Subject Code: 22MA201BS	SET-II	HT NO:			7	R					

CMR TECHNICAL CAMPUS

UGC AUTONOMOUS

B. Tech. II Semester Supply End Examinations, January-2024

Ordinary Differential Equations & Vector Calculus

Common to ECE, AIML, CSM, CSC, CSE, IT &CSD

Time: 3 Hours **Max. Marks: 60**

Note

i. This Question paper contains Part- A and Part- B.
ii. All the Questions in Part A are to be answered compulsorily.
iii. All Questions from Part B are to be answered with internal choice among them.

****

PART-A

10 X 01 = 10 Marks

			Marks	CO	BL
1.	a	Solve $\frac{dy}{dx} = \frac{x^2-2xy}{x^2-siny}$	1	CO1	3
	b	State law of natural growth.	1	CO1	2
	c	Solve $(D^2 + 2D - 12)y = 0$	1	CO2	3
	d	Find the particular integral of $(D^2 - 4)y = sin2x$	1	CO2	1
	e	Find $L\{sin3tcos2t\}$	1	CO3	1
	f	State Convolution theorem.	1	CO3	2
	g	Find the equation of the tangent plane to the surface $x^2 + y^2 + z^2 = 3$ at the point $(1, 1, 1)$	1	CO4	1
	h	Is the position vector $\bar{r} = x\bar{\imath} + y\bar{\jmath} + z\bar{k}$ solenoidal? Justify.	1	CO4	
	i	If $\bar{F}$ is irrotational and C is a closed curve then find the value of $\int_C \bar{F}.d\bar{r}$	1	CO5	1
	j	State Green's theorem.	1	CO5	2

PART- B

5 X 10 = 50 Marks

			Marks	CO	BL
2.	a	Solve $x\frac{dy}{dx} + y = x^3y^6$	5	CO1	3
	b	Find the orthogonal trajectories of the circles $x^2 + y^2 - ay = 0$, where a is a parameter.	5	CO1	1

OR

Subject Code: 22MA201BS	SET-II	HT NO:			7	R					

195

3	a	Solve $x\frac{dy}{dx} + y = \log x$	5	CO1	3
	b	A bacterial culture growing exponentially increases from 200 to 500 grams in the period from 6 am to 9 am. How many grams will be present at noon	5	CO1	4
4	a	Solve $(D^2 + D + 1)y = x^3$	5	CO2	3
	b	Solve $(D^2 + 2D - 3)y = x^2e^{-3x}$	5	CO2	3
		OR			
5		Solve $(1+x)^2\frac{d^2y}{dx^2} + (1+x)\frac{dy}{dx} + y = sin2[\log(1+x)]$	10	CO2	3
6	a	Find the Laplace transform of $te^{2t}cos2t$	5	CO3	2
	b	Find the inverse Laplace transform of $\log\left(1+\frac{a^2}{s^2}\right)$.	5	CO3	1
		OR			
7		Using Convolution theorem , find $L^{-1}\left\{\frac{1}{(s^2+4s+13)^2}\right\}$	10	CO3	3
8	a	If $\bar{r} = x\bar{\imath} + y\bar{\jmath} + z\bar{k}$ and $r = \lvert\bar{r}\rvert$, Show that $\frac{\bar{r}}{r^3}$ is solenoidal.	5	CO4	2
	b	Find the directional derivative of $\emptyset = xy + yz + zx$ at $(1, 2, 0)$ in the direction of vector $\bar{\imath} + 2\bar{\jmath} + 2\bar{k}$	5	CO4	3
		OR			
9	a	Vetify that $\bar{F} = (6xy + z^3)\bar{\imath} + (3x^2 - z)\bar{\jmath} + (3xz^2 - y)\bar{k}$ is irrotational vector and hence find the scalar potential such that $\bar{F} = \nabla\emptyset$.	5	CO4	4
	b	Find $\nabla \times (\bar{a} \times \bar{r})$, where $\bar{a}$, is a constant vector.	5	CO4	3
10	a	Find the work done by $\bar{F} = (2x - y - z)\bar{\imath} + (x + y - z)\bar{\jmath} + (3x - 2y - 5z)\,\bar{k}$ along a curve C in the xy −plane given by $x^2 + y^2 = 9, z = 0$.	5	CO5	3
	b	Evaluate by Stokes' theorem $\oint_C(e^x dx + 2ydy - dz)$ where C is curve $x^2 + y^2 = 4, z = 2$.	5	CO5	5
		OR			
11		Verify Divergence theorem for $2x^2y\bar{\imath} - y^2\bar{\jmath} + 4xz^2\bar{k}$ over the region of first octant of the cylinder $y^2 + z^2 = 9$ and $x = 2$.	10	CO5	6

CO : Course Outcomes

BL : Bloom's Taxonomy Levels **L 1 : Remembering** **L 2 : Understanding** **L 3 : Applying** **L 4 : Analysing** **L 5 : Evaluating** **L 6 : Creating**

*****