MARRI LAXMAN REDDY
INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AN AUTONOMOUS INSTITUTION)
(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)
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MLRS

I B.Tech II Sem Supply End Examination, May 2022
Mathematics -II
(Common to all branches)

Time: 3 Hours.   Max. Marks: 70

Note: 1. Question paper consists: Part-A and Part-B.
2. In Part – A, answer all questions which carries 20 marks.
3. In Part – B, answer any one question from each unit.
Each question carries 10 marks and may have a, b as sub questions.

PART- A
(10*2 Marks = 20 Marks)

1.	a)	Solve: $xdy + ydx = 0$.	2M	CO1	BL3
	b)	State the necessary condition for the differential equation $Mdx + Ndy$ to be exact.	2M	CO1	BL1
	c)	Find the particular solution of $(D^2 + D + 6)y = 0$.	2M	CO2	BL3
	d)	Solve: $(D^2 - 5D + 6)y = 0$.	2M	CO2	BL3
	e)	Define volume integral.	2M	CO3	BL1
	f)	Evaluate $\int_0^1 \int_0^1 y^2 dy dx$.	2M	CO3	BL5
	g)	Define curl of a vector field.	2M	CO4	BL1
	h)	If $\bar{r} = xi + yj + zk$ then find $div\,\bar{r}$.	2M	CO4	BL3
	i)	If S is any closed surface enclosing a volume V and $F = axi + byj + czk$, then find curl F.	2M	CO5	BL3
	j)	Define greens theorem.	2M	CO5	BL1

PART- B
(10*5 Marks = 50 Marks)

2	Solve the differential equation $\dfrac{dy}{dx} + \dfrac{2}{x}y = x^2 y^2$.	10M	CO1	BL3

OR

3	A body originally at $80^o C$ cools down to $60^o C$ in 20 minutes, the temperature of the air being $40^o C$. What will be the temperature of the body after 40 minutes from the original?	10M	CO1	BL3

4	Solve: $\dfrac{d^2 y}{dx^2} + 4\dfrac{dy}{dx} + 3y = e^{2x}$	10M	CO2	BL3

OR

5	Solve $(D^2 - 4D + 4)y = e^{2x} + 3$.	10M	CO2	BL3

6	Using double integration, Find the area lying between the parabola $y = 4x - x^2$ and the straight line $y = x$.	10M	CO3	BL3

<div align="center">**OR**</div>

7	Solve: $x^2 \dfrac{d^2 y}{dx^2} - 4x \dfrac{dy}{dx} + 6y = x$	10M	CO3	BL3

8	Find the directional derivative of $\phi = xy + yz + zx$ at $(1,1,1)$ in the direction towards the point $(2,-1,3)$.	10M	CO4	BL3

<div align="center">**OR**</div>

9	A fluid motion is given by $\overline{f} = (6xy + z^3)i + (3x^2 - z)j + (3xz^2 - y)k.$ Is this motion irrotational? If so find the scalar potential.	10M	CO4	BL3

10	Evaluate $\int\limits_{S} \overline{F} \hat{n} \, ds$ where $\overline{F} = yzi + xzj + xyk$ and S is the portion of the sphere $x^2 + y^2 + z^2 = 1$ which is in the first octant.	10M	CO5	BL3

<div align="center">**OR**</div>

11	Verify Gauss Divergence theorem for $\overline{f} = (x^3 - yz)i - 2x^2 yj + zk$ taken over the surface of the cube bounded by the planes x=y=z=a and coordinate planes.	10M	CO5	BL3

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