



## G H Raisoni College of Engineering and Management, Pune

(An Empowered Autonomous Institute affiliated to Savitribai Phule, Pune University, NAAC Accredited "A+" Grade)

F. Y. B. Tech. (All)

(TERM- II)

CAE II - SUMMER 2025 (2023 Pattern)

**Subject : Integral Calculus & Differential Equations (23UBSL1203)**

(Time: - 01 Hour)

(Max. Marks: 20)

**Instructions to the students:**

- i) All questions are compulsory. ii) Neat diagrams must be drawn wherever necessary.  
 iii) Figures to the right indicate full marks. iv) Use of scientific calculator is allowed  
 v) Assume suitable data, if necessary.

Q.No	Question	Marks	CO	BL
Q1.(a)	Calculate $\int_C \vec{F} \cdot d\vec{r}$ for $\vec{F} = 3x^2\mathbf{i} + (2xz - y)\mathbf{j} + z\mathbf{k}$ along a straight line joining the points (0,0,0) and (2,1,3).	[4]	CO2	L3
<b>OR</b>				
(b)	Find the work done in moving a particle once round the ellipse $\frac{x^2}{16} + \frac{y^2}{4} = 1, z = 0$ under the field of force $\vec{F}$ given by $\vec{F} = (2x - y + z)\mathbf{i} + (x + y - z^2)\mathbf{j} + (3z - 2y + 4z)\mathbf{k}$	[4]	CO2	L3
(c)	Verify Greens theorem for $\vec{F} = x^2\mathbf{i} + xy\mathbf{j}$ over the region R bounded by the curve $y = x^2$ and the line $y = x$ .	[6]	CO2	L3
<b>OR</b>				
(d)	Calculate $\iint_S (\nabla \times \vec{F}) \cdot \hat{n} ds$ for $\vec{F} = xy^2\mathbf{i} + y\mathbf{j} + xz^2\mathbf{k}$ . Where S is the surface of rectangular lamina bounded by $x = 0, y = 0, x = 1, y = 2, z = 0$ .	[6]	CO2	L3
Q 2.(a)	Solve: $\frac{dy}{dx} = \frac{\tan y - 2xy - y}{x^2 - x \tan^2 y + \sec^2 y}$	[5]	CO3	L2
<b>OR</b>				
(b)	Solve: $\left(\frac{y^2}{(y-x)^2} - \frac{1}{x}\right) dx + \left(\frac{1}{y} - \frac{x^2}{(x-y)^2}\right) dy = 0$	[5]	CO3	L2
(c)	Solve: $(1 + x^2) \frac{dy}{dx} + xy = 1$	[5]	CO3	L2
<b>OR</b>				
(d)	Solve: $\cos y \frac{dy}{dx} - \frac{\sin y}{1+x} = (1+x) e^x$	[5]	CO3	L2

- BL - Bloom's Taxonomy Levels (1- Remember, 2- Understand, 3 - Apply, 4 - Analyze, 5 - Evaluate 6 - Create)
- CO- Course Outcomes