[Total No. of CO's -05] **Seat No:** **[Total No. of Pages: 02]**

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

(An Autonomous Institution affiliated to Savitribai Phule Pune University, Pune)

F.Y B. Tech (All Branches) (Term II)

ESE Summer-2021(2020 Pattern)

Integral Calculus and Diff. equations (UBSL104)

[Time: 2 Hours] **[Max. Marks-50]**

COURSE OUTCOME:

1. Understand and use concept of definite integral & solve engineering problems.
2. Evaluate the multiple integrals using different techniques and apply it to solve engineering Problems.
3. Understand vector integration and its applications related to real life problems.
4. Solve first order, first degree & higher order differential equations.
5. Form differential equations for simple engineering systems and find its solution.

Instructions to the candidates:

1) All questions compulsory.
2) Neat diagrams must be drawn wherever necessary.
3) Figures to the right indicate full marks.
4) Assume suitable data, if necessary.

CO	*Sub Question*		*Marks*	*BL*
CO1	***a)***	State DUIS rule 1 and 2	**[2]**	**L1**
CO3	***b)***	State Green's lemma and Gauss Divergence theorem.	**[2]**	**L1**
CO5	***c)***	Define Cauchy and Legendre's homogeneous differential equations.	**[2]**	**L1**
CO1	***a)***	Explain properties of Beta function	**[3]**	**L2**
CO2	***b)***	Evaluate $\int_0^1 \int_0^x (x^2+3y)dxdy$	**[3]**	**L2**
CO4	***c)***	Solve $(e^x + 2xy^2 + y^3)\,dx + (a^y + 2yx^2 + 3x\,y^2)\,dy = 0$	**[3]**	**L2**
CO2	***a)***	Evaluate $\int_0^1 \int_{e^x}^{e} \frac{1}{logy} dxdy$ by using change of order.	**[5]**	**L3**
CO3	***b)***	Evaluate the line integral $\oint (x^2+xy)dx + (x^2+y^2)\,dy$ *where* C is square formed by lines $x = \pm 1$, $y = \pm 1$	**[5]**	**L3**
CO4	***c)***	Solve $(D^2 + D)\,y = \frac{1}{e^x+1}$	**[5]**	**L3**
		OR		
CO4	***d)***	Solve $(D^2 - D - 2)\,y = 2\log x + \frac{1}{x} + \frac{1}{x^2}$	**[5]**	**L3**

CO1	***a)***	Analyze the equation, $xy^2 = a^2 (a-x)$ to trace the curve	**[5]**	**L4**

OR

CO1	***b)***	Explain relation between beta and gamma function and thus evaluate $\int_0^\infty \frac{x^2}{(1+x^2)^{7/2}} dx$	**[5]**	**L4**
CO3	***c)***	Verify stokes theorem for $\bar{F} = (xy^2)\bar{\imath} + (y)\,\bar{\jmath} + (z^2x)\,\bar{k}$ for surface of rectangle bounded by x =0, y =0, x = 1, y= 2, z= 0	**[8]**	**L4**
CO5	***d)***	An inductor of 0.5 H is connected in series with a resistor of 6 ohms , a capacitor of 0.02 F ,a generator having alternative voltage given by 24 sin (10t), t>0 and a switch k. a) Set a differential equation for instantaneous charge on the condenser b) Find the charge and current at time t if charge on capacitor is zero when switch K is closed at t =0.	**[7]**	**L4**

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