Subject Code: 20MA201BS	SET-I	HT NO: 7R

CMR TECHNICAL CAMPUS

UGC AUTONOMOUS

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

Ordinary Differential Equations & Vector Calculus

Common to CE, ME, AIML, CSG, ECE, CSD, CSE, IT, CSM

Time: 3 Hours **Max. Marks: 70**

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.

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PART-A

10 X 02 = 20 Marks

			Marks	CO	BL
1.	a	Form the differential equation by eliminating arbitrary constants y = Ae^{x}+Be^{-x}	[2M]	CO1	L6
	b	Solve (e^{y}+1)cosx dx + e^{y}sinx dy = 0	[2M]	CO1	L3
	c	Find the Particular Integral of (D^2-5D+6)y = e^{4x}	[2M]	CO2	L1
	d	Solve $\frac{d^2y}{dx^2}$ - 8$\frac{dy}{dx}$+15y = 0	[2M]	CO2	L3
	e	Evaluate $\int_0^3\int_1^2 xy(1+x+y)$ dydx	[2M]	CO3	L5
	f	Evaluate $\int_0^1\int_y^1\int_0^{1-x} x\, dzdxdy$	[2M]	CO3	L5
	g	Find ∇∅ when ∅ =3x^2y - y^3z^2 at (1, -2, -1)	[2M]	CO4	L1
	h	Find the value of m if $\bar{F}$ = mx$\bar{i}$ – 5y$\bar{j}$ + 2z$\bar{k}$ is Solenoidal Vector	[2M]	CO4	L1
	i	Evaluate $\int_C \bar{F}.\overline{dr}$ where $\bar{F} = x^2\bar{i} + y^2\bar{j}$ and C is the curve y = x^2 in the xy-plane	[2M]	CO5	L5
	j	State Green's Theorem	[2M]	CO5	L1

PART- B

5 X 10 = 50 Marks

			Marks	CO	BL
2.	a	Solve $x\frac{dy}{dx} + y = \log x$	[5M]	CO1	L3
	b	Solve (x^4e^x – 2mx y^2)dx + 2mx^2y dy = 0	[5M]	CO1	L3
		OR			
3	a	Solve $\frac{dy}{dx}$ + ycosx = y^3sin2x	[5M]	CO1	L3
	b	A body is originally at 80°C and cools down to 60°C in 20 minutes. If the temperature of the air is 40°C, find the temperature of the body after 40 minutes.	[5M]	CO1	L1

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4	a	Solve $(D^2 - 4D+3)y = \sin3x\cos2x$	[5M]	CO2	L3
	b	Solve $(D^2 - 3D+2)y = \sin2x$	[5M]	CO2	L3
		OR			
5	a	Solve by the Method of Variation of Parameters, $(D^2 - 2D)y = e^x \sin x$	[5M]	CO2	L3
	b	Solve$(D^2+4)y = e^x Sinx$	[5M]	CO2	L3
6	a	Evaluate $\iint xy(x+y)dxdy$ over the region R bounded by $y=x^2$ and y=x	[5M]	CO3	L5
	b	Evaluate $\int_0^a \int_0^{\sqrt{a^2-y^2}} (x^2+y^2)dydx$ by changing into polar co-ordinates	[5M]	CO3	L5
		OR			
7		Evaluate $\int_0^{log2} \int_0^x \int_0^{x+logy} e^{x+y+z}dzdydx$	[10M]	CO3	L5
8	a	Prove that $\nabla \times (\nabla \times \bar{a}) = \nabla(\nabla \cdot \bar{a}) - \nabla^2 \bar{a}$	[5M]	CO4	L5
	b	If $\bar{F} = 3xy\bar{\imath} - y^2\bar{\jmath}$, then evaluate $\int_C \bar{F} \cdot \overline{dr}$ where C is the curve $y = 2x^2$ in the xy-plane from (0,0) to (1,2)	[5M]	CO4	L5
		OR			
9		If = $4xz\,\bar{\imath} - y^2\bar{\jmath} + yz\bar{k}$, then evaluate $\int_S \bar{F} \cdot \bar{n}ds$ where S is the surface of the cube bounded by x=0 x=a; y=0 ,y=a; z=0,z=a	[10M]	CO4	L5
10		Verify Gauss Divergence theorem for $\bar{F} = (x^3 - yz)\bar{\imath} - 2x^2y\bar{\jmath} + z\bar{k}$ taken over the surface of the cube bounded by planes x=y=z=a and the co-ordiante planes	[10M]	CO5	L3
		OR			
11		Verify Green's theorem for $\int_C [(xy+y^2)dx + x^2dy]$ where C is bounded by y=x and $y=x^2$	[10M]	CO5	L3

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**

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