

Course-BCA

Year/Sem - I/II

Subject-Mathematics

Topics – Multiple Integrals and differential equations

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Assignment-1

Q1: Evaluate $\int_0^1 \int_0^x (x^2 + y^2) dA$

Q2: Evaluate $\iint_R xy dx dy$ where R is the quadrant of circle $x^2 + y^2 = a^2$ where $x \geq 0$ and $y \geq 0$.

Q3: Evaluate $\iint (x + y)^2 dx dy$ over the area bounded by the ellipse $\frac{a^2}{x^2} + \frac{b^2}{y^2} = 1$

Q4: Evaluate $\int_0^2 \int_0^{\sqrt{2x-x^2}} \frac{xy dx}{\sqrt{x^2+y^2}}$ by changing to polar coordinate.

Q5: Evaluate $\int_0^a \int_y^a \frac{x}{x^2+y^2} dx dy$ changing the order of integration.

Q6: Change the order of integration in

$I = \int_0^1 \int_{x^2}^{2-x} xy dx dy$ and hence evaluate the same.

Q7: Change the order of integration

$$\int_0^{\infty} \int_0^x e^{-xy} y dy dx$$

$$Q8: \int_0^2 \int_0^{x^2} e^{\frac{y}{x}} dy dx$$

$$Q9: \int_0^a \int_0^{\sqrt{ay}} dx dy$$

$$Q10: \int_0^a \int_y^{\sqrt{a^2-y^2}} dx dy$$

$$Q11: \int_0^a \int_y^a \frac{xdxdy}{\sqrt{x^2+y^2}}$$

ASSIGNMENT-2

$$Q1: \text{Solve } (2x+t-3)dt = (x+2t-3)dx$$

$$Q2: \text{Solve } \frac{dy}{dx} = -\frac{(x+2y-2)}{2x-y+3}$$

$$Q3: \text{Solve } (y-3x+3)dy = (2y-x+1)dx$$

$$Q4: \text{Solve } (x-2y-3)dy + (x-y-2)dx = 0$$

LINEAR DIFFERENTIAL EQUATION

$$\frac{dy}{dx} + P \cdot y = Q$$

$$\text{I.F} = e^{\int P dx}$$

$$\text{Sol: } y \cdot e^{\int P dx} = \int Q \cdot e^{\int P dx} dx + c$$

$$Q5: \text{Solve } \frac{dy}{dx} + 2xy = 3e^{-x^2}$$

$$Q6: \text{Solve } \frac{dy}{dx} + \frac{2x}{(x^2-1)}y = \frac{1}{x^2-1}$$

$$Q7: \text{Solve } x \frac{dy}{dx} + 2y = x^2 \log x$$

$$Q8: \text{Solve } \cos^2 x \frac{dy}{dx} + y = \frac{\sin x}{\cos x}$$

Q9: Solve $(\tan^{-1}y-x)dy=(1+y^2)dx$

Q10: Solve $\frac{dy}{dx} + 2y \tan x = \sin x$

Given that $y=0$ when $x=\frac{\pi}{3}$

Q11: solve $(D^3 - 3D^2D' + 2DD'^2)z=0$

Q12: solve $\frac{\partial^3 y}{\partial x^3} - 7 \frac{\partial^3 z}{\partial x \partial y^2} + 6 \frac{\partial^3 z}{\partial y^3} = 0$

Q13: Solve $\frac{d^2y}{dx^2} - 7 \frac{dy}{dx} + 12y=0$

Q14: Solve $\frac{d^2x}{dt^2} - 3 \frac{dx}{dt} + 2x=0$ given that when $t=0, x=0$ and $\frac{dx}{dt}=0$

Q15: Solve $(D^6-1)y=0$

Q16: Solve $\frac{d^2y}{dx^2} - 2k \frac{dy}{dx} + k^2y=e^x$

Q17: Solve $(D^3+1)y=(e^x+1)^2$

Q18: Solve $\frac{d^2y}{dx^2} - \frac{dy}{dx} - 2y=\sin 2x$

Q19: Solve $(D^3+1)y=\cos x$

Q20: Solve $(D^2-5D+6)y=x+\sin 3x$

Q21: Solve $(D+1)^3y=x^2e^{-x}$

Q22: Solve $(D^2+2D+2)y=xe^x$

Q23: Solve $\frac{d^2y}{dx^2} - 2 \frac{dy}{dx} + 6y=e^x \cos x$

Q24: Solve $(D^2-4D+4)y=e^{2x} \sin 3x$

Q25: Solve the differential equation-

$$\frac{d^2y}{dx^2} - 4\frac{dy}{dx} - 5y = xe^{-x}$$

Given that $y=0$ and $\frac{dy}{dx} = 0$ when $x=0$

Q26: Solve $\frac{d^2y}{dx^2} + 4y = x\sin x$

Q27: Solve $(D^2 - 2D + 1)y = xe^x \sin x$

Q28: Solve $(D^2 - 4D + 4)y = 8x^2 e^{2x} \sin 2x$

Q29: solve $(D^2 + 3DD' + 2D'^2)z = x + y$

Q30: solve $(D^2 - 6DD' + 9D'^2)z = 12x^2 + 36xy$

Q31: solve $(D^2 - 5DD' + 4D'^2)z = \sin(4x + y)$

Q32: solve $(D^2 - 2DD' + D'^2)z = e^{x+2y} + x^3$