

Q: 2 Do as directed:

[08]

(1) $\frac{d}{dx}(\sqrt[3]{x}) = \dots\dots\dots$

(2) $\frac{d}{dx}(x^{\sin x}) = \dots\dots\dots$

(3) True or False: $\int \tan^{-1} x dx$ is obtained by the method of Integration by parts.

(4) True or False: If $\int f(x) dx = \frac{x^{n+1}}{n+1}$ then $f(x) = (n+1)x^n$

(5) True or False: $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \cos x dx = 0$

(6) True or False: $\int_a^b f(x) dx + \int_b^a f(x) dx = 0$

(7) The solution of the differential equation obtained by taking particular value of the constant is called-----

(8) If a,b,c are arbitrary constant then order of differential equation is----- where solution is $y = a \cos x + b \sin x + ce^{-x}$

Q: 3 Answer in brief of the following questions. (Any Ten)

[20]

1. Find $\lim_{x \rightarrow 0} \frac{\sin 5x - \sin 7x}{\sin x}$

2. Find $\lim_{x \rightarrow 3} \frac{x^{\frac{3}{2}} - 3^{\frac{3}{2}}}{x - 3}$ $x \in R - \{3\}$

3. Find derivative of $x^3 + y^3 = 3axy$

4. Evaluate: $\int \left(\frac{x}{a} + a^x + x^a + ax \right) dx$

5. Evaluate: $\int x e^x dx$

6. Evaluate: $\frac{1}{4x^2+9} dx$

7. State the working rules of definite integration.

8. Find the value of $\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \sin^2 x dx$

9. Prove that $\int_1^e \log x dx = 1$

10. Obtain the differential equation representing all lines of family $y = 2x + c$, where c is arbitrary constant.

11. Verify that $e^x + \log y = 0$, $x \in R$ is a solution of the differential equation $\frac{dy}{dx} + e^x y = 0$

12. Solve: $xy - ydx = 0$

Q: 4 Attempt any Four of the following:

[32]

(1) Find the limit:

(i) $\lim_{x \rightarrow 2} \frac{x^2 - 4}{\sqrt{x+2} - \sqrt{3x-2}}$

(ii) $\lim_{x \rightarrow 0} \frac{1 - \cos x}{x^2}$

(2) By using the definition find:

(i) $\frac{d}{dx}(x^4)$

(ii) $\frac{d}{dx}(\sqrt{x})$

(3) Evaluate:

(i) $\int \frac{\cos x}{\cos x - 1} dx$

(ii) $\int \frac{x^3 + 3x^2 + 4}{\sqrt{x}} dx$ $x > 0$

(4) Evaluate:

(i) $\int (2 + 7x) \cos 6x dx$

(ii) $\int x \log x dx$

(5) Evaluate:

(i) $\int_{\frac{\pi}{2}}^{\pi} \frac{1 - \sin x}{1 - \cos x} dx$

(ii) $\int_0^2 \frac{6x+3}{x^2+4} dx$

(6) Evaluate:

(i) $\int_0^{\frac{\pi}{4}} \frac{dx}{4 \sin^2 x + 5 \cos^2 x}$

(ii) $\int_0^{2a} \frac{f(x)}{f(x) + f(2a-x)} dx$

(7) Solve the differential equation $\frac{dy}{dx} = e^{x+y}$. Find the particular solution subject to initial condition $y(1) = 1$, also find $y(-1)$.

(8) Solve: $\frac{dy}{dx} = \sin(x+y)$

— x —