



Attempt this Paper on this Question Sheet only.

Division of marks is given in front of each question.

This Paper will be collected back after expiry of time limit mentioned above.

Signature of Supdt.:

Q.1. Encircle the right answer cutting and overwriting is not allowed. (10x1=10)

- (i) If $y = e^{\sin x}$ then $\frac{dy}{dx} = \dots$
 (a) $e^{\cos x}$ (b) $\cos x e^{\cos x}$ (c) $\cos x e^{\sin x}$ (d) None of these
- (ii) $\frac{d}{dx}(\cos^{-1} \frac{x}{a}) = \dots$
 (a) $\frac{1}{\sqrt{a^2-x^2}}$ (b) $\frac{-1}{\sqrt{a^2-x^2}}$ (c) $\frac{-a}{x\sqrt{a^2-x^2}}$ (d) None of these
- (iii) If $y = a^{\sqrt{x}}$ then $\frac{dy}{dx} = \dots$
 (a) $a^{\sqrt{x}} \frac{\ln a}{2\sqrt{x}}$ (b) $a^{\frac{\ln a}{2\sqrt{x}}}$ (c) $a^{\sqrt{x}} \frac{1}{2\sqrt{x}}$ (d) None of these
- (iv) If $x^2 + y^2 = a^2$, then $y_2 = \dots$
 (a) $\frac{-a^2}{y^3}$ (b) $\frac{a^2}{y^3}$ (c) $\frac{-a^2}{y^2}$ (d) None of these
- (v) The value of $\int_1^2 (x^2 + 1)dx = \dots$
 (a) 10 (b) $\frac{8}{3}$ (c) $\frac{10}{3}$ (d) None of these
- (vi) The value of the integral $\int \cos 2x dx = \dots$
 (a) $\frac{1}{2} \cos 2x + c$ (b) $\frac{1}{2} \sin 2x + c$ (c) $\frac{-1}{2} \sin 2x + c$ (d) None of these
- (vii) The value of the integral $\int \sec^2 x dx = \dots$
 (a) $2 \sec x$ (b) $2 \tan x + c$ (c) $\tan x + c$ (d) None of these
- (viii) The value of $\int_a^a f(x) dx = \dots$
 (a) 0 (b) 1 (c) $f(b) - f(a)$ (d) None of these
- (ix) If $f(x) = 3x^2 + 4x + 7$ then the value of $f'(0)$ is equal to
 (a) 4 (b) 10 (c) 20 (d) None of these
- (x) The area between x -axis and the curve $y = x^2 + 1$ from $x = 1$ to $x = 2$ is equal to
 (a) $\frac{1}{3}$ (b) $\frac{2}{3}$ (c) $\frac{10}{3}$ (d) None of these



ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED

Q.2. Solve the following:

(5x4=20)

- (i) If $y = e^{-x} \cos x$ find y' and y'' .
- (ii) The revenue from selling x units of desks is $R(x) = 2000(1 - \frac{1}{x})$. Find the marginal revenue $R'(x)$ on selling x units of desks. Also find the marginal revenue $R'(x)$ on selling 9th desk.
- (iii) Evaluate $\int \frac{1}{(1+x^2) \tan^{-1} x} dx$.
- (iv) Find the area between the x -axis and the curve $y = x^2 + 1$ from $x = 1$ to $x = 2$.
- (v) Use numerical integration with $n = 4$ to approximate $\int_0^4 \sqrt{x^2 + 1}$

Solve the following:

(5x6=30)

- Q.3 If $x = a \cos^3 \theta, y = b \sin^3 \theta$ then show that $a \frac{dy}{dx} + b \tan \theta = 0$.
- Q.4 Solve the first order differential equation $(x^2 - yx^2) \frac{dy}{dx} + y^2(1 + x) = 0$.
- Q.5 Evaluate the integral $\int \tan^4 x dx$.
- Q.6 Use the method of least squares to find least squares linear regression line $y = ax + b$ for the data

x	1	3	4	6	7	8
y	4.5	5.8	6.1	6.9	7.4	7.8

Q.7 A random variable X has probability density function (p.d.f.)

$$f(x) = \begin{cases} kx, & \text{if } 0 \leq x \leq 2, \\ 0, & \text{if otherwise.} \end{cases}$$

Find (i) k (ii) $P(x \geq 1)$ (iii) $P(\frac{1}{2} \leq x \leq \frac{3}{2})$.