

CHAPTER -7

INTEGRALS

ONE MARKS QUESTIONS:

1. Find: $\int \sin mx dx$ (U)
2. Find: $\int (1-x)\sqrt{x} dx$ (U)
3. Find the anti-derivative of $\frac{1}{x\sqrt{x^2-1}}$, $x > 1$ with respect to x (K)
4. Find: $\int e^x \left(\frac{x-1}{x^2} \right) dx$ (A)
5. Find: $\int \sec x (\sec x - \cot x) dx$ (U)
6. Find: $\int (2x - 3\cos x + e^x) dx$. (U)
7. Evaluate : $\int \tan^2 2x dx$ (U)
8. Find: $\int \sin(2+5x) dx$ (U)
9. Find: $\int \frac{1-x}{\sqrt{x}} dx$ (A)
10. Find: $\int \sin\left(\frac{x}{2}\right) \cos\left(\frac{x}{2}\right) dx$ (A)
11. Find: $\int e^x \sec x (1 + \tan x) dx$ (A)
12. Find: $\int (\sin x + \cos x) dx$ (U)
13. Find the anti derivative of $x^2 \left(1 - \frac{1}{x^2} \right)$ with respect to x. (A)
14. Write the antiderivative of e^{2x} with respect to x. (A)
15. Find an anti-derivative of 3^x with respect to x. (A)
16. Find an anti-derivative of $\log_e x$ with respect to x. (A)
17. Find the anti-derivative of $\sin 2x$ with respect to x (A)
18. Find the antiderivative of $\cos 3x$ with respect to x. (A)
19. Find the antiderivative of $(ax+b)^2$ with respect to x. (A)
20. Find the anti derivative of $\sin 2x - 4e^{3x}$ with respect to x. (A)

21. Find the anti derivative of $\left(\sqrt{x} + \frac{1}{\sqrt{x}}\right)$ with respect to x . (A)
22. Find: $\int \frac{dx}{x^2 - 16}$ (U)
23. Find: $\int xe^x dx$ (U)
24. Find: $\int (4e^{3x} + 1)dx$ (U)
25. Find: $\int (ax^2 + bx + c)dx$ (U)
26. Find: $\int (2x^2 + e^x)dx$ (U)
27. Find: $\int \frac{x^3 + 5x^2 - 4}{x^2} dx$ (U)
28. Find: $\int \frac{x^3 + 3x + 4}{\sqrt{x}} dx$ (U)
29. Find: $\int \frac{x^3 - x^2 + x - 1}{x - 1} dx$ (U)
30. Find: $\int \log x dx$ (A)
31. Find: $\int \sqrt{ax + b} dx$ (A)
32. Find: $\int e^{2x+3} dx$ (A)
33. Find $\int \sqrt{x}(3x^2 + 2x + 3)dx$ (U)
34. Find $\int (2x - 3\cos x + e^x)dx$ (U)
35. Find $\int (2x^2 - 3\sin x + 5\sqrt{x})dx$ (U)
36. Find $\int \sec x(\sec x + \tan x)dx$ (U)
37. Find $\int \frac{\sec^2 x}{\cos^2 x} dx$ (U)
38. Find: $\int \sin^{-1}(\cos x)dx$ (S)
39. Find $\int \sqrt{1 + \cos 2x} dx$ (A)
40. Find $\int \sqrt{1 - \cos 2x} dx$ (A)
41. Find $\int \sqrt{1 + \sin 2x} dx$ (A)

42. Evaluate: $\int_{-\pi/2}^{\pi/2} \sin^7 x dx$ (S)

43. Evaluate: $\int_0^{2x} \cos^5 x dx$ (S)

44. Evaluate: $\int_{-\pi/2}^{\pi/2} \sin^3 x dx$ (S)

45. Evaluate: $\int_a^b x dx$ (U)

46. Evaluate: $\int_0^5 (x+1) dx$ (U)

47. Evaluate: $\int_2^3 x^2 dx$ (U)

48. Evaluate: $\int_1^4 (x^2 - x) dx$ (U)

49. Evaluate: $\int_{-1}^1 e^x dx$ (U)

50. Evaluate: $\int_0^4 (x + e^{2x}) dx$ (U)

51. Evaluate: $\int_0^4 \frac{dx}{16 + x^2}$ (U)

52. Evaluate: $\int_1^{\sqrt{3}} \frac{dx}{1 + x^2}$ (A)

53. Evaluate: $\int_0^{\pi} (\sin^2 \frac{x}{2} - \cos^2 \frac{x}{2}) dx$ (S)

54. Evaluate: $\int_2^3 \frac{dx}{x^2 - 1}$ (U)

55. Evaluate: $\int_0^{\pi/4} \sin 2x dx$ (A)

56. Evaluate: $\int_0^{\pi/2} \cos 2x dx$ (A)

57. Evaluate: $\int_0^{\pi/4} \tan x dx$ (A)

58. Evaluate: $\int_0^1 \frac{dx}{\sqrt{1-x^2}}$ (U)

59. Evaluate: $\int (a^x e^x) dx$ (U)

60. Evaluate: $\int (e^{2 \log \sec x}) dx$ (U)

61. Evaluate; $\int (e^x - x^e + e^e) dx$ (U)

TWO MARKS QUESTIONS

1. Find $\int \frac{\sin^2 x}{1 + \cos x} dx$ (A)

2. Find $\int \frac{1}{\sin^2 x \cos^2 x} dx$ (A)

3. Find $\int \frac{\cos 2x - \sin 2\alpha}{\cos x - \sin \alpha} dx$ (A)

4. Find $\int 2x \sin(x^2 + 1) dx$ (A)

5. Find $\int \frac{\sin(\tan^{-1} x)}{1 + x^2} dx$ (A)

6. Find $\int \tan x dx$ (A)

7. Find $\int \cot x dx$ (A)

8. Find $\int \sec x dx$ (A)

9. Find $\int \operatorname{cosec} x dx$ (A)

10. Find : $\int \frac{10x^9 + 10^x \log_e 10}{x^{10} + 10^x} dx$ (A)

11. Find: $\int \frac{dx}{x^2 - 6x + 13}$ (A)

12. Find: $\int x^2 e^{x^3} dx$ (A)

13. Find $\int \frac{2 - 3 \sin x}{\cos^2 x} dx$ (A)

14. Find: $\int \frac{dx}{3x^2 + 13x - 10}$ (A)

15. Find $\int \frac{1 - \cos 2x}{1 + \cos 2x} dx$ (A)

16. Find $\int \frac{1 - \cos 2x}{1 + \cos 2x} dx$ (A)
17. Find $\int \frac{dx}{\sqrt{5x^2 - 2x}}$ (A)
18. Find $\int \tan^{-1} \left(\frac{\sin 2x}{1 + \cos 2x} \right) dx$ (A)
19. Find $\int \tan^{-1} \left(\frac{\sin 2x}{1 + \cos 2x} \right) dx$ (A)
20. Find: $\int \left(\sqrt{x} - \frac{1}{\sqrt{x}} \right)^2 dx$ (A)
21. Find $\int \frac{1 - \sin x}{\cos^2 x} dx$ (A)
22. Find $\int \frac{3 \cos x + 4}{\sin^2 x} dx$ (A)
23. Find $\int \frac{1}{1 - \cos x} dx$ (A)
24. Find $\int \frac{2x}{1 + x^2} dx$ (A)
25. Find $\int \frac{(\log x)^2}{x} dx$ (A)
26. Find $\int \sin x \sin(\cos x) dx$ (A)
27. Find $\int \sin(ax + b) \cos(ax + b) dx$ (A)
28. Find $\int (4x + 2) \sqrt{x^2 + x + 1} dx$ (A)
29. Find $\int \frac{x}{\sqrt{x+4}} dx$ (A)
30. Find $\int \frac{x^2}{(2 + 3x^3)^3} dx$ (A)
31. Find $\int \frac{dx}{x(\log x)^m}, x > 0, m \neq 1$ (A)
32. Find $\int \frac{x}{9 - 4x^2} dx$ (A)
33. Find $\int \frac{x}{e^{x^2}} dx$ (A)

34. Find $\int x\sqrt{1+2x^2} dx$ (A)
35. Find $\int \frac{e^{\tan^{-1} x}}{1+x^2} dx$ (A)
36. Find $\int \frac{e^{2x}-1}{e^{2x}+1} dx$ (A)
37. Find $\int \tan^2(2x-3) dx$ (A)
38. Find $\int \sec^2(7-4x) dx$ (A)
39. Find $\int \frac{\sin^{-1} x}{\sqrt{1-x^2}} dx$ (A)
40. Find $\int \frac{1}{\cos^2 x(1-\tan x)^2} dx$ (A)
41. Find $\int \frac{2\cos x - 3\sin x}{6\cos x + 4\sin x} dx$ (A)
42. Find $\int \frac{\cos \sqrt{x}}{\sqrt{x}} dx$ (A)
43. Find $\int \sqrt{\sin 2x} \cos 2x dx$ (A)
44. Find $\int \frac{\cos x}{\sqrt{1+\sin x}} dx$ (A)
45. Find $\int \cot x \log \sin x dx$ (A)
46. Find $\int \cos^2 x dx$ (A)
47. Find $\int \sin 2x \cos 3x dx$ (A)
48. Find $\int \sin^3 x dx$ (A)
49. Find $\int \log x dx$ (A)
50. Find $\int e^x (\sec x)(1+\tan x) dx$ (A)
51. Find $\int \frac{\cos 2x}{(\sin x + \cos x)^2} dx$ (A)
52. Find $\int \tan^{-1} x dx$ (A)
53. Find $\int \sin^3 x \cos^2 x dx$ (A)

54. Find $\int \frac{3x^2}{x^6 + 1} dx$ (A)

55. Find $\int \frac{1}{\sqrt{1 + 4x^2}} dx$ (A)

56. Find $\int \frac{1}{\sqrt{(2-x)^2 + 1}} dx$ (A)

57. Find $\int \frac{1}{\sqrt{9 - 25x^2}} dx$ (A)

58. Find $\int \frac{3x}{1 + 2x^4} dx$ (A)

59. Find $\int \frac{x^2}{1 - x^6} dx$ (A)

60. Find $\int \frac{x-1}{\sqrt{x^2 - 1}} dx$ (A)

61. Find $\int \frac{x^2}{\sqrt{x^6 + a^6}} dx$ (A)

62. Find $\int \frac{\sec^2 x}{\sqrt{\tan^2 x + 4}} dx$ (A)

63. Find $\int \frac{dx}{\sqrt{x^2 + 2x + 2}} dx$ (A)

64. Find $\int \frac{dx}{9x^2 + 6x + 5} dx$ (A)

65. Find $\int \frac{dx}{\sqrt{7 - 6x - x^2}} dx$ (A)

66. Find $\int \frac{dx}{\sqrt{(x-1)(x-2)}} dx$ (A)

67. Find $\int \frac{dx}{\sqrt{8 - 3x - x^2}} dx$ (A)

68. Find $\int \frac{dx}{x^2 + 2x + 2} dx$ (A)

69. Find $\int \frac{dx}{\sqrt{9x - 4x^2}} dx$ (A)

70. Find $\int x \sin x dx$ (A)

71. Find $\int x \sin 3x dx$ (A)
72. Find $\int x^2 e^x dx$ (A)
73. Find $\int x \log x dx$ (A)
74. Find $\int x \log 2x dx$ (A)
75. Find $\int x^2 \log x dx$ (A)
76. Find $\int x \sec^2 x dx$ (A)
77. Find $\int \sqrt{x^2 + 2x + 5} dx$ (A)
78. Find $\int \sqrt{3 - 2x - x^2} dx$. (A)
79. Find $\int \sqrt{4 - x^2} dx$ (A)
80. Find $\int \sqrt{1 - 4x^2} dx$ (A)
81. Find $\int \sqrt{x^2 + 4x + 6} dx$ (A)
82. Find $\int \sqrt{x^2 + 4x + 1} dx$ (A)
83. Find $\int \sqrt{1 - 4x - x^2} dx$ (A)
84. Find $\int \sqrt{1 + 3x - x^2} dx$ (A)
85. Find $\int \sqrt{x^2 + 3x} dx$ (A)
86. Find $\int \sqrt{1 + x^2} dx$ (A)
87. Find $\int \sqrt{7 - 8x + x^2} dx$ (A)
88. Find $\int \sqrt{1 + \frac{x^2}{9}} dx$ (A)
89. Evaluate $\int_1^2 (4x^3 - 5x^2 + 6x + 9) dx$ (A)
- 90 . Evaluate $\int_0^{\pi/4} \sin 2x dx$ (A)
91. Evaluate $\int_0^{\pi/2} \cos 2x dx$ (A)

92. Evaluate $\int_0^{\pi/2} \cos^2 x dx$ (A)

93. Evaluate $\int_2^3 \frac{x dx}{x^2 + 1}$ (A)

94. Evaluate $\int_0^1 x e^{x^2} dx$ (A)

95. Evaluate $\int_0^{2/3} \frac{dx}{4 + 9x^2}$ (A)

96. Evaluate $\int_2^3 \frac{x dx}{x^2 + 1}$ (A)

97. Evaluate $\int_{-\pi/4}^{\pi/4} \sin^2 x dx$ (A)

98. Evaluate $\int_{-1}^1 \sin^5 x \cos^4 x dx$ (A)

99. Evaluate $\int_{-\pi/2}^{\pi/2} \sin^7 x dx$ (A)

100. Evaluate $\int_0^{2\pi} \cos^5 x dx$ (A)

101. Evaluate $\int_{-\pi/2}^{\pi/2} (x^3 + x \cos x + \tan^5 x + 1) dx$ (A)

102. Find $\int \cos 6x \sqrt{1 + \sin 6x} dx$ (A)

THREE MARKS QUESTION

1. Find the antiderivative of $f(x) = 4x^3 - \frac{3}{x^4}$ such that $f(2) = 0$ (A)

2. Find the antiderivative of F of f defined by $f(x) = 4x^3 - 6$, where $F(0) = 3$ (A)

2. Find $\int \frac{dx}{x + x \log x}$ (A)

3. Find $\int \frac{\tan^4 \sqrt{x} \sec^2 \sqrt{x}}{\sqrt{x}} dx$ (A)

4. Find $\int \frac{\sin x}{\sin(x+a)} dx$ (A)

5. Find $\int \frac{1}{1 + \tan x} dx$ (A)

6. Find $\int \frac{e^{2x} - 1}{e^{2x} + 1} dx$ (A)

7. Find $\int \tan^2(2x - 3) dx$ (A)

8. Find $\int \frac{1}{\cos^2 x (1 - \tan x)^2} dx$ (A)

9. Find $\int \frac{1}{1 - \tan x} dx$ (A)

10. Find $\int \frac{1}{1 + \cot x} dx$ (A)

11. Find $\int \frac{(x+1)(x + \log x)^2}{x} dx$ (A)

12. Find $\int \frac{\sqrt{\tan x}}{\sin x \cos x} dx$ (A)

13. Find $\int \frac{x^3 \sin(\tan^{-1} x^4)}{1 + x^8} dx$ (A)

14. Find $\int \frac{(1 + \log x)^2}{x} dx$ (A)

15. Find $\int \sqrt{\sin 2x \cos 2x} dx$ (A)

16. Find $\int \frac{\sin x}{1 + \cos x} dx$ (A)

17. Find $\int \frac{\sin x}{(1 + \cos x)^2} dx$ (A)

18. Find $\int \frac{1}{1 + \cot x} dx$ (A)

19. Find $\int \frac{(\sin^2 x - \cos^2 x)}{\sin^2 x \cos^2 x} dx$ (A)

20. Find $\int \frac{\sin^3 x + \cos^3 x}{\sin^2 x \cos^2 x} dx$ (A)

21. Find $\int x\sqrt{x+2} dx$ (A)

22. Find $\int \frac{x+2}{2x^2 + 6x + 5} dx$ (A)

23. Find $\int \frac{x+3}{\sqrt{5-4x+x^2}} dx$ (A)

24. Find $\int \frac{dx}{\sqrt{(x-a)(x-b)}}$ (A)

25. Find $\int \frac{4x+1}{\sqrt{2x^2+x-3}} dx$ (A)

26. Find $\int \frac{x+2}{\sqrt{4x-x^2}} dx$ (A)

27. Find $\int \frac{x+2}{\sqrt{x^2+2x+3}} dx$ (A)

28. Find $\int \frac{x+3}{x^2-2x-5} dx$ (A)

29. Find $\int \frac{5x+3}{\sqrt{x^2+4x+10}} dx$ (A)

30. Find $\int \frac{dx}{(x+1)(x+2)}$ (U)

31. Find $\int \frac{x^2+1}{x^2-5x+6} dx$ (A)

32. Find $\int \frac{3x-2}{(x+1)^2(x+3)} dx$ (A)

33. Find $\int \frac{x^2}{(x^2+1)(x^2+4)} dx$ (A)

34. Find $\int \frac{(3\sin\phi-2)\cos\phi}{5-\cos^2\phi-4\sin\phi} d\phi$ (S)

35. Find $\int \frac{x^2+x+1}{(x+2)(x^2+1)} dx$ (A)

36. Find $\int \frac{x}{(x+1)(x+2)} dx$ (A)

37. Find $\int \frac{dx}{x^2-9}$ (A)

38. Find $\int \frac{3x-1}{(x-1)(x-2)(x-3)} dx$ (A)

39. Find $\int \frac{3x-1}{(x-1)(x-2)(x-3)} dx$ (A)

40. Find $\int \frac{2x}{x^2+3x+2} dx$ (A)

41. Find $\int \frac{1-x^2}{x(1-2x)} dx$ (A)

42. Find $\int \frac{x}{(x^2+1)(x-1)} dx$ (A)

43. Find $\int \frac{3x+5}{x^3-x^2-x+1} dx$ (A)

44. Find $\int \frac{2x-3}{(x^2-1)(2x+3)} dx$ (A)

45. Find $\int \frac{5x}{(x+1)(x^2-4)} dx$ (A)

46. Find $\int \frac{x^3+x+1}{x^2-1} dx$ (A)

47. Find $\int \frac{2}{(1-x)(1+x^2)} dx$ (A)

48. Find $\int \frac{3x-1}{(x+2)^2} dx$ (A)

49. Find $\int \frac{dx}{x^4-1}$ (S)

50. Find $\int \frac{1}{x(x^n+1)} dx$ (S)

51. Find $\int \frac{\cos x}{(1-\sin x)(2-\sin x)} dx$ (S)

52. Find $\int \frac{(x^2+1)(x^2+2)}{(x^2+3)(x^2+4)} dx$ (S)

53. Find $\int \frac{2x}{(x^2+1)(x^2+3)} dx$ (S)

54. Find $\int \frac{dx}{x(x^4-1)}$ (S)

55. Find $\int \frac{dx}{e^x-1}$ (A)

56. Find $\int \frac{xdx}{(x-1)(x-2)}$ (A)

57. Find $\int \frac{dx}{x(x^2+1)}$ (A)

58. Find $\int \frac{x \sin^{-1} x}{\sqrt{1-x^2}} dx$ (A)

59. Find $\int e^x \sin x dx$ (A)

60. Prove that $\int e^x [f(x) + f'(x)] dx = e^x + c$ (A)

61. Find $\int x \sin^{-1} x dx$ (A)

62. Find $\int x \tan^{-1} x dx$ (A)

63. Find $\int x \cos^{-1} x dx$ (A)

64. Find $\int x(\log x)^2 dx$ (A)

65. Find $\int (x^2 + 1) \log x dx$ (A)

66. Find $\int e^x (\sin x + \cos x) dx$ (A)

67. Find $\int e^x \left(\frac{1 + \sin x}{1 + \cos x} \right) dx$ (S)

68. Find $\int \frac{xe^x}{(1+x)^2} dx$ (S)

69. Find $\int e^x \left(\frac{1}{x} - \frac{1}{x^2} \right) dx$ (A)

70. Find $\int \frac{(x-3)e^x}{(x-1)^3} dx$ (S)

71. Find $\int e^{2x} \sin x dx$ (A)

72. Find $\int \sin^{-1} \left(\frac{2x}{1+x^2} \right) dx$ (A)

73. Find $\int e^x \sec x (1 + \tan x) dx$ (A)

74. Evaluate $\int_0^2 (x^2 + 1) dx$ as the limit of sum (S)

75. Evaluate $\int_a^b x dx$ as the limit of sum (S)

76. Evaluate $\int_0^5 (x+1) dx$ as the limit of sum (S)

77. Evaluate $\int_2^3 x^2 dx$ as the limit of sum (S)
78. Evaluate $\int_{-1}^1 e^x dx$ as the limit of sum (S)
79. Evaluate $\int_1^4 (x^2 - x) dx$ as the limit of sum (S)
80. Evaluate $\int_0^4 (x + e^{2x}) dx$ as the limit of sum (S)
81. Evaluate $\int_4^9 \frac{\sqrt{x}}{(30 - x^{3/2})^2} dx$ (A)
82. Evaluate $\int_1^2 \frac{xdx}{9(x+1)(x+2)}$ (A)
83. Evaluate $\int_0^{\pi/4} \sin^3 2t \cos 2t dt$ (A)
84. Evaluate $\int_0^1 \frac{2x+3}{5x^2+1} dx$ (A)
85. Evaluate $\int_1^2 \frac{5x^2}{x^2+4x+3} dx$ (A)
86. Evaluate $\int_0^{\pi/4} (2\sec^2 x + x^3 + 2) dx$ (A)
87. Evaluate $\int_0^2 \frac{6x+3}{x^2+4} dx$ (A)
88. Evaluate $\int_0^1 (xe^x + \sin \frac{\pi x}{4}) dx$ (A)
89. Evaluate $\int_{-1}^1 5x^4 \sqrt{x^5+1} dx$ (A)
90. Evaluate $\int_0^1 \frac{\tan^{-1} x}{1+x^2} dx$ (A)
91. Evaluate $\int_0^{\pi/2} \sqrt{\sin \phi} \cos^5 \phi d\phi$ (A)

92. Evaluate $\int_0^1 \sin^{-1}\left(\frac{2x}{1+x^2}\right) dx$ (A)

93. Evaluate $\int_0^2 x\sqrt{x+2} dx$ (A)

94. Evaluate $\int_0^{\pi/2} \frac{\sin x}{1+\cos^2 x} dx$ (A)

95. Evaluate $\int_0^2 \frac{dx}{x+4-x^2}$ (A)

96. Evaluate $\int_{-1}^1 \frac{dx}{x^2+2x+5}$ (A)

97. Evaluate $\int_0^2 \left(\frac{1}{x} - \frac{1}{2x^2}\right) e^{2x} dx$ (A)

98. Evaluate $\int_{1/3}^1 \frac{(x-x^3)^{1/3}}{x^4} dx$ (A)

99. If $f(x) = \int_0^x t \sin t dt$, then find the value of $f'(x)$ (A)

100. Prove that $\int_0^{2a} f(x) dx = \begin{cases} 2 \int_0^a f(x) dx & \text{if } f(2a-x) = f(x) \\ 0 & \text{if } f(2a-x) = -f(x) \end{cases}$ (A)

101. Prove that $\int_0^{2a} f(x) dx = \int_0^a f(x) dx + \int_0^a f(2a-x) dx$ (A)

102. Find $\int \frac{(x^4-x)^{1/4}}{x^5} dx$. (S)

103. Find $\int \frac{x^4 dx}{(x-1)(x^2+1)}$. (S)

104. Find $\int \left[\log(\log x) + \frac{1}{(\log x)^2} \right] dx$ (S)

105. Find $\int [\sqrt{\cot x} + \sqrt{\tan x}] dx$. (S)

106. Find $\int \frac{\sin 2x \cos 2x}{\sqrt{9-\cos^4(2x)}} dx$ (S)

107. Find $\int \frac{1}{x-x^3} dx$ (S)

108. Find $\int \frac{1}{\sqrt{x+a} + \sqrt{x+b}} dx$ (S)

109. Find $\int \frac{1}{x\sqrt{ax-x^2}} dx$ (S)

110. Find $\int \frac{1}{x^2(x^4+1)^{3/4}} dx$ (S)

111. Find $\int \frac{1}{x^{1/2} + x^{1/3}} dx$ (S)

112. Find $\int \frac{5x}{(x+1)(x^2+9)} dx$ (S)

113. Find $\int \frac{\sin x}{\sin(x-a)} dx$ (S)

114. Find $\int \frac{e^{5\log x} - e^{4\log x}}{e^{3\log x} - e^{2\log x}} dx$ (S)

115. Find $\int \frac{\sin^8 x - \cos^8 x}{1 - 2\sin^2 x \cos^2 x} dx$ (S)

116. Find $\int \frac{1}{\cos(x+a)\cos(x+b)} dx$ (S)

117. Find $\int \frac{x^3}{\sqrt{1-x^8}} dx$ (S)

118. Find $\int \frac{e^x}{(1+e^x)(2+e^x)} dx$ (S)

119. Find $\int \frac{1}{(x^2+1)(x^2+4)} dx$ (S)

120. Find $\int \cos^3 x e^{\log \sin x} dx$ (S)

121. Find $\int e^{3\log x} (x^4+1)^{-1} dx$ (S)

122. Find $\int f'(ax+b) [f(ax+b)]^n dx$ (A)

123. Find $\int \frac{1}{\sqrt{\sin^3 x \sin(x+\alpha)}} dx$ (A)

124. Find $\int \frac{\sin^{-1} \sqrt{x} - \cos^{-1} \sqrt{x}}{\sin^{-1} \sqrt{x} + \cos^{-1} \sqrt{x}} dx, x \in [0,1]$ (S)

125. Find $\int \sqrt{\frac{1-\sqrt{x}}{1+\sqrt{x}}} dx$ (S)

126. Find $\int \frac{2+\sin 2x}{1+\cos 2x} dx$ (S)

127. Find $\int \frac{x^2+x+1}{(x+1)^2(x+2)} dx$ (S)

128. Find $\int \tan^{-1} \sqrt{\frac{1-x}{1+x}} dx$ (S)

129. Find $\int \frac{\sqrt{x^2+1} [\log(x^2+1) - 2\log x]}{x^4} dx$ (S)

130. Find $\int_{\pi/2}^{\pi} e^x \left(\frac{1-\sin x}{1-\cos x} \right) dx$ (S)

131. Find $\int_0^{\pi/4} \frac{\sin x \cos x}{\cos^4 x + \sin^4 x} dx$ (S)

132. Find $\int_0^{\pi/2} \frac{\cos^2 x}{\cos^2 x + 4\sin^2 x} dx$ (S)

133. Find $\int_{\pi/6}^{\pi/3} \frac{\sin x + \cos x}{\sqrt{\sin 2x}} dx$ (S)

134. Find $\int_0^1 \frac{dx}{\sqrt{1+x} - \sqrt{x}}$ (S)

135. Find $\int_0^{\pi/4} \frac{\sin x + \cos x}{9+16\sin 2x} dx$ (S)

136. Find $\int_0^{\pi/2} \sin 2x \tan^{-1}(\sin x) dx$ (S)

137. Find $\int_1^4 [|x-1| + |x-2| + |x-3|] dx$ (S)

138. Prove that $\int_1^3 \frac{dx}{x^2(x+1)} = \frac{2}{3} + \log \frac{2}{3}$ (S)

139. Prove that $\int_0^1 xe^x dx = 1$ (S)

140. Prove that $\int_0^{\pi/4} 2 \tan^3 x dx = 1 - \log 2$ (S)

141. Prove that $\int_0^1 \sin^{-1} x dx = \frac{\pi}{2} - 1$ (S)

142. Evaluate $\int_0^1 e^{2-3x} dx$ as a limit of sum. (S)

143. Find $\int \frac{dx}{e^x + e^{-x}}$ (A)

144. Find $\int \frac{\cos 2x}{(\sin x + \cos x)^2} dx$ (A)

145. If $f(a+b-x)=f(x)$, then find $\int_b^a xf(x)dx$ (A)

146. Show that $\int_0^a f(x)g(x)dx = 2\int_0^a f(x)dx$, if f and g are defined as $f(x)=f(a-x)$ and $g(x)+g(a-x)=4$. (A)

147. Evaluate $\int_0^1 \tan^{-1}\left(\frac{2x-1}{1+x-x^2}\right)dx$ (S)

FIVE MARKS QUESTION

1. Find the integral of $\frac{1}{\sqrt{a^2-x^2}}$ with respect to x and evaluate $\int \frac{dx}{\sqrt{2x-x^2}}$ (A)

2. Find the integral of $\frac{1}{\sqrt{a^2-x^2}}$ with respect to x and evaluate $\int \frac{dx}{\sqrt{9-25x^2}}$ (A)

3. Find the integral of $\frac{1}{\sqrt{a^2-x^2}}$ with respect to x and evaluate $\int \frac{dx}{\sqrt{8+3x-x^2}}$ (A)

4. Find the integral of $\frac{1}{\sqrt{a^2-x^2}}$ with respect to x and evaluate $\int \frac{dx}{\sqrt{9x-4x^2}}$ (A)

5. Find the integral of $\frac{1}{\sqrt{a^2-x^2}}$ with respect to x and evaluate $\int \frac{dx}{\sqrt{7-6x-x^2}}$ (A)

6. Find the integral of $\frac{1}{x^2-a^2}$ with respect to x and evaluate $\int \frac{dx}{x^2-16}$ (A)

7. Find the integral of $\frac{1}{x^2 - a^2}$ with respect to x and evaluate $\int \frac{dx}{3x^2 + 13x - 10}$ (A)

8. Find the integral of $\frac{1}{x^2 - a^2}$ with respect to x and evaluate $\int \frac{dx}{x^2 - 16}$ (A)

9. Find the integral of $\frac{1}{a^2 - x^2}$ with respect to x and evaluate $\int \frac{x^2 dx}{1 - x^6}$ (A)

10. Find the integral of $\frac{1}{a^2 - x^2}$ with respect to x and evaluate $\int \frac{\sin x dx}{1 - 4 \cos^2 x}$ (A)

11. Find the integral of $\frac{1}{x^2 + a^2}$ with respect to x and evaluate $\int \frac{dx}{x^2 - 6x + 13}$ (A)

12. Find the integral of $\frac{1}{x^2 + a^2}$ with respect to x and evaluate $\int \frac{dx}{x^2 + 16}$ (A)

13. Find the integral of $\frac{1}{x^2 + a^2}$ with respect to x and evaluate $\int \frac{dx}{9x^2 + 4}$ (A)

14. Find the integral of $\frac{1}{x^2 + a^2}$ with respect to x and evaluate $\int \frac{dx}{2x^2 + 50}$ (A)

15. Find the integral of $\frac{1}{x^2 + a^2}$ with respect to x and evaluate $\int \frac{3x^2 dx}{x^6 + 1}$ (A)

16. Find the integral of $\frac{1}{x^2 + a^2}$ with respect to x and evaluate $\int \frac{dx}{x^2 + 2x + 2}$ (A)

17. Find the integral of $\frac{1}{x^2 + a^2}$ with respect to x and evaluate $\int \frac{dx}{9x^2 + 6x + 5}$ (A)

18. Find the integral of $\frac{1}{x^2 + a^2}$ with respect to x and evaluate $\int \frac{3x dx}{1 + 2x^4}$ (A)

19. Find the integral of $\frac{1}{x^2 + a^2}$ with respect to x and evaluate $\int \frac{\sin x dx}{1 + \cos^2 x}$ (A)

20. Find the integral of $\frac{1}{x^2 + a^2}$ with respect to x and evaluate $\int \frac{\cos x dx}{1 + \sin^2 x}$ (A)

21. Find the integral of $\frac{1}{x^2 + a^2}$ with respect to x and evaluate $\int \frac{dx}{a^2 \cos^2 x + b^2 \sin^2 x}$ (A)

22. Find the integral of $\frac{1}{\sqrt{x^2 - a^2}}$ with respect to x and evaluate $\int \frac{dx}{\sqrt{(x-1)(x-2)}}$ (A)

23. Find the integral of $\frac{1}{\sqrt{x^2 - a^2}}$ with respect to x and evaluate $\int \frac{dx}{\sqrt{(x-a)(x-b)}}$ (A)

24. Find the integral of $\frac{1}{\sqrt{x^2 - a^2}}$ with respect to x and evaluate $\int \frac{dx}{\sqrt{5x^2 - 2x}}$ (A)
25. Find the integral of $\frac{1}{\sqrt{x^2 + a^2}}$ with respect to x and evaluate $\int \frac{dx}{\sqrt{1 + 4x^2}}$ (A)
26. Find the integral of $\frac{1}{\sqrt{x^2 - a^2}}$ with respect to x and evaluate $\int \frac{x^6 dx}{\sqrt{x^6 + a^6}}$ (A)
27. Find the integral of $\frac{1}{\sqrt{x^2 - a^2}}$ with respect to x and evaluate $\int \frac{\sec^2 x dx}{\sqrt{\tan^2 x + 4}}$ (A)
28. Find the integral of $\frac{1}{\sqrt{x^2 - a^2}}$ with respect to x and evaluate $\int \frac{dx}{\sqrt{(2-x)^2 + 1}}$ (A)
29. Find the integral of $\frac{1}{\sqrt{x^2 - a^2}}$ with respect to x and evaluate $\int \frac{dx}{\sqrt{x^2 + 2x + 2}}$ (A)
30. Find the integral of $\sqrt{x^2 - a^2}$ with respect to x and evaluate $\int \sqrt{x^2 + 4x + 1} dx$ (A)
31. Find the integral of $\sqrt{x^2 - a^2}$ with respect to x and evaluate $\int \sqrt{x^2 + 3x} dx$ (A)
32. Find the integral of $\sqrt{x^2 - a^2}$ with respect to x and evaluate $\int \sqrt{x^2 - 8x + 7} dx$ (A)
33. Find the integral of $\sqrt{x^2 + a^2}$ with respect to x and evaluate $\int \sqrt{x^2 + 4x + 6} dx$ (A)
34. Find the integral of $\sqrt{x^2 + a^2}$ with respect to x and evaluate $\int \sqrt{x^2 + 2x + 5} dx$ (A)
35. Find the integral of $\sqrt{x^2 + a^2}$ with respect to x and evaluate $\int \sqrt{1 + \frac{x^2}{9}} dx$ (A)
36. Find the integral of $\sqrt{a^2 - x^2}$ with respect to x and evaluate $\int \sqrt{4 - x^2} dx$ (A)
37. Find the integral of $\sqrt{a^2 - x^2}$ with respect to x and evaluate $\int \sqrt{3 - 2x - x^2} dx$ (A)
38. Find the integral of $\sqrt{a^2 - x^2}$ with respect to x and evaluate $\int \sqrt{1 - 4x - x^2} dx$ (A)
39. Find the integral of $\sqrt{a^2 - x^2}$ with respect to x and evaluate $\int \sqrt{1 + 3x - x^2} dx$ (A)
40. Find the integral of $\sqrt{a^2 - x^2}$ with respect to x and evaluate $\int \sqrt{1 - 4x^2} dx$ (A)
41. Find the integral of $x\sqrt{1 + x - x^2}$ with respect to x. (A)
42. Find the integral of $x\sqrt{x + x^2}$ with respect to x. (A)

43. Find the integral of $(x+1)\sqrt{2x^2+3}$ with respect to x . (A)

44. Find the integral of $(x+3)\sqrt{3-4x-x^2}$ with respect to x . (A)

SIX MARKS QUESTION

1. Prove that $\int_0^a f(x)dx = \int_0^a f(a-x)dx$ and hence evaluate $\int_0^{\pi/4} \log(1+\tan x)dx$ (A)

2. Prove that $\int_0^a f(x)dx = \int_0^a f(a-x)dx$ and hence evaluate $\int_0^{\pi/2} \frac{\sqrt{\sin x}}{\sqrt{\sin x} + \sqrt{\cos x}} dx$ (A)

3. Prove that $\int_0^a f(x)dx = \int_0^a f(a-x)dx$ and hence evaluate $\int_0^{\pi/2} \frac{\sin^{3/2} x}{\sin^{3/2} x + \cos^{3/2} x} dx$ (A)

4. Prove that $\int_0^a f(x)dx = \int_0^a f(a-x)dx$ and hence evaluate $\int_0^{\pi/2} \frac{\cos^5 x}{\sin^5 x + \cos^5 x} dx$ (A)

5. Prove that $\int_0^a f(x)dx = \int_0^a f(a-x)dx$ and hence evaluate $\int_0^{\pi/2} \frac{\sin^4 x}{\sin^4 x + \cos^4 x} dx$ (A)

6. Prove that $\int_0^a f(x)dx = \int_0^a f(a-x)dx$ and hence evaluate $\int_0^a \frac{\sqrt{x}}{\sqrt{x} + \sqrt{a-x}} dx$ (A)

7. Prove that $\int_0^a f(x)dx = \int_0^a f(a-x)dx$ and hence evaluate $\int_0^{\pi/2} \frac{\sin x - \cos x}{1 + \sin x \cos x} dx$ (A)

8. Prove that $\int_0^a f(x)dx = \int_0^a f(a-x)dx$ and hence evaluate $\int_0^{\pi} \frac{x \sin x}{1 + \cos^2 x} dx$ (A)

9. Prove that $\int_0^a f(x)dx = \int_0^a f(a-x)dx$ and hence evaluate $\int_0^{\pi} \frac{x}{1 + \sin x} dx$ (A)

10. Prove that $\int_0^a f(x)dx = \int_0^a f(a-x)dx$ and hence evaluate $\int_0^{\pi/4} \log(1+\tan x)dx$ (A)

11. Prove that $\int_0^a f(x)dx = \int_0^a f(a-x)dx$ and hence evaluate $\int_0^{\pi/2} \log\left(\frac{4+3\sin x}{4+3\cos x}\right) dx$ (A)

12. Prove that $\int_0^a f(x)dx = \int_0^a f(a-x)dx$ and hence evaluate $\int_0^{\pi/2} \log \sin x dx$ (A)

13. Prove that $\int_0^a f(x)dx = \int_0^a f(a-x)dx$ and hence evaluate $\int_0^{\pi} \log(1+\cos x)dx$ (A)

14. Prove that $\int_0^a f(x)dx = \int_0^a f(a-x)dx$ and hence evaluate $\int_0^{\pi/2} (2 \log \sin x - \log \sin 2x)dx$ (A)

15. Prove that $\int_0^a f(x)dx = \int_0^a f(a-x)dx$ and hence evaluate $\int_0^{\pi} \frac{x \tan x}{\sec x + \tan x} dx$ (A)

16. Prove that $\int_0^a f(x)dx = \int_0^a f(a-x)dx$ and hence evaluate $\int_0^{\pi} \frac{x}{a^2 \cos^2 x + b^2 \sin^2 x} dx$ (A)

17. Prove that $\int_a^b f(x)dx = \int_a^b f(a+b-x)dx$ and evaluate $\int_{\pi/6}^{\pi/3} \frac{dx}{1 + \sqrt{\tan x}}$. (A)

18. Prove that $\int_{-a}^a f(x)dx = \begin{cases} 2 \int_0^a f(x)dx & \text{if } f(x) \text{ is even} \\ 0 & \text{if } f(x) \text{ is odd} \end{cases}$ hence evaluate $\int_{-\pi/2}^{\pi/2} \sin^7 x dx$. (A)

19. Prove that $\int_{-a}^a f(x)dx = \begin{cases} 2 \int_0^a f(x)dx & \text{if } f(x) \text{ is even} \\ 0 & \text{if } f(x) \text{ is odd} \end{cases}$ hence evaluate $\int_{-\pi/4}^{\pi/4} \sin^2 x dx$ (A)

20. Prove that $\int_{-a}^a f(x)dx = \begin{cases} 2 \int_0^a f(x)dx & \text{if } f(x) \text{ is even} \\ 0 & \text{if } f(x) \text{ is odd} \end{cases}$ hence evaluate $\int_{-1}^1 x^{17} \cos^4 x dx$. (A)

21. Prove that $\int_{-a}^a f(x)dx = \begin{cases} 2 \int_0^a f(x)dx & \text{if } f(x) \text{ is even} \\ 0 & \text{if } f(x) \text{ is odd} \end{cases}$ hence evaluate $\int_{-1}^1 \sin^5 x \cos^4 x dx$. (A)

22. Prove that $\int_{-a}^a f(x)dx = \begin{cases} 2 \int_0^a f(x)dx & \text{if } f(x) \text{ is even} \\ 0 & \text{if } f(x) \text{ is odd} \end{cases}$ hence evaluate

$$\int_{-\pi/2}^{\pi/2} (x^3 + x \cos x + \tan^5 x) dx.$$

(A)

23. Prove that $\int_{-a}^a f(x)dx = \begin{cases} 2 \int_0^a f(x)dx & \text{if } f(x) \text{ is even} \\ 0 & \text{if } f(x) \text{ is odd} \end{cases}$ hence evaluate $\int_{-\pi/2}^{\pi/2} \sin^2 x dx$. (A)

24. Prove that $\int_b^a f(x)dx = \int_a^c f(x)dx + \int_c^b f(x)dx$ hence evaluate $\int_{-1}^2 |x^3 - x| dx$. (A)

25. Prove that $\int_b^a f(x)dx = \int_a^c f(x)dx + \int_c^b f(x)dx$ hence evaluate $\int_{-5}^5 |x + 2| dx$. (A)

26. Prove that $\int_b^a f(x)dx = \int_a^c f(x)dx + \int_c^b f(x)dx$ hence evaluate $\int_2^8 |x-5|dx$. (A)

27. Prove that $\int_b^a f(x)dx = \int_a^c f(x)dx + \int_c^b f(x)dx$ hence evaluate $\int_0^4 |x-1|dx$ (A)

28. Prove that $\int_b^a f(x)dx = \int_a^c f(x)dx + \int_c^b f(x)dx$ hence evaluate $\int_{-1}^{3/2} |x \sin(\pi x)|dx$ (S)

29. Prove that $\int_0^{2a} f(x)dx = \begin{cases} 2 \int_0^a f(x)dx & \text{if } f(2a-x)=f(x) \\ 0 & \text{if } f(2a-x)=-f(x) \end{cases}$ hence evaluate $\int_0^{\pi} \frac{x}{a^2 \cos^2 x + b^2 \sin^2 x} dx$ (A)

30. Prove that $\int_0^{2a} f(x)dx = \begin{cases} 2 \int_0^a f(x)dx & \text{if } f(2a-x)=f(x) \\ 0 & \text{if } f(2a-x)=-f(x) \end{cases}$ hence evaluate $\int_0^{\pi} \frac{x \tan x}{\sec x + \tan x} dx$. (A)

31. Prove that $\int_0^{2a} f(x)dx = \begin{cases} 2 \int_0^a f(x)dx & \text{if } f(2a-x)=f(x) \\ 0 & \text{if } f(2a-x)=-f(x) \end{cases}$ hence evaluate $\int_0^{\pi} \log(1+\cos x)dx$. (A)
