

5. If $f(2a - x) = -f(x)$ then $\int_0^{2a} f(x)dx =$ CO3- R
- (a) $2 \int_0^a f(x)dx$ (b) 0 (c) $\int_0^a f(2a - x)dx$ (d) None of these
6. Evaluation of $\int x^{-5} dx$ is CO3- R
- (a) $\frac{x^4}{4} + C$ (b) $-\frac{1}{4x^4} + C$ (c) $\frac{x}{2} + C$ (d) None of these
7. The value of $\int_0^b \int_0^a \frac{dx dy}{xy}$ is CO4- R
- (a) $\log ab$ (b) $\log \frac{a}{b}$ (c) $\log a \log b$ (d) $\log a^b$
8. The value of $\int_0^{\frac{\pi}{2}} \int_0^{\sin \theta} r dr d\theta$ is CO4- R
- (a) $\frac{\pi}{2}$ (b) $\frac{\pi}{8}$ (c) π (d) $\frac{\pi}{3}$
9. If one of the eigen value of the matrix A is zero then matrix A is CO5 R
- (a) singular (b) nonsingular
- (c) square (d) None of these
10. Sum of the eigen values of the matrix $\begin{pmatrix} 2 & 0 & 1 \\ 0 & 2 & 0 \\ 1 & 0 & 2 \end{pmatrix}$ is CO5 R
- (a) 3 (b) 5 (c) 6 (d) 0

PART – B (5 x 2= 10Marks)

11. Define Ohms law. CO1- App
12. Find $\frac{dy}{dx}$ given $y \sin x = x \cos y$. CO2- App
13. Evaluate $\int x^2 \sqrt{x^3 + 1} dx$. CO3- App
14. Sketch roughly the region of integration for $\int_0^1 \int_0^x f(x, y) dx dy$. CO4- App

15. Prove that if λ is the eigen value of A then $\frac{1}{\lambda}$ is the eigen value do A^{-1} .

CO5- App

PART – C (5 x 16= 80Marks)

16. (a) (i) If $f(x) = xe^x$ then find $f'(x)$ CO1 -App (4)
(ii) Evaluate $\lim_{x \rightarrow 1} \arcsin \left(\frac{1-\sqrt{x}}{1-x} \right)$ CO1 -App (4)
(iii) Find the n th differential coefficient of $(ax + b)^m$ CO1 -App (8)

Or

- (b) (i).Find y_n if $y = x^{n-1} \log x$ CO1 -App (8)
(ii) If $y = e^{ax} \sin(bx)$ then prove that CO1 -App (8)
 $y_2 - 2ay_1 + (a^2 + b^2)y = 0$

17. (a) (i) Find the Jacobian of CO2 -App (8)
 $u = xyz, v = xy + yz + zx, w = x + y + z$
(ii) Expand $e^x \log(1 + y)$ as Taylors series upto second degree terms. CO2 -App (8)

Or

- (b) (i) Examine $f(x, y) = x^3 + y^3 - 12x - 3y + 20$ for its extreme values. CO2 -App (8)
(ii) The temperature T at any point (x, y, z) in a space is CO2 -App (8)
 $T = 400xyz^2$. Find the
highest temperature on the surface of the unit sphere
 $x^2 + y^2 + z^2 = 1$.

18. (a) (i) Find the reduction formula for $\int \sin^n x dx, n \geq 2$ is an integer. CO3 -Ana (8)
(ii) Define gamma and beta function and derive the relationship between them CO3 -U (8)

Or

- (b) (i) Evaluate $\int \frac{x^2}{(x-1)^3(x-2)} dx$ CO3 -E (8)
(ii) Evaluate $\iint [xy(1-x-y)]^{\frac{1}{2}} dx dy$, over the lines enclosed by the lines CO3 -E (8)
 $x = 0, y = 0$ and $x + y = 1$ in the positive quadrant.

19. (a) (i) Evaluate $\int_0^\infty \int_0^\infty e^{-(x^2+y^2)} dx dy$ using polar coordinates. CO4 -E (8)

(ii) Change the order of integration in $I = \int_0^1 \int_{x^2}^{2-x} xy dy dx$ and hence evaluate it. CO4 -E (8)

Or

(b) (i) Find the area of the region outside the inner circle $r = 2 \cos\theta$ and inside the outer circle $r = 4\cos\theta$ by double integration. CO4 -App (8)

(ii) Find the volume of the tetrahedron bounded by the plane $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1$ and the ordinate axis. CO4 -App (8)

20. (a) (i) Find the eigen values and eigen vectors of $A = \begin{pmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{pmatrix}$ CO5 -App (8)

(ii) Verify Cayley Hamilton Theorem and hence find A^{-1} for $A = \begin{pmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{pmatrix}$ CO5 -App (8)

Or

(b) Reduce the quadratic form $2x_1^2 + 6x_2^2 + 2x_3^2 + 8x_1x_3$ into canonical form using orthogonal transformation and hence find its rank, index, signature and nature. CO5-Ana (16)