ABHINAV ACADEMY

UDUPI

CET25M7 CET25M6 APPLICATION OF DERIVATIVES

Class 12 - Mathematics

Time Allowed: 1 hour and 30 minutes **Maximum Marks: 75**

1. $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \frac{1}{x^2}\sin\left(\frac{1}{x}\right)dx$, where x $\neq$ 0, is equal to **[1]**

   a) -2 b) 0

   c) π d) 1

2. $\int_0^{\infty} \frac{1}{1+e^x}dx$ equals **[1]**

   a) - log 2 b) log 2

   c) log 2 - 1 d) log 4 - 1

3. $\int_0^{\pi/2}$ log(cot x) dx is equal to **[1]**

   a) $-\frac{\pi}{2}\log 3$ b) $\frac{\pi}{2}\log 2$

   c) $\frac{3\pi}{2}\log 5$ d) 0

4. $\int e^x \left\{\tan^{-1} x + \frac{1}{(1+x^2)}\right\}$ dx = ? **[1]**

   a) $e^x \tan^{-1} x + C$ b) $e^x \cdot \frac{1}{(1+x^2)} + C$

   c) $e^x \cdot \frac{x}{(1+x^2)} + C$ d) $-e^x \cot^{-1} x + C$

5. $\int e^x \cdot \frac{x}{(1+x)^2}$ dx = ? **[1]**

   a) $e^x \cdot \frac{1}{x} + C$ b) $e^x \cdot \frac{1}{(1+x)} + C$

   c) $e^x \cdot \frac{x}{(1+x)} + C$ d) $e^x \cdot \frac{2x}{(1+x)} + C$

6. $\int \frac{\sin^2 x}{\cos^4 x}dx$ = **[1]**

   a) $\frac{1}{3}\tan^2 x + c\frac{1}{3}\tan^2 x + c$ b) $\frac{1}{2}\tan^2 x + C$

   c) none of these d) $\frac{1}{3}\tan^3 x + c$

7. $\int_0^2 [2x]$ is equal to , where [.] denotes the Greatest Integer Function **[1]**

   a) 2 b) 0

   c) 3 d) 4

8. $\int e^{\sin x} \sin 2x$ dx = ? **[1]**

   a) $2e^{\sin x}$ (sin x + 1) + C b) $2e^{\sin x}$ (sin x - 1) + C

   c) (2sin x) $e^{\sin x}$ + C d) (2cos x) $e^{\sin x}$ + C

9. $\int \sqrt{e^x}dx = ?$ **[1]**

a) $2\sqrt{e^x} + C$ b) $\frac{1}{2}\sqrt{e^x} + C$

c) $\sqrt{e^x} + C$ d) $\frac{1}{4}\sqrt{e^x} + C$

10. $\int \frac{dx}{(9+4x^2)}dx = ?$ **[1]**

a) $\frac{1}{2}\tan^{-1}\frac{2x}{3} + C$ b) $\frac{1}{4}\tan^{-1}\frac{3x}{4} + C$

c) $\frac{1}{6}\tan^{-1}\frac{3x}{2} + C$ d) $\frac{1}{6}\tan^{-1}\frac{2x}{3} + C$

11. $\int_{-8}^{8}(\sin^{93}x + x^{295})$ dx is equal to **[1]**

a) $2(8^{295} + 1)$ b) 1

c) $2 + 8^{295}$ d) 0

12. $\int x \tan^{-1} x\, dx = ?$ **[1]**

a) $\frac{1}{2}\tan^{-1} x + \log(1 + x^2) - \frac{1}{2}x + C$ b) $\frac{1}{4}(1 + x^2)\tan^{-1} x + \frac{1}{3}x + C$

c) $\frac{1}{2}x^2\tan^{-1} x + \frac{1}{2}x + C$ d) $\frac{1}{2}(1 + x^2)\tan^{-1} x - \frac{1}{2}x + C$

13. $\int \frac{(x+1)(x+\log x)^2}{x}dx = ?$ **[1]**

a) $\frac{x^3}{3} + \frac{x^2}{2} + x + C$ b) $\frac{x^2}{2} + x + C$

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

14. $\int \sec^2 x \operatorname{cosec}^2 x dx = ?$ **[1]**

a) tan x – cot x + C b) - tan x + cot x + C

c) - tan x - cot x + C d) tan x + cot x + C

15. $\int \frac{\sin 2x}{(\sin^4 x + \cos^4 x)}dx = ?$ **[1]**

a) $x^2 + C$ b) $2x^2 + C$

c) $-\tan^{-1}(\tan^2 x) + C$ d) $\tan^{-1}(\tan^2 x) + C$

16. $\int \sec^5 x \tan x\, dx = ?$ **[1]**

a) 4 log |cos x| + C b) $\frac{1}{5}\sec^5 x + C$

c) $5\tan^5 x + C$ d) 5 log |cos x| + C

17. $\int_0^{\frac{\pi}{2}} \sqrt{1 + \cos 2x}dx = ?$ **[1]**

a) $\sqrt{3}$ b) 2

c) $\sqrt{2}$ d) 3

18. The value of $\int_{-\pi}^{\pi} \sin^3 x \cos^2 x dx$ is **[1]**

a) 0 b) $\frac{\pi^4}{4}$

c) $\frac{\pi^4}{2}$ d) $\frac{\pi^4}{6}$

19. $\int \frac{\sin^{-1} x}{(1-x^2)^{3/2}}$ dx = ? **[1]**

a) b)

$\frac{x \sin^{-1} x}{\sqrt{1-x^2}} + \frac{1}{2} \log|1 - x^2| + C$

2 x $\sin^{-1}$ x - $\frac{1}{4}$ log |1 - x^2| + C

c) x $\sin^{-1}$ x + $\frac{1}{2}$ log |1 - x^2| + C

d) $\frac{\sin^{-1} x}{\sqrt{1-x^2}} - \frac{1}{2} \log|1 - x^2| + C$

20. $\int e^x (\cot x - \text{cosec}^2 x)\, dx$ = ? **[1]**

a) e^x cosec^2x + C

b) e^x cot x + C

c) -e^x cot x + C

d) -e^x cosec^2x + C

21. $\int \frac{\cot x}{\log(\sin x)} dx = ?$ **[1]**

a) log |cot x cosec x| + C

b) log |cosec x| + C

c) log |cot x| + C

d) log |log sin x| + C

22. $\int \frac{dx}{(1-\cos x)} = ?$ **[1]**

a) $\log\left|\tan \frac{x}{2}\right| + C$

b) $-\cot \frac{x}{2} + C$

c) log |x – sin x| + C

d) $\frac{1}{(x-\sin x)} + c$

23. $\int (x2^x)\, dx$ = ? **[1]**

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

b) $\frac{2x \cdot 2^x}{(\log 2)} - \frac{x2^x}{(\log 2)^2}$ + C

c) $\frac{x \cdot 2^x}{(\log 2)} + \frac{2^x}{(\log 2)^2}$ + C

d) $\frac{2^x}{(\log 2)}$ (x + log 2) + C

24. $\int_0^\infty \log\left(x + \frac{1}{x}\right) \frac{1}{1+x^2} dx =$ **[1]**

a) $-\frac{\pi}{2} \ln 2$

b) $-\pi \ln 2$

c) $\pi \ln 2$

d) 0

25. $\int_{-1}^{-2} x^3 \left(1 - x^2\right) dx =$? **[1]**

a) $\frac{40}{3}$

b) $-\frac{27}{4}$

c) $\frac{5}{6}$

d) $-\frac{40}{3}$

26. $\int \frac{dx}{\sqrt{x(1-2x)}} = ?$ **[1]**

a) $\frac{1}{\sqrt{2}} \sin^{-1}(2x + 1) + C$

b) $\frac{1}{\sqrt{2}} \sin^{-1}(2x - 1) + C$

c) $\frac{1}{\sqrt{2}} \sin^{-1}(4x - 1) + C$

d) $\frac{1}{\sqrt{2}} \sin^{-1}(4x + 1) + C$

27. $\int \sqrt{\frac{x}{1-x}} dx$ is equal to **[1]**

a) $\sin^{-1} |\sqrt{x} - \sqrt{x(1-x)}| + c$

b) $\lim^{-1}(\sqrt{x(1-x)}) + C$

c) $\sin^{-1} \sqrt{x} - \sqrt{x(1-x)} + c$

d) $\sin^{-1} \sqrt{x} + c$

28. $\int \frac{2x \tan^{-1} x^2}{(1+x^4)} dx = ?$ **[1]**

a) 2 $\tan^{-1}$ x^2 + C

b) $\frac{1}{2}\left(\tan^{-1} x^2\right)^2 + C$

c) $(\tan^{-1}x^2)^2$ + C

d) 3 $\tan^{-1}$ x^2 + C

29. $\int \frac{x + \sin x}{1 + \cos x} dx$ is equal to **[1]**

a) x.tan $\frac{x}{2}$ + C

b) x - tan $\frac{x}{2}$ + C

c) log|1 + cos x| + C

d) log |x + sin x| + C

30. $\int \frac{dx}{(9+x^2)} = ?$ **[1]**

a) $3\tan^{-1}\frac{x}{3} + C$ b) $\frac{1}{3}\tan^{-1}\frac{x}{3} + C$

c) $\frac{1}{2}\tan^{-1}\frac{x}{4} + C$ d) $\tan^{-1}\frac{x}{3} + C$

31. $\int \sqrt{e^x - 1}dx = ?$ **[1]**

a) $2\sqrt{e^x - 1} - 2\tan^{-1}\sqrt{e^x - 1} + C$ b) $\frac{2}{3}(e^x - 1)^{3/2} + C$

c) $\frac{3}{2}(e^x + 1)^{3/2} + C$ d) $\frac{1}{2} \cdot \frac{e^x}{\sqrt{e^x - 1}} + C$

32. $\int_0^{\pi/2} \log(\sin x)\, dx$ **[1]**

a) $\pi\ log\ 2$ b) $\frac{\pi}{2}\ log\ 3$

c) $-\pi\ log\ 5$ d) $-\frac{\pi}{2}\log 2$

33. $\int \sin\sqrt{x}\ \text{dx} = ?$ **[1]**

a) $-2\sqrt{x}\cos\sqrt{x} + 2\sin\sqrt{x} + \text{C}$ b) $2\sqrt{x}\cos\sqrt{x} - 4\sin\sqrt{x} + \text{C}$

c) $-\sqrt{x}\cos\sqrt{x} - 2\sin\sqrt{x} - \text{C}$ d) $-\sqrt{x}\cos\sqrt{x} + \text{C}$

34. $\int_0^{\pi}(\sin 2x \cos 3x)dx = ?$ **[1]**

a) $-\frac{4}{5}$ b) $-\frac{12}{5}$

c) $\frac{4}{5}$ d) $\frac{5}{12}$

35. $\int 3^x dx = ?$ **[1]**

a) $3^x + \text{C}$ b) $\frac{3^x}{\log 3} + c$

c) $3^x (\log 3) + \text{C}$ d) $\frac{\log 3}{3^x} + C$

36. $\int \sqrt{4 - x^2}dx = ?$ **[1]**

a) $\frac{1}{4}x\sqrt{4 - x^2} - 4\sin^{-1}\frac{x}{4} + C$ b) $\frac{x}{2}\sqrt{4 - x^2} + 2\sin^{-1}\frac{x}{2} + C$

c) $x\sqrt{4 - x^2} + \sin^{-1}\frac{x}{2} + C$ d) $\frac{1}{2}x\sqrt{4 - x^2} - 2\sin^{-1}\frac{x}{2} + C$

37. $\int_0^{2\pi} |\sin x|dx = ?$ **[1]**

a) 3 b) 1

c) 4 d) 2

38. The value of $\int_{\frac{-\pi}{2}}^{\frac{\pi}{2}} \left(x^3 + x\cos x + \tan^5 x + 1\right) dx$ is **[1]**

a) 1 b) 0

c) 2 d) π

39. $\int \frac{3x^2}{(1+x^6)}dx = ?$ **[1]**

a) $\tan^{-1} x^3 + \text{C}$ b) $\cot^{-1} x^3 + \text{C}$

c) $\cos^{-1} x^3 + \text{C}$ d) $\sin^{-1} x^3 + \text{C}$

40. $\int \frac{dx}{e^x + e^{-x}}$ is equal to **[1]**

a) $\log(e^x + e^{-x}) + \text{C}$ b) $\log(e^x - e^{-x}) + \text{C}$

c) $\tan^{-1}(e^{-x}) + C$

d) $\tan^{-1}(e^{x}) + C$

41. $\int \frac{\cos x}{(1+\cos x)} dx = ?$ **[1]**

a) $-x - \tan\frac{x}{2} + C$

b) $x - \tan\frac{x}{2} + C$

c) $x + \tan\frac{x}{2} + C$

d) $-x + \tan\frac{x}{2} + C$

42. $\int \sin^3 x \, dx = ?$ **[1]**

a) $\frac{3}{4}\cos x + \frac{\cos 3x}{12} + C$

b) $-\frac{3}{4}\cos x - \frac{\cos 3x}{12} + C$

c) $\frac{1}{4}\cos x - \frac{\cos 2x}{12} + C$

d) $-\frac{3}{4}\cos x + \frac{\cos 3x}{12} + C$

43. $\int \frac{x^2}{\sqrt{x^6-1}} dx = ?$ **[1]**

a) $\frac{1}{2}\log\left|x^3 + \sqrt{x^6-1}\right| + C$

b) $\frac{1}{2}\log\left|x^3 + \sqrt{x^6-1}\right| + C$

c) $\frac{1}{3}\log\left|x^3 - \sqrt{x^6-1}\right| + C$

d) $\frac{1}{3}\log\left|x^3 + \sqrt{x^6-1}\right| + C$

44. $\int_2^{\pi/2} \frac{1}{2+\cos x} dx$ equals **[1]**

a) $2\sqrt{3}\tan^{-1}\sqrt{3}$

b) $\sqrt{3}\tan^{-1}(\sqrt{3})$

c) $\frac{1}{3}\tan^{-1}\left(\frac{1}{\sqrt{3}}\right)$

d) $\frac{2}{\sqrt{3}}\tan^{-1}\left(\frac{1}{\sqrt{3}}\right)$

45. $\int_0^{\pi} |\cos x| dx = ?$ **[1]**

a) $\frac{3}{2}$

b) 0

c) 2

d) 1

46. $\int \frac{dx}{\sqrt{4-9x^2}} = ?$ **[1]**

a) $\frac{1}{3}\sin^{-1}\left(\frac{4x}{3}\right) + c$

b) $\frac{2}{3}\sin^{-1}\left(\frac{2x}{3}\right) + c$

c) $\frac{1}{3}\sin^{-1}\frac{x}{3} + c$

d) $\frac{1}{3}\sin^{-1}\left(\frac{3x}{2}\right) + C$

47. $\int \tan^{-1}\sqrt{\frac{1-x}{1+x}}$ dx = ? **[1]**

a) $\frac{1}{2}$ x $(3\cos^{-1}x) - \frac{1}{2}\sqrt{1-x^2} + C$

b) $\frac{1}{2}$ x $(\cos^{-1}x) + \frac{1}{2}\sqrt{1-x^2} + C$

c) $\frac{1}{2}$ x $(\sin^{-1}x) + \frac{1}{2}\sqrt{1-x^2} + C$

d) $\frac{1}{2}$ x $(\cos^{-1}x) - \frac{1}{2}\sqrt{1-x^2} + C$

48. $\int \frac{dx}{(e^x+e^{-x})} = ?$ **[1]**

a) $-\tan^{-1}(e^{-x}) + C$

b) $\tan^{-1}(e^{-x}) + C$

c) $\tan^{-1}(e^{x}) + C$

d) $2\tan^{-1}(e^{-x}) + C$

49. $\int \frac{1}{(2-3x)^4}$ dx = ? **[1]**

a) $\frac{1}{15(2-3x)^5} + C$

b) $\frac{1}{9(2-3x)^3} + C$

c) $\frac{1}{-12(2-3x)^3} + C$

d) $\frac{1}{20(3-2x)^5} + C$

50. $\int \frac{\cos 2x}{\cos^2 x \sin^2 x} dx = ?$ **[1]**

a) - cot x + tan x + C

b) cot x - tan x + C

c) - cot x – tan x + C

d) cot x + tan x + C

51. $\int \tan^{-1}\{\sqrt{\frac{1-\cos 2x}{1+\cos 2x}}\} dx = ?$ **[1]**

a) $2\ x^2+C$

b) $\frac{2}{(1+x^2)}+C$

c) $\frac{x^2}{2}+C$

d) $3\ x^2+C$

52. $\int_{\frac{1}{\pi}}^{\frac{2}{\pi}} \frac{\sin(\frac{1}{x})}{x^2}dx = ?$ **[1]**

a) $\frac{3}{4}$

b) 1

c) $\frac{3}{2}$

d) $\frac{1}{2}$

53. $\int e^x (\tan x + \log \sec x)\ dx = ?$ **[1]**

a) $e^x(\log \cos x) + C$

b) $e^x \tan x + C$

c) $e^x \log \sec x + C$

d) $e^x \log \tan x + C$

54. $\int |x|^3 dx$ is equal to **[1]**

a) $\sin \sqrt{x} + C$

b) $\frac{-x^4}{4}+C$

c) none of these

d) $\frac{|x|^4}{4}+c$

55. $\int_{-1}^{1} |2x-1|\,dx$ is equal to **[1]**

a) $\frac{-1}{2}$

b) – 2

c) $\frac{1}{2}$

d) $\frac{5}{2}$

56. $\int_0^{\frac{\pi}{6}} \sec^2(x - \frac{\pi}{6})\ dx$ is equal to: **[1]**

a) $\sqrt{3}$

b) $-\sqrt{3}$

c) $\frac{1}{\sqrt{3}}$

d) $-\frac{1}{\sqrt{3}}$

57. $\int \frac{\sin x}{\sin(x-\alpha)}dx = ?$ **[1]**

a) $x\sin\alpha - (\sin\alpha)\log|\sin(x-\alpha)| + C$

b) $x\cos\alpha - (\sin\alpha)\log|\sin(x-\alpha)| + C$

c) $x\sin\alpha + (\sin\alpha)\log|\sin(x-\alpha)| + C$

d) $x\cos\alpha + (\sin\alpha)\log|\sin(x-\alpha)| + C$

58. $\int_{a+c}^{b+c} f(x)dx$ is equal to **[1]**

a) $\int_a^b f(x)dx$

b) $\int_{a-c}^{b-c} f(x)dx$

c) $\int_a^b f(x-c)dx$

d) $\int_a^b f(x+c)dx$

59. $\int e^x \left(\frac{1+\sin x}{1+\cos x}\right)$ dx = ? **[1]**

a) $e^x \cot \frac{x}{2} + C$

b) $e^x \sin \frac{x}{2} + C$

c) $e^x \cos \frac{x}{2} + C$

d) $e^x \tan \frac{x}{2} + C$

60. $\int_{\pi/6}^{\pi/3} \frac{1}{\sin 2x}dx$ is equal to **[1]**

a) $\log_e \sqrt{3}$

b) $\log_e 3$

c) $\frac{1}{2}\log(-1)$

d) log (-1)

61. $\int_0^{\frac{\pi}{2}} \frac{1}{1+\sqrt{\cot x}}dx$ is equal to **[1]**

a) $\frac{\pi}{4}$

b) $-\pi$

c) π

d) $\frac{3\pi}{4}$

62. $\int \frac{\csc^2 x}{(1-\cot^2 x)} dx = ?$ **[1]**

a) $\frac{1}{2}\log\left|\frac{1-\cot x}{1+\cot x}\right| + C$

b) $-\frac{1}{2}\log\left|\frac{1+\cot x}{1-\cot x}\right| + C$

c) $-\frac{1}{2}\log\left|\frac{1-\cot x}{1+\cot x}\right| + C$

d) $\frac{1}{2}\log\left|\frac{1+\cot x}{1-\cot x}\right| + C$

63. $\int e^x \left(\frac{1}{x^2} - \frac{2}{x^3}\right)$ dx = ? **[1]**

a) $2e^x \left(\frac{-1}{x} + \frac{1}{x^2}\right)$ + C

b) $\frac{e^x}{x^2}$ + C

c) $\frac{-e^x}{x^2}$ + C

d) $e^x \left(\frac{-1}{x} + \frac{1}{x^2}\right)$ + C

64. $\int e^x$ (tan x - log cos x) dx = ? **[1]**

a) e^x log sec x + C

b) e^x tan x + C

c) e^x log cot x + C

d) e^x log cos x + C

65. $\int \frac{x^9}{(4x^2+1)^6} dx$ is equal to **[1]**

a) $\frac{1}{5x}\left(4 + \frac{1}{x^2}\right)^{-5} + C$

b) $\frac{1}{10x}(1+4)^{-5} + C$

c) $\frac{1}{10}\left(\frac{1}{x^2} + 4\right)^{-5} + C$

d) $\frac{1}{5}\left(4 + \frac{1}{x^2}\right)^{-5} + C$

66. $\int_1^2 \left|x^2 - 3x + 2\right| dx =$? **[1]**

a) $\frac{1}{6}$

b) $\frac{2}{3}$

c) $\frac{1}{3}$

d) $\frac{-1}{6}$

67. $\int$ (log x)^2 dx = ? **[1]**

a) x (log x)^2 - 2x log x + 2x + C

b) x (log x)^2 + 2x log x - 2x + C

c) $\frac{1}{3}$ (log x)^3 + C

d) $\frac{2\log x}{x}$ + C

68. $\int \frac{1}{x\sqrt{x^4-1}} dx = ?$ **[1]**

a) cosec^{-1} x^2 + C

b) $\frac{1}{2}\sec^{-1} x^2 + C$

c) sec^{-1} x^2 + C

d) 2cosec^{-1} x^2 + C

69. $\int \frac{dx}{\sqrt{x^2-16}} = ?$ **[1]**

a) $\log|x + \sqrt{x^2-16}| + C$

b) $2\sin^{-1}\left(\frac{x}{2}\right) + C$

c) $\log|x - \sqrt{x^2-16}| + C$

d) $\sin^{-1}\left(\frac{x}{4}\right) + C$

70. If $\int \frac{dx}{(x+2)(x^2+1)}$ = a log |1 + x^2| + b tan^{-1} x + $\frac{1}{5}$ log |x + 2| + C, then **[1]**

a) a = $\frac{1}{10}$, b = $\frac{2}{5}$

b) a = $\frac{1}{10}$, b = -$\frac{2}{5}$

c) a = $\frac{-1}{10}$, b = $\frac{2}{5}$

d) a = $\frac{-1}{10}$, b = $\frac{-2}{5}$

71. $\int \sqrt{1-9x^2} dx = ?$ **[1]**

a) $\frac{3x}{2}\sqrt{1-9x^2} + \frac{1}{6}\sin^{-1} 3x + C$

b) $\frac{x}{2}\sqrt{1-9x^2} + \frac{1}{6}\sin^{-1} 3x + C$

c) $\frac{x}{2}\sqrt{1-9x^2}+\frac{1}{18}\sin^{-1}3x+C$

d) $\frac{x}{2}\sqrt{1-9x^2}-\frac{1}{8}\sin^{-1}2x+C$

72. $\int \cot^2 x dx = ?$ **[1]**

a) -cot x + x + C

b) cot x - x + C

c) cot x + x + C

d) -cot x - x + C

73. $\int \frac{1}{(1+\cos x)} dx = ?$ **[1]**

a) cot x + cosec x + C

b) -cot x + cosec x + C

c) cot x - cosec x + C

d) - cot x - cosec x + C

74. $\int \frac{\log x}{x^2}$ dx = ? **[1]**

a) $-\frac{1}{x}$ (log x + 1) + C

b) $\frac{1}{x}$ (log x + 1) + C

c) $\frac{1}{x}$ (log x - 1) + C

d) $\frac{1}{2x}$ (log x - 1) + C

75. $\int_0^1 \frac{dx}{(e^x+e^{-x})} = ?$ **[1]**

a) $\tan^{-1} e - \frac{\pi}{4}$

b) $\left(1-\frac{\pi}{4}\right)$

c) $\tan^{-1} e + \frac{\pi}{4}$

d) $\tan^{-1} e$