CHRIST HIGH SCHOOL PLOT 5, CHS STREET, KM 32, ABUJA-KEFFI ROAD UKE, NASARAWA STATE

CHRIST HIGH SCHOOL PLOT 5, CHS

FIRST TERM EXAMINATION
2024/2025 ACADEMIC SESSION

SUBJECT: FURTHER MATHEMATICS (PAPER I)
CLASS: SS 2
TIME: 2 Hours

NAME……

CANDIDATE'S ADMISSION NO.

INSTRUCTION

Write your name and number in the space provided on your answer booklet. Write your name on any extra sheet used.

Answer all questions.

At the end of the examination, staple all

FOR EXAMINER'S USE	
Total Score:	+

SECTION A (OBJECTIVES)

1. Express $\frac{3}{3-\sqrt{6}}$ in the form $x + m\sqrt{y}$.
   A. $3 + 3\sqrt{6}$
   B. $3 + \sqrt{6}$
   C. $3 - \sqrt{6}$
   D. $3 - 3\sqrt{6}$
   E. $3 + 2\sqrt{6}$
2. If $(\frac{1}{9})^{2x-1} = (\frac{1}{81})^{2-3x}$, find the value of x.
   A. $\frac{5}{8}$
   B. $\frac{3}{8}$
   C. $-\frac{5}{8}$
   D. $-\frac{3}{8}$
   E. $\frac{2}{8}$
3. In differential calculus,

   $\frac{dy}{dx} = \frac{dy}{du} \times \frac{du}{dx}$ is known as

   A. Quotient rule
   B. Product rule
   C. Chain rule
   D. Multiple rule
   E. Function rule
4. If $(x - 5)$ is a factor of $x^3 - 4x^2 - 11x + 30$, find the remaining factors.
   A. $(x - 3) and\ (x + 2)$.
   B. $(x - 3) and\ (x - 2)$.
   C. $(x + 3) and\ (x - 2)$.
   D. $(x + 3) and\ (x + 2)$.
   E. $Non\ of\ the\ above$.
5. If $y + xy - x = 5$, find $\frac{dy}{dx}$
   A. $\frac{1-y}{x+1}$
   B. $\frac{1-2y}{x}$

C. $\frac{1-y}{x+2y}$

D. $\frac{1}{x+2y}$

E. $\frac{x+2y}{1-y}$

6. If $\alpha \; and \; \beta$ are the roots of $7x^2 + 12x - 4 = 0$, find the value of $\frac{\alpha\beta}{(\alpha+\beta)^2}$.

A. $\frac{36}{7}$

B. $-\frac{36}{7}$

C. $\frac{7}{36}$

D. $-\frac{7}{36}$

E. $\frac{3}{36}$

7. Given that $y^2 + xy = 5, find \; \frac{dy}{dx}$.

A. $\frac{-y}{2y-y}$

B. $\frac{-y}{2y+y}$

C. $\frac{-y}{2y-x}$

D. $\frac{y}{2y+x}$

E. $\frac{-y}{2y+x}$

8. In differential calculus, **function of a function** is also known as

A. Quotient rule

B. Product rule

C. Chain rule

D. Multiple rule

E. Function rule

9. If f(x) = ($x^2 + 3)^2$. Find the gradient of f(x) at x = $\frac{1}{2}$

A. 4.0

B. 5.0

C. 6.0

D. 5.5

E. 6.5

10. Given that $P = \{x: 2 \leq x \leq 8\} and \; Q = \{x: 4 < x \leq 12\}$ are subsets of $\mu = \{x: x \epsilon \mathbb{R}\}$, find $(P \cap Q')$.

A. $\{x: 4 \leq x \leq 8\}$.

B. $\{x: 2 \leq x \leq 4\}$.

C. $\{x: 4 < x \leq 8\}$.

D. $\{x: 2 \leq x < 4\}$.

E. $\{x: 4 < x < 8\}$.

11.Evaluate $\lim_{x \to 1} \frac{1-x}{x^2-3x+2}$

A. 1

B. $\frac{1}{2}$

C. 0

D. -1

E. -3

12. If $3x^2 + px + 12 = 0$ has equal roots, find the value of p.

A. ± 3

B. ± 4

C. ± 6

D. ± 12

E. ± 8

13.Evaluate $\lim_{x \to 3} \frac{x^2-2x-3}{x-3}$

A. 4

B. 3

C. 2

D. 0

E. 1

14. Given that $P = \begin{bmatrix} m+1 & m-1 \\ m+4 & m-8 \end{bmatrix}$ and $|P| = -32$, find the value of m.

A. 5

B. 4

C. 3

D. 2

E. 1

15. Find the value of y for which $5^{2y-8} = 1$

A. 1

B. 2

C. 3

D. 4

E. 5

16.Find the derivative of $3x^2 + \frac{1}{x^2}$

A. $6x^2 + 2x$

B. $6x + 1$

C. $6x - \frac{2}{x^3}$

D. $6x + \frac{1}{2x}$

E. $3x^2 + \frac{1}{x^2}$

17. If $y = \sqrt{x}$, find $\frac{dy}{dx}$

A. $\frac{1}{2\sqrt{x}}$

B. $\frac{1}{\sqrt{x}}$

C. $\frac{\sqrt{x}}{2}$

D. $\frac{1}{\sqrt{x}}$

E. $\frac{1}{2x}$

18. Find the derivative of $\frac{1}{x\sqrt{x}}$

A. $\frac{-3}{2x^{5/2}}$

B. $\frac{3}{2x^{5/2}}$

C. $\frac{3}{2x^{-5/2}}$

D. $\frac{-3}{2x^{-5/2}}$

E. $\frac{3}{x^{5/2}}$

19. The derivative of Cos x is

A. cosec x

B. –sec x

C. -sinx

D. –sec x cot x

E. Sinx

20. If $r = i + 2j \; and \; n = -i + 3j, find \; |2n - r|$.

A. 8.5

B. 5.0

C. 6.0

D. 4.0

E. 3.6

21. If y= 3 $\cos(\frac{x}{3})$, find $\frac{dy}{dx} \; at$ x = $\frac{3\pi}{2}$

A. 0

B. -3

C. 2

D. -1

E. 1

22.If $\log_{10}(3x-1)+\log_{10}4=\log_{10}(9x+2)$, find x.

A. 0
B. 3
C. -2
D. 1
E. 2

Use the information below to answer question 24-26.

The motion of a particle along a straight line is specified by

$x= t^4+3t^3$. Where x is in metres and t in seconds

23. The velocity after 5 seconds is ……

A. 513m/s
B. 725m/s
C. 351m/s
D. 130m/s
E. 387m/s

24.The distance after 3 second is ….

A. 152m
B. 162m
C. 273m
D. 2874m
E. 125m

25.The acceleration after 7 seconds is…….

A. 814 m/ s^2
B. 714 m/ s^2
C. 614 m/ s^2
D. 514 m/ s^2
E. 414 m/ s^2

26.If $y= (1+x)^2$, find $\frac{dy}{dx}$

A. 2x-1
B. X-1
C. 2+2x
D. 6x+ 3
E. 1+ 2x

27.If $y= 3x^3- 2x^2+ 4$, find $\frac{d^2y}{dx^2}$,

A. $9x^2$ - 4x

B. 8x- 4
C. 18x- 4
D. $18x^2$- 4
E. 4x- 8

28.If y= 3sin(- 4x), find $\frac{dy}{dx}$

A. 12xcos 4x
B. -12xcos(-4x)
C. -12cos(-4x)
D. 12sin(-4x)
E. 12sin x

29.If $\underset{PQ}{\rightarrow} = -2i + 5j \; and \; \underset{QR}{\rightarrow} = i + 7j$, find $\underset{PR.}{\rightarrow}$

A. $-3i + 12j.$
B. $-3i - 12j.$
C. $-i + 12j.$
D. $-i - 12j.$
E. $3i + 12j.$

30. If y = sin 5x , find $\frac{dy}{dx}$

A. 5sin5x
B. 5cos5x
C. -5cos5x
D. Cos5x
E. -5sin5x

31.Simplify: $\left(\frac{3\sqrt{6}+\sqrt{54}}{\sqrt{5}(3\sqrt{5})}\right)^{-1}$.

A. $\frac{5\sqrt{6}}{12}$
B. $-\frac{5\sqrt{6}}{12}$
C. $\frac{5\sqrt{3}}{6}$
D. $\frac{5\sqrt{3}}{12}$
E. $\frac{5\sqrt{6}}{6}$

32.Find the third derivative of y = $\frac{1}{x}$

A. $-X^{-2}$
B. $2X^{-3}$
C. $-6X^{-4}$
D. $6X^{-4}$
E. $4X^{-6}$

Use the information below to answer question 34 - 37

$(2+ x)^5 = x^5+10x^4 + ax^3 +bx^2+ cx + d$

33. The value of d is..
    A. 10
    B. 40
    C. 80
    D. 32
    E. 20

34.The value of c is...
    A. 10
    B. 40
    C. 80
    D. 32
    E. 20

35.The value of b is...
    A. 10
    B. 40
    C. 80
    D. 32
    E. 20

36.The value of a is..
    A. 10
    B. 40
    C. 80
    D. 32
    E. 20

37.The value of a + b + c is
    A. 100
    B. 150
    C. 200
    D. 250
    E. 300

38.Find the coefficient of x^4 in the expansion of $(1-2x)^6$.
    A. 320
    B. 240
    C. -240
    D. -320
    E. 90

39.If $A = [2 \quad -1 \quad 4]$ and $B = [1 \quad 0 \quad 4]$, find A + B.

A. $[2 \quad 1 \quad 4]$
B. $[3 \quad 1 \quad 8]$
C. $[2 \quad -1 \quad 8]$
D. $[3 \quad -1 \quad 4]$
E. $[3 \quad -1 \quad 8]$

40. If vectors **A** = $a\underline{i} - 2\underline{j} + \underline{k}$, **B** = $2a\underline{i} + a\underline{j} - 4\underline{j}$. Find the value of **a** for which **A** and **B** are perpendicular.
    A. -1 or 2
    B. 1 or 2
    C. 1 or -2
    D. -1 or -2
    E. 2 or -1/2
41. A polynomial is defined by F(x) $= x^3 + 3x^2 - 4x + 2$, find $F''(x)$.
    A. -8
    B. -12
    C. 24
    D. 18
    E. -6
42. Determine the coefficient of x^6 in the binomial expansion of $(x+y)^8$.
    A. $8y^2$
    B. $28y^2$
    C. $56y^2$
    D. $70y^2$
    E. $80y^2$
43. Each member of a set is called a/an……..
    A. Subset
    B. superset
    C. elements
    D. finite
    E. singleton
44. Which of the following binomial coefficient is not correct?
    A. 1,2,1
    B. 1,3,3,1
    C. 1,4, 8,4,1
    D. 1,5,10,10,5,1
    E. 1,6,15,20,15,6,1
45. Express $17\sqrt{2}$ as a single surd
    A. $\sqrt{875}$
    B. $\sqrt{587}$
    C. $\sqrt{578}$

D. $\sqrt{478}$

E. $\sqrt{785}$

46. Two vectors $\boldsymbol{m}\ and\ \boldsymbol{n}$ are defined by $\boldsymbol{m} = 3i + 4j\ and\ \boldsymbol{n} = 2i - j$. Find the angle between $\boldsymbol{m}\ and\ \boldsymbol{n}$.

A. 97.9°

B. 79.7°

C. 63.4°

D. 36.4°

E. 70.9°

47. If $f(x) = mx^2 - 6x - 3\ and\ f'(1) = 12$, find the value of constant$m$.

A. -9

B. 3

C. -3

D. -4

E. 9

48. If $\begin{vmatrix} 4 & x \\ 5 & 3 \end{vmatrix} = 32$, find the value of x.

A. 4

B. 3

C. -2

D. 2

E. -4

49. The sum and product of the roots of a quadratic equation are 4/7 and 5/7 respectively. Find the equation;

A. $7x^2 - 4x + 5 = 0$.

B. $7x^2 - 4x - 5 = 0$

C. $7x^2 + 4x - 5 = 0$

D. $7x^2 - 2x + 5 = 0$

E. $7x^2 + 4x + 5 = 0$

50. If $(x + 1)$ is a factor of the polynomial $x^3 + px^2 + x + 6 = 0$. Find the value of p.

A. -8

B. 4

C. 8

D. -5

E. -4