Roll Number in Figures: ____________

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Flc. No. ____________

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MATHEMATICS (New)

Inter Part-II

(Fresh/Reappear)

Flc. No. ____________

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Superintendent

Signature / Stamp:

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MATHEMATICS (New)

Inter Part-II

(Fresh/Reappear)

Flc. No. ____________

(For Board's Office use only)

Time Allowed: 3 Hours **Marks: 100**

Note: There are THREE sections in this paper i.e. Section A, B and C.
Attempt Section-A on the same paper and return it to the Superintendent within the given time.
No marks will be awarded for Cutting, Erasing or Overwriting. Marks of Identification will lead to UFM case. Mobile Phone etc are not allowed in the examination hall.

Time Allowed: 20 minutes **Section – A** **Marks: 20**

Q-I Write the correct option i.e. A, B, C or D in the empty box provided opposite to each part.

i.	Order of the differential equation $\left(\frac{d^3y}{dx^3}\right)^2 - \frac{d^2y}{dx^2} + x^2\frac{dy}{dx} + y = 3$ is	A. 0	B. 1	C. 2	D. 3
ii.	$x\frac{\partial z}{\partial x} + y\frac{\partial z}{\partial y} = nz$ represents	A. Lagrange theorem	B. Couchy theorem	C. Euler's theorem	D. None of these
iii.	For finding area, if approximation is made through parabolic arc, then it is known as..	A. Rectangular rule	B. Trapezoidal rule	C. Newton's rule	D. Simpson's rule
iv.	The centre of circle $x^2 + y^2 + 2gx + 2fy + c = 0$ is	A. $(-g, f)$	B. $(-g, -f)$	C. $(g, -f)$	D. (g, f)
v.	Homogenous equation of degree "2" represents	A. Two circles	B. Two straight lines	C. Ellipse	D. Parabola
vi.	If $f(x) = (4x-3)^3$ then $f'(x) =$	A. $3(4x-3)^2$	B. $12(4x-3)^2$	C. $12(4x-3)^3$	D. $9(4x-3)^2$
vii.	Domain of function $f(x) = \|x\|$ is	A. $(-\infty, \infty)$	B. $(0, \infty)$	C. $(-\infty, 0)$	D. None of these
viii.	For parabola $x^2 = 4py$, if $p > 0$ then it is open	A. Down	B. Up	C. Left	D. Right
ix.	Differential Equation of the form $\frac{dy}{dx} = \frac{x+y}{x-y}$ is .... Differential equation.	A. Partial	B. Linear	C. Non linear	D. None of these
x.	Slope of the secant line is the	A. Instantinous rate of change	B. Average rate of change	C. Both A and B	D. None of these
xi.	If for a function $f(x)$, $f'(x) > 0 \ \forall x$, then $f(x)$ is	A. Increasing	B. Stationary	C. Decreasing	D. None of these
xii.	The domain of $F(t) = 2t\hat{i} - 3t\hat{j} + \frac{1}{t}\hat{k}$ is	A. All t	B. All $t > 0$	C. All $t \neq 0$	D. None of these
xiii.	$f(x, y) = \frac{\sqrt{y} + \sqrt{x}}{y + x}$ is a homogenous function of degree.......	A. 1	B. $\frac{1}{2}$	C. 0	D. 2
xiv.	The line $y = mx + c$ should touch the circle $x^2 + y^2 = a^2$ if......	A. $c = \sqrt{1+m^2}$	B. $c = a\sqrt{1+m^2}$	C. $c = a\sqrt{1-m^2}$	D. $c = \pm a\sqrt{1+m^2}$
xv.	Vertex in a parabola $(y+1)^2 = 6(x-2)$ is	A. $(2, -1)$	B. $(1, -2)$	C. $(-2, -1)$	D. $(-1, -2)$
xvi.	$\int \frac{1}{1+x^2}\,dx =$	A. $\sin^{-1}x + c$	B. $\cos^{-1}x + c$	C. $\sec^{-1}x + c$	D. $\tan^{-1}x + c$
xvii	The $\lim_{x\to 0}(1+x)^{\frac{1}{x}} =$	A. $\frac{1}{x}$	B. x	C. e	D. $-e$
xviii	The graph of a function $f(x)$ is concave upward on (a, b) if......	A. $f''(x) > 0$	B. $f''(x) < 0$	C. $f''(x) = 0$	D. All of these
xix.	The .....method always used the midpoint of the interval on the next iterate.	A. Regular Falsi	B. Bisection	C. Newton Raphson	D. Simpson's
xx.	The slope of the line L through the two points M (3, 1) and N (−1, 3) is	A. 0	B. $\frac{1}{2}$	C. $-\frac{1}{2}$	D. $\frac{3}{2}$

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MATHEMATICS (New)

Inter Part-II

(Fresh/Reappear)

Note: Time allowed for Section – B and Section – C is 2 Hours and 40 minutes.

Section – B

Marks: 50

Q-II Answer any TEN parts. Each part carries FIVE marks.

1. Find $f[g(x)]$ and $g[f(x)]$ if $f(x) = x^2 + 1$ and $g(x) = 2x$.
2. Find at the average rate of change for the function $h = \sqrt{t} - 9$ from $t = 9$ to $t = 16$.
3. Differentiate $y = \tan x$ by first principle rule.
4. Evaluate $\lim\limits_{t \to 2} \left[(2i - tj + e^t k) \times (t^2 i + 4\sin t\, j) \right]$
5. Evaluate $\int \dfrac{\cot \sqrt{x}}{\sqrt{x}}\, dx$.
6. Determine the actual value of the integral using definition $\int_{x=0}^{x=3} (2x - 4)\, dx$.
7. Show that the area bounded by the triangle ABC whose vertices are A (– 3, 6), B (3, 2) and C (6, 0). Are the vertices of triangle ABC collinear?
8. Find the first two derivatives of $f(x) = \dfrac{e^x - e^{-x}}{e^x + e^{-x}}$.
9. Differentiate $y = \ell n x$ by first principle rule.
10. Find an equation of a circle which passes through the three points (– 3, 0) (5, 4) and (6, – 3).
11. Find the equation of parabola with focus at F (0, 3), directrix $y = -3$.
12. Verify Euler's Theorem for the homogenous functions. $f(x, y) = ax^2 + 2hxy + by^2$.
13. Approximate by Simpson's rule the definite integral $I = \int_2^4 x^2\, dx$, $n = 3$

Section – C

Marks: 30

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

Q-III (a) Find x so that $\log_b x + \log_b (x - 4) = \log_b 21$.

(b) Use Maclaurin's series to approximate the value of a function $f(x) = \sin x$ at a point $x_0 = 0$.

Q-IV (a) Find the angles of the triangle ABC whose vertices are A (– 2, – 3), B (4, – 1) and C (2, 3).

(b) Find the equations of the tangents to the circle $x^2 + y^2 = 25$ which are parallel to the straight line $3x + 4y - 7 = 0$.

Q-V (a) Solve the differential equation $e^x \dfrac{dy}{dx} + y^2 = 0$.

(b) For what value of C, the line $y = x + c$ will touch the hyperbola $\dfrac{x^2}{16} - \dfrac{y^2}{4} = 1$?

Q-VI (a) Evaluate the integral $\int \dfrac{3x + 5}{x^2 + 2x - 3}\, dx$.

(b) Show that $f(x, y) = \dfrac{1}{x + y} \sin \dfrac{2xy}{x^2 + y^2}$ is a homogenous function of degree 1.