## G. H. Raisoni College of Engineering and Management, Pune.
### (An Autonomous Institution)
### F.Y B.Tech (All Branches) (Term-I)
### CAE-2(2020 Pattern)
## Subject Name: Matrices and Differential Calculus(USBL301)

**[Time: 1 Hours]**                                              **[ Max. Marks-15]**

**COURSE OUTCOME:**
1. Understand and use the theory of Matrices to solve the system of linear equations and engineering problems in respective disciplines.
2. Determine the Eigen values and Eigen vectors of a matrix and apply to various engineering problems in respective disciplines.
3. Apply concepts of differentiation in solving engineering problems.
4. Use applications of partial differentiation to solve various problems in engineering.
5. Apply the Knowledge of vector differentiation to solve various problems in engineering.

| CO3 | a) | State Leibnitz Theorem | [1] | L1 |
|------|------|------|------|------|
|  | b) | Find $n^{th}$ order derivative of $y=\dfrac{x^3}{x^2-3x+2}$ <br> **OR** | [3] | L3 |
|  |  | Using Taylor's series express $(x-2)^4 - 3(x-2)^3 + 4(x-2)^2 + 5$ in powers of x. | [3] | L3 |
|  | c) | Expand $y = \sin(m\sin^{-1}x)$ show that $(1-x^2)y_{n+2} = (2n+1)xy_{n+1} + (n^2 - m^2)y_n$ | [4] | L4 |
|  |  |  |  |  |
| CO4 | a) | State Commutative property of mixed partial derivatives. | [1] | L1 |
|  | b) | If u=ax²+2hxy+by² then find $\dfrac{\partial u}{\partial x}$ & $\dfrac{\partial u}{\partial y}$ | [2] | L2 |
|  | c) | If u= $\log(tanx + tany + tanz)$, then show that $\text{Sin2x}\dfrac{\partial u}{\partial x} + sin2y\dfrac{\partial u}{\partial y} + sin2z\dfrac{\partial u}{\partial z} = 2$ | [4] | L4 |

**BEST**                    **LUCK**