

(To be filled in by the candidate)

Roll No.

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HSSC (12th) 2nd Annual 2022

Time : 2:30 Hours

Marks : 80

Mathematics

Subjective

Paper : II

Note: - Section B is compulsory. Attempt any three questions from section C.

SECTION - B

(8 x 2 = 16)

2. Write short answers to any Eight parts.

i. Define Odd Function and give its example.

ii. Evaluate $\lim_{x \rightarrow 1} \frac{x^2 - 1}{x^2 - x}$

iii. Evaluate $\lim_{\theta \rightarrow 0} \frac{\sin 7\theta}{\theta}$

iv. If $f(x) = \sqrt{x+1}$, $g(x) = \frac{1}{x^2}$, $x \neq 0$, find $f \circ f(x)$, $g \circ f(x)$.

v. For real valued function $f(x) = (-x+9)^3$, find $f^{-1}(x)$.

vi. Find $\frac{dy}{dx}$ if $y = \sinh^{-1}\left(\frac{x}{2}\right)$.

vii. Find $f'(x)$ if $f(x) = \ln(e^x + e^{-x})$

viii. Find $\frac{dy}{dx}$ if $xy + y^2 = 2$.

ix. Differentiate $\sin^2 x$ w.r.t. $\cos^4 x$.

x. Differentiate $\frac{a+x}{a-x}$ w.r.t. x .

xi. Divide 20 into two parts so that the sum of their squares will be minimum.

xii. Find y_4 if $y = \sin 3x$

(8 x 2 = 16)

3. Write short answers to any Eight parts.

i. Evaluate $\int (a-2x)^{\frac{3}{2}} dx$

ii. By using differential, find $\frac{dy}{dx}$ and $\frac{dx}{dy}$ if $x^4 + y^2 = xy^2$

iii. Evaluate $\int \frac{x}{\sqrt{4+x^2}} dx$.

iv. Evaluate $\int \frac{\sin \theta}{1 + \cos^2 \theta} d\theta$

v. Evaluate $\int x^2 \ln x dx$

vi. Find area bounded by $\cos$ function from $x = -\frac{\pi}{2}$ to $x = \frac{\pi}{2}$

vii. Define Differential Equation and Order of Differential Equation.

viii. Evaluate $\int \frac{2a}{x^2 - a^2} dx$

ix. Find equation of a line passing through $(-8, 5)$ and having slope undefined.

x. Find the coordinates of the point that divides the join of $A(-6, 3)$ and $B(5, -2)$ internally in ratio 2:3.

xi. Show that the points $(2, 3)$ and $(-2, 3)$ lies on same or opposite side of the line $3x - 5y + 8 = 0$.

xii. Find angle from the line with slope $\frac{-7}{3}$ to the line with slope $\frac{5}{2}$.

(Turn Over)