PART-A (10 X 2 = 20)
(Answer all the questions)

1	Find $\frac{du}{dt}$ if $u = x^2 + y^2, x = at^2, y = 2at.$
2	State Maclaurin's series.
3	Change the order of integration $\int_0^1 \int_0^x f(x,y)dydx$
4	State Green's Theorem.
5	Evaluate: $(D^4 - 1)y = 0$
6	Solve $(cosx - xcosy)dy - (siny + ysinx)dx = 0$
7	The product of two eigen values of the matrix $A = \begin{pmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{pmatrix}$ is 16. Find the third eigen value.

8	Find the rank of the matrix $\begin{bmatrix} 1 & 1 & 0 \\ 2 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$
9	Define Vector space.
10	Define Linear Span

	PART- B (5 X 16 = 80)
11	(a) (i) Find the intervals on which f is increasing or decreasing, local maximum or minimum,intervals of concavity and the inflection points: $f(x) = 2x^3 + 3x^2 - 36x$.
	(a) (ii) Determine $\lim_{x \to \frac{\pi}{2}} \frac{1+\cos 2x}{(\pi-2x)^2}$
	(OR)
	(b) (i) Expand $e^x \log(1 + y)$ in powers of x and y using Taylor's series up to third degree terms.
	(b) (ii) Examine the extreme values $f(x, y) = x^3 + y^3 - 3x - 12y + 20$.
12	(a) (i) Verify Gauss's divergence theorem for $\vec{F} = 4xz\vec{i} - y^2\vec{j} + yz\vec{k}$ taken over the cube bounded by the planes $x = 0, x = 1, y = 0, y = 1, z = 0, z = 1$.
	(a) (ii) Show that $\vec{F} = (6xy + z^3)\vec{i} + (3x^2 - z)\vec{j} + (3xz^2 - y)\vec{k}$ is irrotational vector
	(OR)
	(b) (i) Find the volume of the sphere $x^2 + y^2 + z^2 = a^2$
	(b) (ii) By changing Cartesian to polar co-ordinates, show that $\int_0^\infty \int_0^\infty e^{-(x^2+y^2)} dxdy = \frac{\pi}{4}$ and hence evaluate $\int_0^\infty e^{-t^2} dt = \frac{\sqrt{\pi}}{2}$
13	(a) (i) Produce a complete solution for $(D^2 + a^2)y = \tan ax$
	(a) (ii) Find the singular integral of $z = px + qy + \sqrt{1 + p^2 + q^2}$

	(b) (i) Convert $[(3x+2)^2D^2+3(3x+2)D-36]y = 3x^2+4x+1$ into constant coefficients also produce a general solution.	CO3
	(b) (ii) Generate complete solution for the differential equation $(D^2+4)y = x^2 cos2x$	CO3
14	(a) (i) Reduce the quadratic form $6{x_1}^2+3{x_2}^2+3{x_3}^2-4x_1x_2+4x_1x_3-2x_2x_3$ to canonical form through an orthogonal transformation and find its nature, rank and signature.	CO4
	(OR)	
	(b) (i) Factorize the following system of equations by LU decomposition method $7x_1-2x_2+x_3=12,\ 14x_1-7x_2-3x_3=17,\ -7x_1+\ 11x_2+18x_3=5$	CO
	(b) (ii) Solve the following system of equations by Gauss Jordan method $x+2y+z=3,\ 2x+3y+3z=10,\ 3x-y+2z=13$	CC
15	(a) (i) Let V be the set of all positive real numbers. Define the vector addition and scalar multiplication as follows: $x+y=xy$ & $kx=x^k$.Determine whether or not V is a vector space over F with respect to above operations.	CC
	(a) (ii) Let $V=R^3;\ W=\{(a_1,a_2,a_3)/2a_1-7a_2+a_3=0\}$. Verify whether it is a subspace or not.	CO
	(OR)	
	(b) (i) State and prove Dimension theorem (or) Rank-Nullity theorem	CO5
	(b) (ii) Let $T:R^2\to R^3$ and $U:R^2\to R^3$ be the linear transformations respectively defined by $T(a_1,a_2)=(a_1+3a_2,0,2a_1-4a_2)$, $U(a_1,a_2)=(a_1-a_2,2a_1,3a_1+2a_2)$, then prove that $[T+U]_\beta^\gamma=[T]_\beta^\gamma+[U]_\beta^\gamma$	CO5