

RAVI TEST PAPERS & NOTES

WHATSAPP – 8056206308

12th Mathematics

Instructions

1. integrals and differentiability

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Q1. Evaluate:
 $\int \sin 4x \cos 3x \, dx.$

Q2. Evaluate: $\int \cos 4x \cos 3x \, dx$

Q3. Evaluate:
 $\int_0^{\frac{x}{2}} \frac{1}{1+(\tan x)^{\frac{2}{3}}} \, dx$

Q4. Evaluate:
 $\int_0^{\frac{x}{4}} \frac{dx}{1+\tan x}$

Q5. Find:
 $\int \frac{1}{\sqrt{x}(\sqrt{x}+1)(\sqrt{x}+2)} \, dx$

Q6. Evaluate:
 $\int \frac{\sin(x-\alpha)}{\sin(x+\alpha)} \, dx$

Q7. Evaluate:
 $\int \frac{1+x^2}{1+x^4} \, dx$

Q8. Find the area of the region $[(x, y) : x^2 \leq y \leq x + 2]$, using integration.

Q9. Evaluate: $\int_0^{2\pi} \frac{dx}{1+e^{\sin x}}$

Q10. Evaluate: $\int_{-1}^2 |x^3 - x| \, dx.$

3 Marks

Q11. Evaluate:
 $\int_0^{\frac{\pi}{2}} |\sin x - \cos x| \, dx$

Q12. Evaluate:
 $\int \frac{dx}{\sqrt{x^2-3x+2}}$

Q13. Evaluate:

$$\int_1^3 \frac{\sqrt{x}}{\sqrt{x+\sqrt{4-x}}} dx$$

Q14. Evaluate:
 $\int x \log 2x \, dx.$

Q15. Find:
 $\int \frac{x^2}{(x^2+4)(x^2+9)} dx$

Q16. Evaluate:
 $\int \frac{2x \cdot \tan^{-1}(x^2)}{1+x^4} dx.$

Q17. Using integration find the area of the region $[(x, y) : y^2 \leq y \leq x + y]$

Q18. Evaluate:
 $\int_0^{\frac{\pi}{2}} [\log(\sin x) - \log(2 \cos x)] dx$

Q19. Find:
 $\int \frac{x^2}{(x^2+4)(x^2+9)} dx$

Q20. Find: $\int \frac{dx}{\sqrt{x} \sqrt[3]{x}}$

Q21. Evaluate:
 $\int_1^3 (|x-1| + |x-2| + |x-3|) dx$

Q22. Find:
 $\int e^x \cdot \sin 2x \, dx$

Q23. Evaluate:
 $\int_0^{\frac{\pi}{2}} e^x \sin x \, dx$

Q24. Find:
 $\int \frac{1}{\cos(x-a) \cos(x-b)} dx$

Q25. $\int_0^{\frac{\pi}{2}} \frac{\cos x}{(1+\sin x)(4+\sin x)} dx.$

Q26. Evaluate the following integrals:
 $\int_{\pi}^{\frac{3\pi}{2}} \sqrt{1 - \cos 2x} \, dx$

Q27. Write a value of $\int e^x \left(\frac{1}{x} - \frac{1}{x^2} \right) dx$

Q28. Evaluate the following integrals:
 $\int \frac{1}{\sqrt{1-x^2}(2+3 \sin^{-1} x)} dx$

Q29. Evaluate the following integrals:

$$\int \frac{1+\sin x}{\sqrt{x-\cos x}} dx$$

Q30. Write a value of $\int \frac{1}{x(\log x)^n} dx$

Q31. Evaluate the following integrals:

$$\int x \sin 2x dx$$

Q32. If $e^{x+y} - x = 0$, prove that $\frac{dy}{dx} = \frac{1-x}{x}$

Q33. Evaluate the following integrals:

$$\int \frac{1}{\cos x(\sin x + 2 \cos x)} dx$$

Q34. Evaluate the following definite integrals:

$$\int_0^1 \frac{1}{\sqrt{1+x}-\sqrt{x}} dx$$

Q35. Evaluate the following definite integrals:

$$\int_1^e \frac{e^x}{x} (1 + x \log x) dx$$

Q36. Evaluate the definite integral in Exercise:

$$\int_0^{\frac{\pi}{4}} \frac{\sin x \cos x}{\cos^4 x + \sin^4 x} dx$$

Q37. Evaluate the following integrals:

$$\int 2x^3 e^{x^2} dx$$

Q38. If $y = \sqrt{\tan x + \sqrt{\tan x + \sqrt{\tan x + \dots \text{to } \infty}}}$ prove that $\frac{dy}{dx} = \frac{\sec^2 x}{2y-1}$

Q39. Evaluate the following:

$$\int \frac{\sin x + \cos x}{\sqrt{1 + \sin 2x}} dx$$

Q40. Evaluate the definite integral in Exercise:

$$\int_0^{\frac{\pi}{2}} \cos^2 x dx$$

Q41. Evaluate the definite integral in Exercise:

$$\int_{\frac{\pi}{2}}^{\pi} e^x \left(\frac{1-\sin x}{1+\cos x} \right) dx$$

Q42. Evaluate the following integrals:

$$\int_{-3}^3 |x+1| dx$$

Q43. Find the integrals of the functions in Exercises:

$$\frac{\cos x - \sin x}{1 + \sin 2x}$$

Q44. Evaluate the following integrals:

$$\int_{-1}^1 x|x|dx$$

Q45. If $x = a(\cos t + t \sin t)$ and $y = a(\sin t - t \cos t)$, find $\frac{d^2y}{dx^2}$

Q46. Evaluate the following integrals:

$$\int e^x \left(\frac{\sin x \cos x - 1}{\sin^2 x} \right) dx$$

Q47. If $y = (\tan^{-1} x)^2$ then prove that $(1 + x^2)y_2 + 2x(1 + x^2)y_1 = 2$

Q48. Evaluate the following integrals:

$$\int \sqrt{2ax - x^2} dx$$

Q49. If $y = \sin(\log x)$ prove that $x^2 \frac{d^2y}{dx^2} + x \frac{dy}{dx} + y = 0$

Q50. By using the properties of definite integral, evaluate the integral in Exercise:

$$\int_0^{\frac{\pi}{2}} \frac{\cos^5 x \, dx}{\sin^5 x + \cos^5 x}$$

Q51. Evaluate the following integrals:

$$\int \frac{x + \sin x}{1 + \cos x} dx$$

Q52. If x and y are connected parametrically by the equations given in Exercise without eliminating the parameter, Find $\frac{dy}{dx}$.

$$x = a(\theta - \sin \theta), y = a(1 + \cos \theta)$$

Q53. Evaluate the following integrals:

$$\int_4^{12} x(x - 4)^{\frac{1}{3}} dx$$

Q54. Integrate the function in Exercise:

$$\frac{1}{\sqrt{8+3x-x^2}}$$

Q55. If $f'(x) = 8x^3 - 2x$, $f'(2) = 8$, find $f'(x)$.

Q56. Evaluate the following integrals:

$$\int x^2 e^{x^3} \cos(e^{x^3}) dx$$

Q57. If $y = \sqrt{x + \sqrt{x + \sqrt{x + \dots \text{to } \infty}}}$, prove that $\frac{dy}{dx} = \frac{1}{2y-1}$

Q58. Evaluate the following integrals:

$$\int \left(\frac{1}{\log x} - \frac{1}{(\log x)^2} \right) dx$$

Q59. Evaluate the following definite integrals:

$$\int_0^{\frac{\pi}{2}} \sin x \sin 2x \, dx$$

Q60. Evaluate the following integrals:

$$\int_0^{\frac{\pi}{2}} \log \tan x \, dx$$

Q61. Find the integrals of the functions in Exercises:
 $\cos 2x \cos 4x \cos 6x$

Q62. Differentiate the functions with respect to x .
 $\cos x^3 \cdot \sin^2(x^5)$

Q63. If $y = e^x(\sin x + \cos x)$ prove that $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + 2y = 0$

Q64. Evaluate the following integrals:

$$\int \frac{1}{\sqrt{\tan^{-1}x} \cdot (1+x^2)} dx$$

Q65. If $y = (\tan^{-1} x)^2$, show that $(x^2 + 1)^2 y_2 + 2x(x^2 + 1)y_1 = 2$

Q66. If $y = ae^{2x} + be^{-x}$, show that $\frac{d^2y}{dx^2} - \frac{dy}{dx} - 2y = 0$

Q67. If $y = e^{-x} \cos x$, show that $\frac{d^2y}{dx^2} = 2e^{-x} \sin x$.

Q68. If $x = a(\cos 2t + 2t \sin 2t)$ and $y = a(\sin 2t - 2t \cos 2t)$, then find $\frac{d^2y}{dx^2}$.

Q69. If $y = \sqrt{\log x + \sqrt{\log x + \sqrt{\log x + \dots \text{to } \infty}}}$, prove that $(2y - 1)\frac{dy}{dx} = \frac{1}{x}$

Q70. If $y = x \sin y$, prove that $\frac{dx}{dy} = \frac{\sin^2 y}{(1 - x \cos y)}$

Q71. Evaluate the integral in Exercise:

$$\int_1^2 \left(\frac{1}{x} - \frac{1}{2x^2} \right) e^{2x} dx$$

Q72. Differentiate the function given in Exercise:

$$\sqrt{\frac{(x-1)(x-2)}{(x-3)(x-4)(x-5)}}$$

Q73. If $y = (\cos x)^{(\cos x)^{(\cos x) \dots \infty}}$, show that $\frac{dy}{dx} = \frac{y^2 \tan x}{y \log \cos x - 1}$.

Q74. Write a value of $\int e^{3 \log x} x^4 dx$.

Q75. Evaluate the integral in Exercise:

$$\int_0^{\frac{\pi}{2}} \sqrt{\sin \phi} \cos^5 \phi \, d\phi$$