BAMENDA ARCHDIOCESAN EXAMINATION BOARD (BAEBOC)
MOCK G.C.E. EXAMINATION

MARCH 2025

ADVANCED LEVEL

Centre N°. & Name	
Candidate N°	
Candidate Name	

0775 Further Mathematics: Multiple - Choice Questions Paper 1

Time: 1 hour 30 mins.

INSTRUCTIONS TO CANDIDATES

Read the following instructions carefully before you start answering the questions in this paper. Make sure you have a soft HB pencil and an eraser for this examination.

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 Further Mathematics 0775**"
4. Insert the information required in the spaces above.
5. Without opening the booklet, pull out your 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 and Name, Candidate Number, Subject Code Number and Paper Number.

HOW TO ANSWER THE QUESTIONS IN THE EXAMINATION.

7. Answer all questions in this section.
8. Each question has FOUR suggested answers: A, B, C and D. Decide on which answer is correct. Find the number of the question on the answer sheet and draw a thick 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]
9. 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, then mark your new answer.
10. Avoid spending too much time on any one question. If you find a question difficult, move on to the next question. You can come back to that question later.
11. Do all rough work in this booklet, using where necessary, the blank spaces in the question booklet.
12. Mobile phones are not allowed in the examination room.

TURN OVER

1. $\frac{2x^2-3}{x^2-9}$ expressed in partial fractions, where p, q and r are constants , is
   - A $\frac{p}{x-3}+\frac{q}{x+3}$
   - B $p+\frac{q}{x-3}+\frac{r}{x+3}$
   - C $\frac{p}{x-3}-\frac{q}{(x-3)^2}$
   - D $p+\frac{q}{x+3}+\frac{r}{(x-3)^2}$

2. If $sinhx = 2, then\ x =$
   - A $\ln(2-\sqrt{3})$
   - B $\ln(2+\sqrt{3})$
   - C $\ln(-2+\sqrt{5})$
   - D $\ln(2+\sqrt{5})$

3. The integrating factor for $x\frac{dy}{dx}+3y = x+1\ is$
   - A $3x$
   - B x
   - C x^3
   - D $3lnx$

4. $(\boldsymbol{i}-\boldsymbol{j}-\boldsymbol{k})\times(\boldsymbol{j}-2\boldsymbol{k}) =$
   - A $3\boldsymbol{i}-2\boldsymbol{j}+\boldsymbol{k}$
   - B $3\boldsymbol{i}+2\boldsymbol{j}+\boldsymbol{k}$
   - C $-\boldsymbol{i}+2\boldsymbol{j}+\boldsymbol{k}$
   - D $-\boldsymbol{i}-2\boldsymbol{j}-\boldsymbol{k}$

5. The polar curves $r = 2sec\theta$ and $r = cos\theta + 1$ intersect at the point
   - A $(2,\pi)$
   - B $(-2,\pi)$
   - C (2,0)
   - D (0,2)

6. $\int_{-1}^{1} e^{|x|}\,dx =$
   - A 0
   - B (e-1)
   - C 2(e-1)
   - D 2(1-e)

7. The general solution of the differential equation $\frac{d^2y}{dx^2}+\frac{dy}{dx}-6y = 0$ is
   - A $ae^{3x}+be^{2}$
   - B $ae^{-3x}+be^{2x}$
   - C $ae^{3x}+be^{-2x}$
   - D $e^{-6x}(a+bx)$

8. One of the tangents at the pole to the polar curve $r = 1-2cos\theta$ is $\theta =$
   - A $\frac{\pi}{4}$
   - B $\frac{\pi}{3}$
   - C $\frac{\pi}{6}$
   - D $\frac{\pi}{2}$

9. The oblique asymptote to the curve $y = \frac{x^2-2}{x+2}$ is
   - A $y = x+1$
   - B $y = x+2$
   - C $y = x-2$
   - D $y = x-1$

10. The random variable X has variance $\frac{3}{2}$. $Var(2X-1) =$
    - A 6
    - B 3
    - C 4
    - D 9

11. The parabola $y^2 = 4(x+1)$ has as focus the point
    - A (0,1)
    - B (1,0)
    - C (0,−1)
    - D (0,0)

12. The equation of motion of a particle performing simple harmonic motion is given by $\frac{d^2x}{dt^2}+9x = 0$. The period of the motion is
    - A $\frac{2\pi}{3}$
    - B $\frac{3\pi}{2}$
    - C $\frac{\pi}{2}$
    - D π

13. A force **F** acts on a particle displacing it from a point with position vector a to another point with position vector **b**. The work done on the particle is
    - A $\boldsymbol{F}.(\boldsymbol{a}-\boldsymbol{b})$
    - B $\boldsymbol{F}.(\boldsymbol{b}-\boldsymbol{a})$
    - C $(\boldsymbol{a}-\boldsymbol{b})\times\boldsymbol{F}$
    - D $(\boldsymbol{b}-\boldsymbol{a})\times\boldsymbol{F}$

14. One of the asymptotes to the curve $xy-y-2x = 0$ is
    - A $x = -1$
    - B $y = -2$
    - C $y = 2$
    - D $x = 2$

15. The real-valued function $f(x) = \sqrt{\frac{x-2}{x+2}}$ is continuous on
A $[2, +\infty[$
B $]-\infty, 2]$
C $[-2,2]$
D $]-2,2[$

16. Given that $|z| = 3$, then the greatest value of $|z-2|$ is
A 5
B 3
C 2
D 1

17. If $3x \equiv 1(mod\ 7)$, then $x =$
A 3
B 4
C 5
D 6

18. P, Q and N are non-singular square matrices of the same order then $(PN^{-1}Q)^{-1} =$
A $P^{-1}NQ^{-1}$
B $Q^{-1}NP^{-1}$
C $NQ^{-1}P^{-1}$
D $Q^{-1}P^{-1}N$

19. Given that the position vector of a particle P of mass 2kg is j m and its velocity is $(-i + j)ms^{-1}$, then its moment of momentum is
A **k** Ns
B -2**k** Ns
C 2**k** Ns
D - **k** Ns

20. The binary operation $*$ is defined on $\mathbb{R}$,the set of real numbers, by $a * b = a + b - 1$. The identity element is
A 2
B -1
C 0
D 1

21. If $U_1 = \frac{1}{2}, U_{n+1} = \alpha U_n,\ n \geq 1$, then U_n can be expressed as
A $\left(\frac{1}{2}\right)\alpha^n$
B $\left(\frac{1}{2}\right)^n \alpha$
C $\left(\frac{1}{2}\right)^{n-1} \alpha$
D $\left(\frac{1}{2}\right)\alpha^{n-1}$

22. If the motion modeled by $\frac{d^2x}{dt^2} + 2k\frac{dx}{dt} + n^2x = 0$ is a damped harmonic motion then
A $k < n$
B $k \leq n$
C $k > n$
D $k \geq n$

23. A particle P of unit mass moves horizontally in a straight line against a resistance of kv^2,where $k > 0$ and v is the speed at time t. When P has covered a distance x, its equation of motion is
A $\frac{dv}{dx} - kv = 0$
B $\frac{dv}{dx} + kv = 0$
C $\frac{dv}{dt} - kv = 0$
D $\frac{dy}{dt} + kv = 0$

24. The series $\sum_{r=1}^{\infty} \left(\frac{2}{r}\right)^n$ converges if
A $n < 1$
B $n \leq 1$
C $n > 1$
D $n \geq 1$

25. The Maclaurin expansion of $\ln(2-3x)$ is valid for
A $-\frac{2}{3} \leq x < \frac{2}{3}$
B $-\frac{2}{3} < x \leq \frac{2}{3}$
C $-\frac{3}{2} < x < \frac{3}{2}$
D $-\frac{2}{3} < x < \frac{2}{3}$

26. Given that the function $f(x) = \begin{cases} kx^3 + 8, & x < 1 \\ (x+2)^2, & x \geq 1 \end{cases}$ is continuous , the value of k is
A 1
B 9
C 2
D -8

27. The probability distribution of a random variable X is given by the following table:

x	0	1	2
$P(x)$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{4}$

The mean of X is
A $\frac{1}{2}$
B 1
C $\frac{3}{4}$
D $\frac{1}{4}$

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28. Given that Z is a standard normal variable, $P(-1.5 < Z < 1.3) =$
A $P(Z < 1.5) - P(Z < 1.3)$
B $P(Z < 1.3) - P(1.5)$
C $[P(Z < 1.5) + P(Z < 1.3)] - 1$
D $P(Z < 1.5) - [P(Z < 1.3) + 1]$

29. The function $f(x) = \frac{(x-3)(x+1)}{(x^2-3x)(x+3)}$ has a removable discontinuity at $x =$
A 0
B 1
C 3
D -3

30. Given that $\frac{dy}{dx} = 1 + x^2y$ and $y = 1$ when $x = 1$, the Taylor series approximation for y is
A $1 + x + 2x^2$
B $1 - 2x + 2x^2$
C $1 + 2x + 2x^2$
D $1 + 2x - 2x^2$

31. A smooth sphere is moving on a horizontal surface with velocity $\boldsymbol{i} + 2\boldsymbol{j}$ *just before it hits* a wall which is parallel to the vector i and the coefficient of restitution between the sphere and the wall is $\frac{1}{2}$. The velocity of the sphere after it hits the wall
A $\boldsymbol{i} + \boldsymbol{j}$
B $-\boldsymbol{i} + \boldsymbol{j}$
C $-\boldsymbol{i} - \boldsymbol{j}$
D $\boldsymbol{i} - \boldsymbol{j}$

32. Given that the moment of inertia of a body of mass 4m about an axis is $48ma^2$, its radius of gyration about this axis is
A $12a$
B $2\sqrt{3}a$
C $\sqrt{3}a$
D $\frac{\sqrt{3}a}{2}$

33. Using the approximation $h\left(\frac{dy}{dx}\right)_n \approx y_{n+1} - y_n$ and that $\frac{dy}{dx} = 1, y = 2$ when $x = 0$, $y_1 =$
A $h + 1$
B $h + 2$
C $h - 1$
D $h - 2$

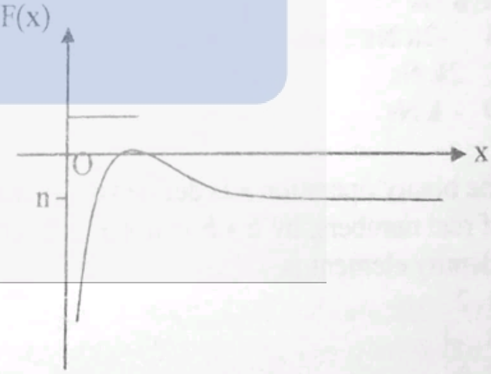
34. Given the statements $P: y = x^3$
$Q: \frac{dy}{dx} = 3x^2$.
which of the following is correct?
A Q *is a necessary condition for* P.
B P *is a necessary condition for* Q.
C $\sim P$ *is a necessary condition for* $\sim Q$.
D $\sim P$ *is a sufficient condition for* $\sim Q$.

35. Given the complex numbers z_1 and z_2 such that $|z_1 + z_2| = k$, where k is a constant, then which one of the following is true?
A $k < |z_1| + |z_2|$
B $k \geq |z_1| + |z_2|$
C $k = |z_1| + |z_2|$
D $k \leq |z_1| + |z_2|$

36. $\lim_{x \to 0^-} \frac{|x|}{x} =$
A 0
B -1
C 1
D ∞

37. The period of a simple pendulum of length l is T. When the length is $3l$, the period is
A $3T$
B $\sqrt{6}T$
C $\frac{1}{\sqrt{3}}T$
D $\sqrt{3}T$

38. F(x)



From the graph of F, the equation $F(x) = m$ has two distinct roots, if
A $m \geq n$
B $n < m < 0$
C $m \leq n$
D $0 \leq m \leq n$

39. The mean value of $y = \tanh x$ *over the interval* $0 \leq x \leq 1$ *is*
A $\cosh 1$
B 0
C $\ln(\cosh 1)$
D 1

40. A uniform circular disc rotating about a smooth axis through its centre and perpendicular to its plane with angular speed ω is brought to rest in $2\ seconds$, the angular retardation of the disc in $rads^{-1}$ is
A $\frac{\omega}{2}$
B 2ω
C ω
D $2\omega^2$

41. If the point represented by the complex number z is reflected in the real- axis and z* is the conjugate of z, then the complex number representing the image point is
A $-z$
B z^*
C $-z^*$
D iz

42. Given that $\boldsymbol{v}$ *and* $\boldsymbol{u}$ are two non-zero vectors such that $\boldsymbol{v} + \alpha\boldsymbol{u} = \boldsymbol{0}$, where α is a real constant . Which of the following is true?
A $\boldsymbol{v} \cdot \boldsymbol{u} = \alpha$
B $\boldsymbol{v} \times \boldsymbol{u} = 0$
C $\boldsymbol{v} \cdot \boldsymbol{u} = 0$
D $|v \times u| = \alpha$

43. $\int \frac{x}{\sqrt{x^2+4}} dx =$
A $\frac{1}{2}\ln(x^2+4)+k$
B $\frac{1}{\sqrt{x^2+4}}+k$
C $\sqrt{x^2+4}+k$
D $\frac{1}{4}\ln(x^2+4)+k$

44. The series $\sum u_n$ is convergent if
A $\lim_{n\to\infty}\left|\frac{u_n}{u_n}\right| < 1$
B $\lim_{n\to\infty}\left|\frac{u_{n+1}}{u_n}\right| > 1$
C $\lim_{n\to\infty}\left|\frac{u_{n+1}}{u_n}\right| < 1$
D $\lim_{n\to\infty}(u_n) = 0$

45. Given that $f\ is\ an\ even\ function, then\ \int_{-a}^{a} f(x)dx =$
A 0
B 1
C $\int_0^a f(x)dx$
D $2\int_0^a f(x)dx$

46. $e^{-3i\theta} =$
A $\frac{1}{e^3}(cos\theta + isin\theta)$
B $3(cos\theta - isin\theta)$
C $cos3\theta - sin3\theta$
D $\frac{1}{3}(cos\theta - isin\theta)$

47. The equation of the plane that passes through the point (1,0,1) and is parallel to the plane $2x - y + 3z = 0$ is
A $2x + y + 3z = 5$
B $2x - y - 3z = 5$
C $2x - y + 3z = -5$
D $-2x + y - 3z = -5$

48. The moment of inertia of a uniform rod OA of length $2l$ *and mass* $2m$ about an axis through the centre of the rod and perpendicular to the rod is $\frac{2}{3}ml^2$. The moment of inertia of the rod through the end O perpendicular to the rod is
A $\frac{7}{3}ml^2$
B $\frac{8}{3}ml^2$
C $\frac{5}{3}ml^2$
D $\frac{4}{3}ml^2$

49. Given that $(G,*)$ is a proper subgroup of the group $(H,*)$ and that $n(H) = 15$, the possible order of G is
A 5
B 7
C 10
D 15

50. A particle moves round the curve $r = a(1 - cos\theta)$with constant angular velocity ω. Its radial component of velocity is
A $a\omega sin\theta$
B $a\omega cos\theta$
C $-a\omega sin\theta$
D $-a\omega cos\theta$