Sig. of Supdt.	MRD-XII-16(A) **MATHEMATICS** (Part – II) (Fresh / New Course)	Roll No. .....

Fic. # .....

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Fic. # .....

Time Allowed : 3 Hrs. **MATHEMATICS** Total Marks: 100

(Part – II)

(Fresh / New Course)

NOTE : There are THREE sections in this paper i.e. Section A, B and C.

Time : 20 Mins. **Section "A"** Marks: 20

NOTE : Use this sheet for this section. No mark will be awarded for cutting, erasing or over writing.

Q. 1 Write the correct option i.e. A, B, C and D int eh empty box provided opposite to each part.

i) Range of the function $f(x) = \frac{1}{x}$ is ☐ (i)

(a) Set of real numbers (b) Set of non-zero numbers

(c) Positive real numbers (d) None of these

ii) Solution et of $(x-3)e^x = 0$ ☐ (ii)

(a) {3} (b) {3,0} (c) {0} (d) None of these

iii) $\frac{d}{dx}x^n = ...$ ☐ (iii)

(a) x^n (b) $\frac{x^n}{e}$ (c) ex^{n-1} (d) None of these

iv) Slope of the secant line is the ..... ☐ (iv)

(a) instantinous rate of change (b) Average rate of change

(c) Both a and b (d) None of these

v) $\frac{d}{dx}(\tan x) = ...$ ☐ (v)

(a) Cot x (b) Sin x (c) $Sec^2 x$ (d) $Cosec^2 x$

vi) A point at which function double derivative is zero is called ..... ☐ (vi)

(a) Critical point (b) Point of infection (c) Stationary point (d) None of these

vii) Two lines represents by $ax^2 + 2hxy + by^2 = 0$ are imaginary if ..... ☐ (vii)

(a) $h^2 < ab$ (b) $h^2 > ab$ (c) $h^2 = ab$ (d) $h^2 \neq ab$

viii) The two lines represented by $ax^2 + 2hxy + by^2 = 0$ will be perpendicular to each ether if ..... ☐ (viii)

(a) $a + b = -1$ (b) $a \cdot b = -1$ (c) $a + b = 0$ (d) $a \cdot b = 0$

ix) Circles with the same center are known as ..... ☐ (ix)

(a) Complex (b) Point (c) Symmetric (d) Concentric

x) Radius of the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ is ..... ☐ (x)

(a) $\sqrt{g^2+f^2-c}$ (b) $\sqrt{g^2-f^2+c}$ (c) $\sqrt{g^2+f+c}$ (d) $\sqrt{g^2+f^2}$

xi) $\int \frac{1}{1+x^2}dx = ...$ ☐ (xi)

(a) $\sin^{-1}x + c$ (b) $\cos^{-1}x + c$ (c) $\sec^{-1}x + c$ (d) $\tan^{-1}x + c$

xii) The process of finding anti derivation is called ..... ☐ (xii)

(a) Mid point (b) Integration (c) Derivation (d) None of these

xiii) Let $F_1(-c,0)$ and $F_2(c,0)$ be the two foci on ellipse and p(x, y) is any point on the ellipse then ..... ☐ (xiii)

(a) $|PF_1|+|PF_2|=2a$ (b) $|PF_1|-|PF_2|=2a$ (c) $|PF_1|+|PF_2|=a$ (d) $|PF_1|+|PF_2|=a$

xiv) If $e = \frac{5}{3}$, then the conic will be a .....

(a) Circle (b) Ellipse (c) Parabola (d) Hyperbola

(xiv)

xv) The degree of $\frac{d^3y}{dx^3} + 2x\frac{d^2y}{dx^2} + y = 5$ is .....

(a) 3 (b) 2 (c) 1 (d) 0

(xv)

xvi) The highest order derivative occurring in the differential equation is ..... of the differential equation.

(a) Degree (b) Order (c) Solution (d) Both A and C

(xvi)

xvii) $\lim_{(x,y)\to(-1,-1)} \frac{x^2}{x^2+y^2+2} =$ .....

(a) Zero (b) Undefined (c) $\frac{1}{4}$ (d) $-\frac{1}{4}$

(xvii)

xviii) $f(x, y) = 2xy + y^2$ is a homogenous function of degree .....

(a) 1 (b) 0 (c) 3 (d) 2

(xviii)

xix) The .....method uses the slopes of the tangent lines to the graph of a function f(x) to approximate roots of equation f(x) = 0.

(a) Newton – Raphson (b) Bisection (c) Regular – Falsi (d) None of these

(xix)

xx) For finding parabolic 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

(xx)

MRD-XII-16(A)

MATHEMATICS

(Part – II)

(Fresh / New Course)

Section – B & C Total Marks : 80

Time Allowed : 2:40 Hrs. **Section – B** Marks : 50

Q. 2 Answer any Ten parts. Each part carries equal marks.

(i) Evaluate $\lim_{x\to 1}\frac{\sqrt{x}-1}{x-1}$

(ii) Find the average rate of change for the fraction $y = x^2 + 4$ from $x = 2$ to $x = 3$.

(iii) Differentiate $y = \sin x$ by first principle rule.

(iv) Evaluate $\lim_{x\to 0}\left[\frac{\sin t\hat{i} - t\hat{k}}{t^2+t-1}\right]$

(v) Evaluate $\int\frac{\sin x - \cos x}{\sin x + \cos x}dx$

(vi) Determine the actual integral using definition $\int_{x=0}^{x=2} x^3 dx$

(vii) Find a joint equation of the straight line that passes through origin and perpendicular to the lines represented by $3x^2 - 7xy + 2y^2 = 0$.

(viii) Find the first two derivatives of $f(x) = \frac{e^x - e^{-x}}{e^x + e^{-x}}$

(ix) Differentiate $y = a^x$ by first principle rule.

(x) Find an equation of a circle passes through the three points (1,2), (3,–4) and (5,–6).

(xi) Find an equation of parabola with focus at F(0,3), directrix $y = -3$.

(xii) If $U = f\left(\frac{y}{x}\right)$ then show that $x\left(\frac{\partial u}{\partial x}\right) + y\left(\frac{\partial u}{\partial y}\right) = 0$

(xiii) Approximate by trapezoidal rule the definite integral $I = \int_{-1}^{2} x^2 dx$ in $n = 4$ subintervals.

Section – C

Marks : 30

NOTE : Attempt any THREE questions. Each question carries equal marks.

Q. 3 (a) Find x so that $\log_{10}(x+6) - \log_{10}(x-3) = 1$

(b) Use Maclaurin series to approximate the value of a function $f(x) = \log_a(1+x)$ at a point $x_0 = 0$.

Q. 4 (a) Find the angles of the triangle ABC whose vertices are A(–4,0), B(2,0) and C(2,5)

(b) For what value of C the line $y = mx + c$ touches the circle $x^2 + y^2 = a^2$?

Q. 5 (a) Solve the differential equation $\frac{dy}{dx} = \frac{x+y}{x-y}$.

(b) Find the tangent equation at a point (1, 2) to ellipse $\frac{x^2}{4} + \frac{y^2}{9} = 1$ which is perpendicular to the line $9x + 8y - 36 = 0$.

Q. 6 (a) Evaluate the integral $\int\frac{x}{(x+1)(x^2+1)}dx$

(b) Show that the rational function $f(x,y) = \frac{\sqrt{y} + \sqrt{x}}{y+x}$ is a homogeneous function.