

Chapter-8

Basic applications of Differential and Integral Calculus

MTP-March '20

1. $\int e^{ax} dx$
- (a) $e^x + c$ (b) $\frac{e^{ax}}{a} + c$ (c) $\log x + c$ (d) $e^{ax} + c$
2. The gradient of the curve $y = 2x^3 - 5x^2 - 3x$ at $x = 0$ is
- (a) 3 (b) -3 (c) $1/3$ (d) none of these
3. Evaluate $\int_1^4 (2x + 5) dx$ and the value is
- (a) 3 (b) 10 (c) 30 (d) None of these.
4. If $f(x) = x^2 - 6x + 8$ then $f'(5) - f'(8)$ is equal to
- (a) $f'(2)$ (b) $3 \cdot f'(2)$ (c) $2 \cdot f'(2)$ (d) none of these.

MTP-October '19

5. If $y^3 \cdot x^5 = (x+y)^8$, then $\frac{dy}{dx}$ is
- (a) $\frac{y}{x}$ (b) $\frac{-y}{x}$ (c) $\frac{y^5}{x^3}$ (d) None of these

MTP-Oct '20

6. If $f'(x) = 3x^2 + 2$ & $f(0) = 0$ then find $f(2)$
- (a) 8 (b) 10 (c) 12 (d) None of these
7. The gradient of the curve $x^3 + y^3 = 9$ at the point (1,2) is
- (a) $-1/4$ (b) $1/4$ (c) 4 (d) -4
8. If $X = \frac{2t}{1+t^2}$, $y = \frac{1-t^2}{1+t^2}$ then $\frac{dy}{dx} + \frac{x}{y}$ is
- (a) 1 (b) 2 (c) 0 (d) $4t^2$

MTP-March '21

9. Evaluate $\int \frac{2x+1}{x(x+1)} dx$
(a) $x \log(x^2-x)+c$ (b) $\log(x^2+x)+c$ (c) $\log(x^2+1)+c$ (d) None of these
10. Evaluate $\int_0^1 x.e^x dx$
(a) e (b) e^{-1} (c) $2e$ (d) 1

MTP-March '19

11. Given $x = 2t + 5$, $y = t^2 - 2$; $\frac{dy}{dx}$ is calculated
(a) t (b) $-1/t$ (c) $1/t$ (d) none of these
12. The slope of the tangent to the curve $y = x^2 - x$ at the point, where the line $y = 2$ cuts the curve in the first quadrant, is
(a) 2 (b) 3 (c) -3 (d) -2
13. For the curve $x^2 + y^2 + 2gx + 2hy = 0$, the value of $\frac{dy}{dx}$ at $(0,0)$ is
(a) $-g/h$ (b) g/h (c) h/g (d) $-h/g$
14. $\int e^{-3x} dx$
(a) $-\frac{1}{3}e^{-3x} + c$ (b) $\frac{1}{3}e^{-3x} + c$ (c) $-\frac{1}{3}e^{3x} + c$ (d) $-3e^{-3x} + c$
15. $\int x \cdot \log_x$
(a) $\frac{x^2}{2} \cdot \log x - \frac{x^2}{4} + c$ (b) $-\frac{x^2}{2} \cdot \log x - \frac{x^2}{4} + c$
(c) $\frac{x^2}{2} \cdot \log x + \frac{x^2}{4} + c$ (d) $-\frac{x^2}{2} \cdot \log x + \frac{x^2}{4} + c$

MTP-April '19

16. if $x = at^2$, $y = 2at$, then $\left. \frac{dy}{dx} \right|_{t=2}$ is equal to
(a) $1/2$ (b) -2 (c) $-1/2$ (d) none of these

17. The gradient of the curve $y = 4x^2 - 2x$ at $x = 1$ is
 (a) 4 (b) 6 (c) 8 (d) None of these

18. $\int \frac{1}{a^2 - x^2} dx$
 (a) $\frac{1}{2a} \log \left| \frac{a+x}{a-x} \right| + c$ (b) $\frac{-1}{2a} \log \left| \frac{a+x}{a-x} \right| + c$
 (c) $\frac{1}{2a} \log \left| \frac{x-a}{x+a} \right| + c$ (d) None of these

19. $\int \left\{ \frac{1}{\log x} - \frac{1}{(\log x)^2} \right\} dx$
 (a) $\frac{1}{\log x} + c$ (b) $\frac{x}{\log x} + c$
 (c) $\frac{-x}{\log x} + c$ (d) None of these

20. $\int x^2 e^x dx$
 (a) $e^x (x^2 - 2x + 2) + c$ (b) $e^x (x^2 - 2) + c$ (c) $e^x (x^2 + 2x + 2) + c$ (d) $e^x (x^2 - 2x) + c$

21. If $x = at^3$, $y = \frac{a}{t^3}$, $\frac{dy}{dx}$ at $t = 1$ is
 (a) 1 (b) -1 (c) 3 (d) $2/3$

MTP-Oct '20

22. If $x, x\sqrt{1+y} + y\sqrt{1+x} = 0$, then $(1+x)^2 \frac{dy}{dx} =$
 (a) 0 (b) 1 (c) -1 (d) 2
23. Find $\frac{dy}{dx}$ at $t=1$ when $x = t \log t$ and $y = \frac{(\log t)}{t}$
 (a) 1 (b) -1 (c) $-1/2$ (d) 0

MTP-March '21

24. Evaluate $\int_0^2 x^5 dx$
 (a) $32/3$ (b) $1/3$ (c) $1/2$ (d) 1

MTP-March '22

25. $\int e^x (x^2 + 2x) dx$ (a) $x^2 \cdot e^x + c$ (b) $x \cdot e^x + c$ (c) $-x \cdot e^x + c$ (d) $e^{-x} + c$
26. if $xy = 1$ then $y^2 + \frac{dy}{dx} = ?$ (a) 1 (b) 0 (c) 2 (d) none of these

MTP-Oct '21

27. If $y = e^{\sqrt{2x}}$, $\frac{dy}{dx}$ is calculated as (a) $\frac{e^{\sqrt{2x}}}{\sqrt{2x}}$ (b) $e\sqrt{2x}$ (c) $\frac{e^{\sqrt{2x}}}{\sqrt{2x}}$ (d) none
28. Evaluate: $\int_0^5 \frac{x^2}{x^2 + (5-x)^2} dx$ (a) 2.5 (b) 0 (c) -1 (d) 2

MTP-Nov '21

29. Marginal cost and marginal revenue of a commodity is $C'(x) = 8 + 6x$ and $R'(x) = 30$. Fixed cost is 0. Find the total profit. (a) $22x + 3x^2$ (b) $22x - 3x^2$ (c) $22x - x^2$ (d) $x + 3x^2$

30. $\int 2^{3x} \cdot 3^{2x} \cdot 5^x dx$ (a) $\frac{2^{3x} \cdot 3^{2x} \cdot 5^x dx}{\log(270)} + C$ (b) $\frac{2^{3x} \cdot 3^{2x} \cdot 5^x dx}{\log(360)} + C$ (c) $\frac{2^{3x} \cdot 3^{2x} \cdot 5^x}{\log(180)} + C$ (d) $\frac{2^{3x} \cdot 3^{2x} \cdot 5^x}{\log(90)} + C$

MTP-Oct '21

31. if $f(x) = x^2/e^x$, then $f'(-1)$ is equal to (a) $-3e$ (b) $1/e$ (c) e (d) none

MTP-Nov'21

32. Find the value of $\frac{d}{dx}$ of $(-3x+7)$
(a) 3 (b) -3 (c) 0 (d) 1
33. A total cost function of a company RXL Ltd is $C(x) = 10+50x-30x^2+x^3/3$ Where x denotes the output. Find the output level at which the profit is maximum if price function is given by $450-30x$
(a) 30 (b) 40 (c) 50 (d) 20

MTP-2 Nov'22

34. $\int_0^1 (e^x + e^{-x}) dx$ is
(a) $e - e^{-1}$ (b) $e^{-1} - e$ (c) $e + e^{-1}$ (d) None of these
35. If $f(x) = x^k$ and $f'(1) = 10$, then the value of k is :
(a) 10 (b) -10 (c) 1/10 (d) None of these
36. If $y = ae^{nx} + be^{-nx}$, then $\frac{d^2y}{dx^2}$ is equal to _____ .
(a) n^2y (b) $-n^2y$ (c) ny (d) None of these

MTP-1 Nov'22

37. $\int_0^1 x.e^x dx$
(a) -1 (b) 1 (c) e^1 (d) $1/e$

MTP-2 June'22

38. If $y = x^x$, then $\frac{dy}{dx}$ is :
(a) $x^x (2 + \log x)$ (b) $x^x \log(ex)$ (c) $x^x \cdot \log$ (d) None of these
39. If $y = \sqrt{x} + \frac{1}{\sqrt{x}}$ then $2x \frac{dy}{dx}$ is
(a) $\sqrt{x} - \frac{1}{\sqrt{x}}$ (b) $\sqrt{x} + \frac{1}{\sqrt{x}}$ (c) $x - \frac{1}{x}$ (d) None of these

40. Evaluate $\int 2^x x^2 dx$

(a) $\frac{2^x \cdot x^2}{2} - \frac{x \cdot 2^{x+1}}{(\log 2)^2} + \frac{2^{x+1}}{(\log 2)^2} + c$

(b) $\frac{2^x \cdot x^3}{3} - \frac{x^2 \cdot 2^{x+1}}{(\log 2)^2} + \frac{2^{x+1}}{(\log 3)^2} + c$

(c) $\frac{2^x \cdot x^2}{3} - \frac{x^3 \cdot 2^x}{3} + \frac{2^{x+1}}{(\log 2)^3} + c$

(d) None of these

ANSWER KEYS

1 (b)	2 (b)	3 (c)	4 (b)
5 (a)	6 (c)	7 (a)	8 (c)
9 (b)	10 (d)	11 (a)	12 (b)
13 (a)	14 (a)	15 (a)	16 (a)
17 (b)	18 (a)	19 (b)	20 (a)
21 (b)	22 (c)	23 (a)	24 (a)
25 (a)	26 (b)	27 (a)	28 (a)
29 (b)	30 (b)	31 (a)	32 (b)
33 (d)	34 (a)	35 (a)	36 (a)
37 (b)	38 (b)	39 (a)	40 (d)

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