5}$ C. $\frac{5}{4}$ D. $\frac{4}{3}$

2. A tangent at the pole to the polar curve $r = \sqrt{2} - 2\cos\theta$ is $\theta =$

A. $\frac{\pi}{6}$ B. $\frac{\pi}{4}$ C. $\frac{\pi}{3}$ D. $\frac{\pi}{2}$

3. If the chord joining the points $P(ap^2, 2ap)$ and $Q(aq^2, 2aq)$ on the parabola $y^2 = 4ax$ passes through the focus, then

A. $p + q = 1$
B. $p + q = -1$
C. $pq = 1$
D. $pq = -1$

4. The root mean square of $\frac{1}{x}$ in the interval $1 \le x \le 4$ is:

A. $\frac{1}{4}$ B. $\frac{1}{2}$ C. $\frac{3}{4}$ D. $\frac{\sqrt{3}}{2}$

5. The inverse of 4 in modulo 7 is:

A. 1
B. 2
C. 3
D. 4

6. The complex transformation T: $z \to w$, given by $w = iz$, represents:

A. reflection in the real axis
B. reflection in the imaginary axis
C. rotation about O through 90° clockwise
D. rotation about O through 90° anticlockwise

7. A continuous random variable T has probability density function

$$f(t) = \begin{cases} 2ke^{-4t}, t \ge 0 \\ 0 \quad , t < 0 \end{cases}.$$

The value of k is:

A. 2
B. −2
C. 4
D. −4

8. $\lim_{x \to 0}\left(\frac{\sin^{20} x}{x^{19}\sin 2x}\right) =$

A. 0
B. $\frac{1}{2}$
C. 1
D. ∞

9. The contrapositive of the statement "If $x + 2 = 7$, then $x = 5$" is:

A. If $x + 2 \neq 7$, then $x \neq 5$
B. If $x + 2 \neq 7$, then $x \neq 5$
C. If $x = 5$, then $x + 2 = 7$
D. If $x \neq 5$, then $x + 2 = 7$

10. The oblique asymptote to the curve $f(x) = \frac{1 + x - x^2}{2 + x}$ is :

A. $y = x - 1$
B. $y = -x - 1$
C. $y = x - 3$
D. $y = -x + 3$

11. A suitable substitution to use in evaluating $\int \frac{1}{\sqrt{4 + 9x^2}}$ is:

A. $3x = 2\tan u$
B. $3x = 2\sin hu$
C. $3x = 2\sin u$
D. $3x = 2\tan hu$

12. An estimate for $\int_1^5 2^x\,dx$, using Simpson's rule with three ordinates, is:

A. 66
B. 50
C. 44
D. $\frac{100}{3}$

13. The force $\vec{F} = (3i)$N acts through the point $\vec{r} = (2j)m$. The vector moment of $\vec{F}$ about $\vec{a} = (k)m$ is:

A. $-3j - 6k$
B. $-6j + 3k$
C. $6j - 3k$
D. $3j + 6k$

14. $\left(\cos\frac{\pi}{5} + i\sin\frac{\pi}{5}\right)^{20} =$

A. 1
B. −1
C. i
D. −i

15. The order of the element 3 in the group $(\{0, 1, 2, 3\}, +_4)$, where $+_4$ is addition modulo 4, is:

A. 1
B. 2
C. 3
D. 4

16. The centre of symmetry of the curve $f(x) = \ln\left(\frac{x-4}{x+2}\right)$

A. (1, 0)
B. (0, 1)
C. (−1, 0)
D. (0, −1)

17. The probability distribution table for a discrete random variable Y is given below.

y	1	2	3	4
$P(Y = y)$	0.2	0.4	0.3	0.1

The mode of Y is

A. 4
B. 2
C. 0.4
D. 0.1

18. The value of $[3.5] - [-5.3]$, where $[x]$ is the greatest integer function is:

A. 8
B. 8.2
C. 9
D. 10

19. A particle moves in a plane such that its polar coordinates after t seconds are given by $r = t^2$, $\theta = 3t$. The transverse acceleration of the particle after 2 seconds is:

A. 3
B. 6
C. 12
D. 24

20. The angle between the vectors j and j − k is:

A. 90°
B. 60°
C. 45°
D. 30°

21. The period of a compound pendulum is $\frac{\pi}{2}\sqrt{\frac{7a}{g}}$. The length of the equivalent simple pendulum is:

A. $\frac{7a}{2}$ B. $\frac{7a}{4}$ C. $\frac{7a}{8}$ D. $\frac{7a}{16}$

22. If x is small enough for x^3 and higher powers to be neglected, then $e^{3x} + e^{-3x}$ approximates to

A. $2 + 9x^2$
B. $2 + 18x^2$
C. $2 - 18x^2$
D. $2 - 9x^2$

23. If a particle moves along a straight line ox such that its displacement x from O at time t is given by

$25\frac{d^2x}{dt^2}+4x=0$, then its period of motion is:

A. $\frac{4\pi}{5}$ B. $\frac{2\pi}{5}$

C. $\frac{5\pi}{2}$ D. 5π

24. The value of k for which the matrix $\begin{pmatrix}2 & -1 & 0\\ 0 & 4 & -1\\ 6 & k & 3\end{pmatrix}$ is not invertible is:

A. −15
B. −9
C. 9
D. 15

25. Given that $I_n=\int_0^{\frac{\pi}{2}}\cos^n x dx=\left(\frac{n-1}{n}\right)I_{n-2}$, the value of I_5 is:

A. $-\frac{8\pi}{15}$
B. $-\frac{8}{15}$
C. $\frac{8}{15}$
D. $\frac{8\pi}{15}$

26. The inverse of the permutation $\begin{pmatrix}1 & 2 & 3\\ 2 & 3 & 1\end{pmatrix}$ is:

A. $\begin{pmatrix}1 & 2 & 3\\ 3 & 2 & 1\end{pmatrix}$ B. $\begin{pmatrix}1 & 2 & 3\\ 1 & 3 & 2\end{pmatrix}$

C. $\begin{pmatrix}1 & 2 & 3\\ 2 & 1 & 3\end{pmatrix}$ D. $\begin{pmatrix}1 & 2 & 3\\ 3 & 1 & 2\end{pmatrix}$

27. A particle of unit mass is falling vertically in a medium in which the resistance to motion is kv, where v is the speed and k is a positive constant. The equation of motion of the particle is:

A. $-g-kv=\frac{dv}{dt}$
B. $g-kv=\frac{dv}{dt}$
C. $g+kv=\frac{dv}{dt}$
D. $-g+kv=\frac{dv}{dt}$

28. The domain of $\ln\left(\frac{1+3x}{1-3x}\right)$ is:

A. $-\frac{1}{3}<x<\frac{1}{3}$
B. $x<-\frac{1}{3}\cup x>\frac{1}{3}$
C. $-3<x<3$
D. $x<-3\cup x>3$

29. Which of the following is a statement?
A. 7 is less than 3.
B. What is the square root of 49?
C. The Financial Secretary
D. How dare you!

30. The maximum value of $\frac{24}{5+\cosh x}$ is :

A. 24
B. 6
C. $\frac{24}{5}$
D. 4

31. The moment of inertia of a uniform solid sphere of mass 2m and radius a about a tangent line to the sphere is:

A. $\frac{2}{5}ma^2$
B. $\frac{4}{5}ma^2$
C. $\frac{12}{5}ma^2$
D. $\frac{14}{5}ma^2$

32. The polar equation of the curve $x^2+y^2=4y$ is:
A. $r=4\sin\theta$
B. $r=4\cos\theta$
C. $r^2=4\sin\theta$
D. $r^2=4\cos\theta$

33. Given that

$\frac{9+3x}{(x+2)(x^2+x+1)}\equiv\frac{p}{x+2}+\frac{q}{(x+2)^2}+\frac{rx+s}{x^2+x+1}$, the value of q is:

A. 5
B. 1
C. −1
D. −2

34. Given that $z^3=2+2i$, the modulus of z is:

A. $\sqrt{2}$
B. 2
C. $\sqrt{8}$
D. 8

35.

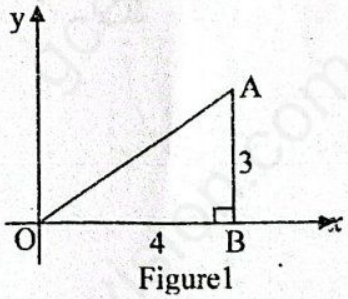

Figure1

If the triangle OAB in figure 1 is rotated completely about the x-axis, the volume of the solid generated, using the theorem of Pappus, is:

A. 24π
B. 18π
C. 12π
D. 9π

36. A fly wheel whose moment of inertia is $50kgm^2$ is rotating at 4 $rads^{-1}$. The kinetic energy of the wheel is:

A. 200J
B. 400J
C. 800J
D. 1600J

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37. A sphere P collides obliquely with another sphere Q. Given that the velocities of P before and after the collision are respectively, $(2\mathbf{i} - \mathbf{j} + 2\mathbf{k})ms^{-1}$ and $(3\mathbf{j} - 4\mathbf{k})ms^{-1}$, the line of centres of P and Q is parallel to the vector
A. $2\mathbf{i} - \mathbf{j} + 2\mathbf{k}$
B. $3\mathbf{j} - 4\mathbf{k}$
C. $\mathbf{i} - 2\mathbf{j} + 3\mathbf{k}$
D. $\mathbf{i} + \mathbf{j} - \mathbf{k}$

38. Given that e is the eccentricity of a rectangular hyperbola, the value of e is:
A. $\frac{1}{2}$
B. 1
C. $\sqrt{2}$
D. 2

39. The value of the constant k for which $y = ke^{-x}$ is a solution of $\frac{d^2y}{dx^2} - \frac{dy}{dx} - 6y = 2e^{-x}$ is:
A. $-\frac{1}{2}$
B. $-\frac{1}{3}$
C. $\frac{1}{3}$
D. $\frac{1}{2}$

40. The point P(1, −1, −1) lies on the plane
A. $x + 2y - 4z = 3$
B. $-2x + y + 4z = 5$
C. $4x - y + 2z = -3$
D. $x - y + 2z = -5$

41. A particle moves in a straight line with simple harmonic motion of period π seconds. Given that the maximum velocity of the particle is $5ms^{-1}$, the amplitude of motion is:
A. $\frac{5}{4}m$
B. $\frac{5}{2}m$
C. 5m
D. 10m

42. The sequence $(u_n): \mathbb{N} \to \mathbb{R}$ given by $u_n = \frac{1}{2}u_{n-1} + 2$ is
A. monotonic
B. arithmetic
C. geometric
D. constant

43. The remainder when 3^{42} is divided by 5 is:
A. 1
B. 2
C. 3
D. 4

44. A suitable trial solution for the particular integral of the differential equation $\frac{d^2y}{dx^2} - 10\frac{dy}{dx} + 25y = 8e^{5x}$ is y =
A. ae^{5x}
B. axe^{5x}
C. ax^2e^{5x}
D. a^2e^{5x}

45. A linear transformation $T: \mathbb{R}^3 \to \mathbb{R}^3$ has matrix M, where $M = \begin{pmatrix} 2 & 1 & 1 \\ 3 & 1 & 3 \\ -1 & -2 & 4 \end{pmatrix}$. Which of the following belongs to the kernel of T?
A. $\begin{pmatrix} 2 \\ 3 \\ 1 \end{pmatrix}$ B. $\begin{pmatrix} -2 \\ 3 \\ 1 \end{pmatrix}$ C. $\begin{pmatrix} 2 \\ -3 \\ 1 \end{pmatrix}$ D. $\begin{pmatrix} -2 \\ -3 \\ 1 \end{pmatrix}$

46. The appropriate continuity correction for $P(14 \leq X < 18)$ is:
A. $P(13.5 < X 17.5)$
B. $P(13.5 < X < 18.5)$
C. $P(14.5 < X < 17.5)$
D. $P(14.5 < X < 18.5)$

47. Which of the following series is convergent?
A. $\sum_{r=1}^{\infty}(2+3r)$ B. $\sum_{r=1}^{\infty}5^r$
C. $\sum_{r=1}^{\infty}\frac{1}{r}$ D. $\sum_{r=1}^{\infty}\frac{50}{r^2}$

48. The distance of the plane $6x - 3y + 2z = 36$ from the point (2, 1, 3) is:
A. 3
B. $\frac{36}{7}$
C. 21
D. 36

49. The polar curves $r = 1 + \cos\theta$ and $r = 1 - \sin\theta$ intersect when $0 =$
A. $-\frac{\pi}{2}$
B. $-\frac{\pi}{4}$
C. $\frac{\pi}{4}$
D. $\frac{\pi}{4}$

50. The invariant point of the transformation T with matrix $M = \begin{pmatrix} 2 & -1 & 0 \\ 1 & -2 & 1 \\ 1 & 1 & 0 \end{pmatrix}$ is:
A. (−1, −1, 2)
B. (1, 1, 2)
C. (−1, 1, −2)
D. (1, 1, −2)

End

Go back and check your work