

Integral Calculus

Question Bank

Engineering Mathematics-II (B.tech)

1. Evaluate : $\int_0^1 \frac{x}{\sqrt{\log \frac{1}{x}}} dx$ [B.tech.(Old) Nov/Dec 2009]

2. Evaluate : $\int_0^{\infty} \frac{x^4(1+x^5)}{(1+x)^{15}} dx$ [B.tech.(Old) Nov/Dec 2009]

3. Given: $\Gamma(1.8) = 0.9314$, find the value of $\Gamma(-2.2)$ [B.tech. May/June 2010]

4. Evaluate: $\int_0^2 x(8-x^3)^{\frac{1}{3}} dx$ [B.tech. May/June 2010]

5. Evaluate: $\int_0^{\pi} \frac{\sin^4 \theta}{(1+\cos \theta)^2} d\theta$ [B.tech. Nov/Dec 2008]

6. Evaluate: $\int_0^1 \frac{x^{-1/2}}{\sqrt{\log \frac{1}{x}}} dx$ [B.tech. Nov/Dec 2008]

7. Evaluate: $\int_0^1 x^3 \sqrt{\frac{1+x^2}{1-x^2}} dx$ [B.tech. Nov/Dec 2008]

8. Prove that: $\frac{\Gamma(m+\frac{1}{2})}{2^{2m-1}} = \sqrt{\pi} \Gamma(2m)$ [B.tech. May/June 2009]

$$\Gamma(m) \Gamma(m) = \Gamma(2m)$$

9. Prove that: $\int_0^{\infty} \frac{dx}{(e^x + e^{-x})^n} = \frac{1}{4} \beta\left(\frac{n}{2}, \frac{n}{2}\right)$ [B.tech. May/June 2009]

10. Prove that : $\int_a^b (x-a)^m (b-x)^n dx = (b-a)^{m+n+1} \beta(m+1, n+1)$

11. Evaluate: $\int_0^{\infty} \sqrt{x} e^{-x^2} dx$ [B.tech. Nov/Dec 2010]

12. Evaluate: $\int_0^2 y^4 (8-y^3)^{1/3} dy$ [B.tech. Nov/Dec 2010]

13. Evaluate: $\int_0^1 (\text{Log}x)^n dx$ [B.tech. Nov/Dec 2012]

14. Evaluate: $\int_0^{\infty} \frac{x^{10}}{10^x} dx$ [B.tech. Nov/Dec 2012]

15. Find the value of : $\int_0^{\pi/2} \frac{dx}{\sqrt{\sin x}} \times \int_0^{\pi/2} \sqrt{\sin x} dx$ [B.tech. Nov/Dec 2012]

16. Prove that : $\int_0^{\infty} \sqrt{y} e^{-y^2} dy \times \int_0^{\infty} \frac{1}{\sqrt{y}} e^{-y^2} dy = \frac{\pi}{2\sqrt{2}}$ [B.tech.(Old) Nov/Dec 2012]

17. Prove that : $\int_0^{\infty} \frac{dx}{(e^x + e^{-x})^n} = \frac{1}{4} \beta\left(\frac{n}{2}, \frac{n}{2}\right)$ [B.tech.(Old) Nov/Dec 2012]

18. Evaluate: $\int_0^{\infty} x^{1/4} e^{-\sqrt{x}} dx$ [B.tech. Nov/Dec 2009]

19. Evaluate: $\int_0^3 \frac{x^3}{\sqrt{1-x}} dx$ [B.tech. Nov/Dec 2009]

20. Prove that : $\int_0^{\infty} \frac{x^{m-1}}{(a+bx)^{m+n}} dx = \frac{1}{a^n b^m} \beta(m, n)$ [B.tech.(Old) May/June 2009]

21. Show that :
$$\frac{\Gamma\left(\frac{m+1}{2}\right) \Gamma\left(\frac{n+1}{2}\right)}{\Gamma\left(\frac{m+n}{2}\right) + 1}$$
 [B.tech.(Old) May/June 2009]

$$\int_0^{\pi/2} \sin^m \theta \cos^n \theta d\theta = \frac{1}{2} \frac{\Gamma\left(\frac{m}{2}\right) \Gamma\left(\frac{n}{2}\right)}{\Gamma\left(\frac{m+n}{2}\right)}$$

22. If $\beta(n, 3) = \frac{1}{3}$ n is a positive integer, find n.

23. Evaluate: $x^3 \log \left(\int_0^1 \frac{1}{x} dx \right)^4$
24. Evaluate: $\int_0^{\pi} x \sin^7 x \cos^4 x dx$
25. Define Gamma function and evaluate: $\int_0^{\infty} e^{-2x} x^3 dx$ [F.E. May/June 2012]
26. Evaluate: $\int_0^{\infty} \frac{x^4}{4^x} dx$ [F.E. May/June 2012]
27. Evaluate: $\int_0^{\infty} \frac{x^2}{(1+x^6)^{7/2}} dx$ [F.E. May/June 2012]
28. Evaluate: $\int_0^1 x^{n-1} \left(\log \frac{1}{x} \right)^{n-1} dx$ [F.E. May/June 2012]
29. Evaluate: $\int_0^{\pi/2} \sin^{-1/2} \theta \cos^{1/2} \theta d\theta$ [F.E. May/June 2012]
30. Evaluate: $\int_0^1 \frac{dx}{(1-x^9)^{1/2}}$ [F.E. May/June 2012]
31. Evaluate: $\int_0^1 (x \text{Log} x)^4 dx$ [F.E. May/June 2009]
32. Evaluate: $\int_0^{\infty} \frac{dx}{1+x^4}$ [F.E. May/June 2009]
33. Prove that: $\beta(m, n) = \beta(m+1, n) + \beta(m, n+1)$ [F.E. May/June 2009]
34. Evaluate: $\int_0^1 x^3 (1-x)^4 dx$ [F.E. Nov/Dec 2012]
35. Solve: $\int_0^{\pi} \sin^3 \theta \cos^5 \theta d\theta$ [F.E. Nov/Dec 2012]
36. Evaluate: $\int_0^{\pi/2} \theta \sin^3 \theta \cos^5 \theta d\theta$ [F.E. Nov/Dec 2012]

37. Evaluate: $\int_0^1 \sqrt{1-x^4} dx$ [F.E. Nov/Dec 2012]
38. Evaluate: $\int_0^{\infty} \frac{x^a}{a^x} dx$ [F.E. (Old)Nov/Dec 2012]
39. Show that: $\int_0^1 \frac{x^7}{\sqrt{1-x^4}} dx = \frac{1}{3}$ [F.E. (Old)Nov/Dec 2012]
40. Prove that: $\int_0^1 \frac{x^{m-1} + x^{n-1}}{(1+x)^{m+n}} dx = \beta(m, n)$ [F.E. (Old)Nov/Dec 2012]
41. Solve: $\int_0^{\pi} x \sin^5 x \cos^4 x dx$ [F.E. (Old)Nov/Dec 2012]
42. Evaluate: $\int_0^{\pi} x \cos^6 x dx$ [F.E. May/June 2011]
43. Evaluate: $\int_0^{\infty} \frac{x^7(1-x^{12})}{(1+x)^{28}} dx$ [F.E. May/June 2011]
44. Evaluate: $\int_0^{\infty} e^{-h^2 x^2} dx$ [F.E. May/June 2011]
45. Evaluate: $\int_0^{\infty} \frac{x^5}{5^x} dx$ [F.E. May/June 2011]
46. Evaluate: $\int_0^{2a} x \sqrt{2ax - x^2} dx$ [F.E. Oct/Nov 2011]
47. Evaluate: $\int_0^{2\pi} \sin^2 \theta (1 + \cos \theta)^4 d\theta$ [F.E. Oct/Nov 2011]
48. Evaluate: $\int_0^{\infty} x^9 e^{-2x^2} dx$ [F.E. Oct/Nov 2011]
49. Evaluate: $\int_0^1 \frac{dx}{\sqrt{x \log \frac{1}{x}}}$ [F.E. Oct/Nov 2011]
50. Evaluate: $\int_0^{\infty} \sqrt[3]{x^2} e^{-\sqrt[3]{x}} dx$ [F.E. May/June 2009]

51. Find $\int_0^{\frac{7}{2}} \frac{1}{x} dx$ [B.tech. Nov/Dec 2013]

52. Evaluate: $\int_0^1 x^3(1-\sqrt{x})^5 dx$ [B.tech. Nov/Dec 2013]

53. Evaluate: $\int_0^{\pi/2} \sqrt{\cot\theta} d\theta$ [B.tech. Nov/Dec 2013]

54. Prove that: $\int_1^{\infty} \frac{x^{\frac{n}{2}-1}}{(1+x)^n} = \frac{1}{2} \beta\left(\frac{n}{2}, \frac{n}{2}\right)$ [B.tech. Nov/Dec 2013]

55. Evaluate: $\int_0^{2\pi} \sin^4 x \cos^6 x dx$ [B.tech. May/June 2013]

56. Evaluate: $\int_0^{\infty} x^2 e^{-x^4} dx \int_0^{\infty} e^{-x^4} dx$ [B.tech. May/June 2013]

57. Evaluate: $\int_0^1 x^5(1-x^5)^{10} dx$ [B.tech. May/June 2013]

58. Evaluate: $\int_0^{\infty} \frac{y^8(1-y^6)}{(1+y)^{24}} dx$ [B.tech. May/June 2013]

59. Define Beta function. [B.tech. Nov/Dec 2014]

60. Find $\int_0^{\frac{9}{2}} \frac{1}{x} dx$ [B.tech. Nov/Dec 2014]

61. Evaluate: $\int_0^{\infty} \sqrt{x} e^{-x^{1/3}} dx$ [B.tech. Nov/Dec 2014]

62. Evaluate: $\int_3^7 \sqrt[4]{(7-x)(x-3)} dx$ [B.tech. Nov/Dec 2014]

63. Prove that: $\beta(m, n) \int_0^{\infty} \frac{t^{m-1}}{(1+t)^{m+n}} dt$ [B.tech. Nov/Dec 2014]

64. Evaluate: $\int_0^{\infty} e^{-x} x^{2n+1} dx$ [F.E. Nov/Dec 2014]

65. Evaluate: $\int_0^{\pi} \sin^6 x \cos^4 x dx$

[F.E. Nov/Dec 2014]

66. Evaluate: $\beta\left(\frac{1}{2}, \frac{3}{2}\right)$

[F.E. Nov/Dec 2014]

67. Evaluate: $\int_0^{\infty} \sqrt{t} e^{-\sqrt{t}} dt$

[F.E. Nov/Dec 2014]

68. Evaluate: $\int_0^1 x^5 (1-x^3)^{10} dx$

[F.E. Nov/Dec 2014]

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