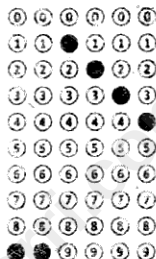


Sample

9	8	7	6	5	4
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991234



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Signature of Student: _____

Sign and Seal of Suptd: _____

Paper Code: 32

SEAL

Paper Version

(A) (B) (C)

HSSC-A-I-2026 (12th) P-472 OFFICIAL

(Section-A) Marks= (20) Time Allowed: 20 Minutes

All questions of this section must be answered on this page and handed over to the Superintendent within given time.

Student Name: _____

Name of Paper: MATHEMATICS (M-II)

Paper Date: 25-MAY-26

Roll No
Student Must Fill the
Roll Number Subline

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



سوالات

سوال نمبر کے مطابق درست جواب تحریر کرنا ضروری ہے۔

- The centre of the circle having equation $(x-4)^2 + (y+4)^2 = 9$ is: a) $(4, -4)$, b) $(-4, 4)$, c) $(4, 4)$, d) $(-4, -4)$
- The ODE $(1-x)\frac{d^2y}{dx^2} - 4x\frac{dy}{dx} + 5y = 1$ is: a) 3rd order, b) 2nd order, c) 1st order, d) none
- For $f(x) = x^2 - 1$ on the interval $[0, 2]$, the updated interval after the first iteration of the bisection method is: a) $[0, 1]$, b) $[0.5, 1.5]$, c) $[1, 2]$, d) $[1.5, 2]$
- If $f(x, y) = \ln(x^2y)$ the f_y should be: a) $\frac{2}{x}$, b) $\frac{2}{xy}$, c) $\frac{2}{x^2y}$, d) $\frac{1}{y}$
- If $f'(x) = 0$ at any iteration in the Newton-Raphson method, the method fails because: a) the function is not continuous, b) it leads to division by zero, c) the method becomes too fast to calculate, d) the root is outside the interval
- The correct equation for a straight line passes through the point $(-6, 2)$ and has undefined slope is: a) $y = 2$, b) $y = -6$, c) $x = 2$, d) $x = -6$
- For the line $y = x - 10$, the point $(5, 5)$ lies: a) at the origin, b) above the line, c) below the line, d) on the line
- The degree of the differential equation $(\frac{d^4y}{dx^4})^3 + 3(\frac{d^2y}{dx^2})^2 = 2x^3$ is: a) 3, b) 4, c) 6, d) 8
- The line representing directrix of parabola $x^2 = y$ is: a) $y = \frac{1}{4}$, b) $y = -\frac{1}{4}$, c) $x = \frac{1}{4}$, d) $x = -\frac{1}{4}$
- Coordinates of the foci for the ellipse $\frac{x^2}{20} + \frac{y^2}{16} = 1$ are: a) $(\pm 4, 0)$, b) $(0, \pm 2)$, c) $(\pm 2, 0)$, d) $(0, \pm 4)$
- If $f(t) = (t-1)^{-1}i + t^2j + tk$ is a vector function, the value of t excluded from the domain is: a) 1, b) 2, c) $\frac{1}{2}$, d) 0
- The most general anti-derivative of $f(x) = e^{-3x}$ is: a) $-3e^{-3x} + C$, b) $\frac{e^{-3x}}{-3} + C$, c) $3e^{-3x} + C$, d) $-3xe^{-3x} + C$
- If $f(x)$ is an anti-derivative of $f(x) = \frac{1}{x}$ for $x > 0$ and $F(1) = 2$, the specific equation for $F(x)$ is: a) $F(x) = \ln x + 2$, b) $F(x) = \ln x + 1$, c) $F(x) = -\ln x + 2$, d) $F(x) = e^x + 1$
- Correct value of $\int (e^{k+1} + a)dx$ is: a) $(\frac{e^k}{k+1} + a)x + C$, b) $(\frac{e^k + a}{k+1}) + C$, c) $(e^{k+1} + a)x + C$, d) $e^{k+1} + C$
- To evaluate $\int xe^{x^2}dx$, correct substitution is: a) $u = x^2$, b) $u = xe^{x^2}$, c) $u = e^{x^2}$, d) $u = x$
- If a function $f(x)$ approaches the value 5 as x increases forever, it can be written in limit notation as: a) $\lim_{x \rightarrow \infty} f(x) = 5$, b) $\lim_{x \rightarrow \infty} f(x) = \infty$, c) $\lim_{x \rightarrow \infty} f(x) = \infty$, d) $\lim_{x \rightarrow \infty} f(x) = 5$
- The average rate of change of the linear function $f(x) = 10 - x^2$ as x increases from 1 to 3 is: a) 4, b) -4, c) 8, d) -8
- The correct value of the limit $\lim_{x \rightarrow \infty} \frac{x-2}{\sqrt{x}-\sqrt{2}}$ is: a) 0, b) $\frac{1}{\sqrt{2}}$, c) $2\sqrt{2}$, d) $\frac{1}{2\sqrt{2}}$
- Derivative of $y = \sec x$ is: a) $\tan x \sec x$, b) $\cos x \sec x$, c) $\cot x \sec x$, d) $\csc x \sec x$
- The 2nd derivative of $f(x) = 5x^{-2}$ is: a) $-10x^{-1}$, b) $10x$, c) $30x^{-4}$, d) $-30x^{-4}$

- (B) (C) (D)
- (B) (C) (D)
- (A) (B) ● (D)
- (B) (C) (D)
- (A) ● (C) (D)
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- (A) (B) ● (D)
- (B) (C) (D)
- (A) (B) ● (D)

If the Candidate is absent, The Superintendent Should fill this Circle } and pack the sheet with solved OMR sheets in roll number order } → ○

PART-II

Time: 2 Hours 40 Minutes

SECTION-B

Marks: 50

1. Attempt any ten of the following short questions. Each question carries 5 marks.

- Evaluate the limit of $\lim_{x \rightarrow 0} \frac{1 - \cos 2x}{x^2}$
- Find the derivative of the implicit function $\tan(x+y) = y$
- Find equation of the tangent line to the curve $y = 3x^2e^x$ at $x = 1$
- Find the vector derivative of $F(x) = x \ln x i + \cos x^2 j + 5k$
- Evaluate the integral and check the result through differentiation $\int \frac{x^2 + 2x + 1}{x^4} dx$
- Evaluate the integral $\int x^3 \ln x dx$
- Find the angle from the line $4x - y + 7 = 0$ to the line $3x + 5y - 2 = 0$
- Find the equation of a line if the x-intercept and y-intercept of the line are $x: (-7, 0)$ and $y: (0, 7)$
- Find the centre and radius of the circle $x^2 + y^2 - 4x + 6y - 12 = 0$
- Find the equation of tangent and normal at a point $(1, -2)$ to the ellipse $5x^2 + y^2 = 9$
- Translate to parallel axes through the point $(1, -2)$, the conic $9x^2 + 16y^2 + 18x - 64y - 71 = 0$
- Find the general solution of the homogeneous differential equation $\frac{dy}{dx} = \frac{y-x}{y+x}$
- Perform two iteration of bisection method to approximate the actual root r of the function $f(x) = x^3 - 1 - x$ in the interval $[1, 2]$

SECTION-C

Marks: 30

NOTE: Attempt any three of the following questions. Each question carries 10 marks.

- Determine the $\lim_{x \rightarrow \pi} \frac{3x + \sin x}{x}$
 - Find derivative of $y = \sin^{-1}(2x)$
- Find the area between the x-axis and the curve $f(x) = 3x^2 - 12$ from $x = 0$ to $x = 3$
 - Find the point of intersection $P(x, y)$ of the pair of lines $2x - 3y = 7$ and $x + y = 1$
- Prove that the line $x - y + 1 = 0$ touches the circle $x^2 + y^2 - 4x - 2y + 3 = 0$. Also find the contact point.
 - Find the vertices, foci, eccentricity and the asymptotes of the hyperbola $x^2 - 4y^2 = 4$
- Use Euler's Theorem to verify the function $f(x, y) = ax^2 + 2bxy + cy^2$ is a homogeneous function of degree 2.
 - Find iterate x_3 of Newton Raphson Method for the function $f(x) = x^3 + 3x - 1$ with $x_0 = 0$