

MATHEMATICS PAPER-XII

HSSC-12th-Kohat-2026

(A-I-KT-26)

Sign & Stamp of Supdt:

Roll No.

C No. 62

Name:

VERSION: A

Time Allowed: 20 Minutes

SECTION-A

Marks:20

1. The precise meaning of the expression " $x \rightarrow 0$ " in the context of limit is:
 A. x is exactly equal to 0 B. x gets arbitrarily close to 0 but does not necessarily equal 0 C. x is a very small negative number only D. x is a constant value very near to 0
2. The correct value of the limit, $\lim_{x \rightarrow 3} \frac{\sqrt{x}-3}{x-9}$ is: 128234
 A. $\frac{1}{6}$ B. 6 C. $\frac{1}{3}$ D. 3
3. The average rate of change of the linear function $f(x) = 3x + 5$ as x increases from 1 to 4 is:
 A. 17 B. 14 C. 8 D. 3
4. Derivative of $y = \cos x$ is:
 A. $\cos x$ B. $-\sin x$ C. $\sec^2 x$ D. $\cos^2 x$
5. The 3rd derivative of $f(x) = 2x^5$ is:
 A. $20x^4$ B. $20x^5$ C. $120x^3$ D. $120x^2$
6. If $f(t) = \frac{1}{t-2} + \ln(t+1) + e^t k$, is a vector function, the value of t excluded from the domain is:
 A. 2 B. -2 C. -1 D. 1
7. The most general anti-derivative of $f(x) = \cos 4x$ is:
 A. $4\cos x + C$ B. $-4\cos x + C$ C. $\frac{\sin 4x}{4} + C$ D. $-k \sin x + C$
8. If $F(x)$ is an anti-derivative of $f(x) = \sec^2 x$, and $F(\frac{\pi}{4}) = 5$, the specific equation for $F(x)$ is:
 A. $F(x) = \tan x + \frac{5}{4}$ B. $F(x) = \tan x + 4$ C. $F(x) = \sec x + \frac{5}{4}$ D. $F(x) = -\cot x + 4$
9. The correct value of $\int (3+a) dx$ is:
 A. $(3+a)x + C$ B. $3x + a$ C. $ax + 3$ D. $3x + C$
10. To evaluate $\int \sin^3 x \cos x dx$, the most appropriate substitution is:
 A. $u = \cos x$ B. $u = \sin x$ C. $u = \sin^3 x$ D. $u = x$
11. The correct equation for a straight line that is parallel to the y -axis and passes through the point $(4, -1)$ is:
 A. $x = 4$ B. $y = 4$ C. $y = -1$ D. $x = -1$
12. The point lies below the line $y = x - 4$ is:
 A. $(5, 2)$ B. $(5, 1)$ C. $(5, 0)$ D. $(5, 5)$
13. The center of the Circle having equation $(x-5)^2 + (y-3)^2 = 16$ is:
 A. $(-5, 3)$ B. $(5, 3)$ C. $(-5, -3)$ D. $(3, -5)$
14. The vertex of the parabola $(y-2)^2 = 8(x+3)$ is located at:
 A. $(2, -3)$ B. $(3, -2)$ C. $(-3, 2)$ D. $(0, 0)$
15. The coordinates of the foci for the ellipse $\frac{x^2}{100} + \frac{y^2}{64} = 1$ are:
 A. $(\pm 10, 0)$ B. $(0, \pm 6)$ C. $(\pm 8, 0)$ D. $(\pm 6, 0)$
16. The order of the differential equation $\frac{d^2 y}{dx^2} + 5(\frac{dy}{dx})^3 - 6y^2 = 0$ is:
 A. 4 B. 3 C. 2 D. 1
17. The ODE $\frac{d^2 y}{dx^2} + x \frac{dy}{dx} + 6y = \cos x$ is: 126234
 A. Linear, First Order B. Linear, Second Order C. Non-linear, First Order D. Non-linear, Second Order
18. If $f(x, y) = 7x^3 - 4y^2 + 10xy$, then f_x should be:
 A. $21x^2 - 8y + 10y$ B. $21x^2 + 10y$ C. $21x^2 - 8y + 10x$ D. $21x^2 + 10x$
19. If $f(x) = x^2 - 4$ and the initial interval is $[1, 2]$, The interval for second iteration of the Bisection Method is:
 A. $[1.25, 1.75]$ B. $[1, 1.5]$ C. $[1.5, 2]$ D. $[1.25, 2]$
20. The Newton-Raphson method fails when:
 A. $f'(x_n) = 0$ B. $f(x_n) = 0$ C. $f'(x_n) > 0$ D. $f'(x_n) < 0$

Write Roll No. in the boxes and shade the appropriate circle.

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0	0	0	0	0	0
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9

Shade the correct answers for each question below.

1.	☐ A	☒ B	☐ C	☐ D
2.	☒ A	☐ B	☐ C	☐ D
3.	☐ A	☐ B	☐ C	☒ D
4.	☐ A	☒ B	☐ C	☐ D
5.	☐ A	☐ B	☐ C	☒ D
6.	☒ A	☐ B	☐ C	☐ D
7.	☐ A	☐ B	☒ C	☐ D
8.	☐ A	☒ B	☐ C	☐ D
9.	☒ A	☐ B	☐ C	☐ D
10.	☐ A	☒ B	☐ C	☐ D
11.	☐ A	☒ B	☐ C	☐ D
12.	☐ A	☐ B	☒ C	☐ D
13.	☐ A	☒ B	☐ C	☐ D
14.	☐ A	☐ B	☒ C	☐ D
15.	☐ A	☐ B	☐ C	☒ D
16.	☒ A	☐ B	☐ C	☐ D
17.	☐ A	☒ B	☐ C	☐ D
18.	☐ A	☒ B	☐ C	☐ D
19.	☐ A	☐ B	☒ C	☐ D
20.	☒ A	☐ B	☐ C	☐ D

Section "B"

Marks: 50

Q.2 Attempt any TEN parts. All parts carry equal marks.

- i. Evaluate the limit of: $\lim_{x \rightarrow 0} \frac{\sqrt{x+9}-3}{x}$ 1+2+2
- ii. Find derivative of the implicit function $x^2 + xy + y^2 = 9$ 1+2+2
- iii. Find equation of the tangent line to the curve $y = x^2 \ln x$ at $x = e$ 1+2+2
- iv. Find the vector derivative of $F(x) = \ln x i + (x^2 + 3x)j - \tan x k$ 1+2+2
- v. Evaluate the integral and check the result through differentiation $\int \frac{x^3-5}{x^2} dx$ 1+2+2
- vi. Evaluate the integral $\int (2x+3) \ln x dx$ 1+2+2
- vii. Find the angle from the line $7x + 3y - 9 = 0$ to the line $5x - 2y + 2 = 0$ 1+2+2
- viii. Find equation of a line if the x -intercept and y -intercept of the line are $x: (5, 0)$ and $y: (0, -2)$ 1+2+2
- ix. Find the center and radius of the Circle $2x^2 + 2y^2 - 6x + 8y = 0$ 1+2+2
- x. Find equation of Tangent and Normal at a point $(\sqrt{2}, 2)$ to the ellipse $\frac{x^2}{10} + \frac{y^2}{5} = 1$ 1+2+2
- xi. Translate to parallel axes through the point $(-5, 3)$ the conic $x^2 + 4y^2 + 10x - 24y + 45 = 0$. 1+2+2
- xii. Find the general solution of the non-linear differential equation $\frac{dy}{dx} = \sin(x+y)$ 1+2+2
- xiii. Perform two iteration of Bisection Method to approximate the actual root r of the function $f(x) = x^2 - 2 - \ln x$ in the interval $[1, 2]$ 1+2+2

Section "C"

Marks: 30

Note: Attempt any THREE questions. All questions carry equal marks.

- Q.3 a). Determine the $\lim_{x \rightarrow \infty} \frac{5x^2-2x+1}{2x^2+7}$ 1+2+2
- b). Find derivative of $y = \operatorname{cosec}^{-1}(5x)$ 1+2+2
- Q.4 a). Find the area between the x -axis and the curve $f(x) = x^2 - 4$ from $x = 0$ to $x = 4$ 1+2+2
- b). Find the point of intersection $P(x, y)$ of the pair of lines $2x + 5y = 12$ and $4x - y = 2$ 1+2+2
- Q.5 a). Prove that the line $3x - 4y + 25 = 0$ touch the circle $x^2 + y^2 - 25 = 0$. Find also the contact point. 1+2+2
- b). Find vertices, foci, eccentricity and the asymptotes of the hyperbola $\frac{x^2}{49} - \frac{y^2}{24} = 1$ 1+2+2
- Q.6 a). Use Euler's Theorem to verify the function $f(x, y) = \frac{x^4+y^4}{x^2+y^2}$ is a homogenous function of degree 2. 1+2+2
- b). Find iterate x_3 of Newton Raphson Method for the function $f(x) = \sin^2 x - x^2 + 1$ with $x_0 = 1$ 1+2+2