Course Code: 1920002 Roll No: **MLRS- R19**

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INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AN AUTONOMOUS INSTITUTION)
(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)
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I B.Tech II Sem Supplementary Examination, September 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 $x\,dy - y\,dx = xy^2\,dx$	2M	CO1	BL3
	b)	Define exact differential equation.-	2M	CO1	BL3
	c)	Solve $4y''' + 4y'' + y' = 0$	2M	CO2	BL3
	d)	Find y_p, Where $(D^2+9)\,y = \cos 3x$	2M	CO2	BL1
	e)	Evaluate $\int_0^2\int_0^x y\,dy\,dx$	2M	CO3	BL5
	f)	Evaluate $\int_0^1\int_0^1\int_0^1 xyz\,dx\,dy\,dz$	2M	CO3	BL5
	g)	Prove that $\nabla(r^n) = n r^{n-2}\bar{r}$	2M	CO4	BL5
	h)	If $\bar{F} = (x+y+1)\bar{i} + \bar{j} - (x+y)\bar{k}$, then find $\bar{F}.\,\mathrm{curl}\,\bar{F}$	2M	CO4	BL1
	i)	If $\bar{F} = xy\,\bar{i} - z\,\bar{j} + x^2\,\bar{k}$ and C is the curve $x=t^2, y = 2t, z = t^3$ from to $t=0$ to $t=1$. Evaluate $\int_C \bar{F}.\,d\bar{r}$	2M	CO5	BL5
	j)	State Stoke's theorem.	2M	CO5	BL5

PART- B

(10*5 Marks = 50 Marks)

2	a)	Solve $x^2 y\,dx - (x^3 + y^3)\,dy = 0$	5M	CO1	BL3
	b)	Solve $\frac{dy}{dx} + \frac{y}{x} = y^2 x \sin x$	5M	CO1	BL3
		OR			
3		If the temperature of a body is changing from 100°C to 70°C in 15 minutes, find when the temperature will be 40°C, if the temperature of air is 30°C. and also find out the temperature of the body after 30 min	10M	CO1	BL1

4	Solve $(D^2 - 4D + 4)\,y = 8x^2 e^{2x} \sin 2x$.	10M	CO2	BL3

OR

5	Solve $(D^2 + a^2)\,y = \tan ax$, by the method of variation of parameters.	10M	CO2	BL3
6	Change the order of integration in $\int_0^1 \int_{x^2}^{2-x} xy\,dx\,dy$ and hence evaluate the double integral.	10M	CO3	BL5

OR

7	Find the area of the region bounded by the parabolas $y^2 = 4ax$ and $x^2 = 4ay$.	10M	CO3	BL1
8 a)	Find the direction derivative of $x^2yz + 4xz^2$ at $(1,-2,-1)$ in the direction of $2\bar{i} - \bar{j} - 2\bar{k}$.	5M	CO4	BL1
b)	Find the angle between the surfaces $x^2+y^2+z^2 = 9$ and $z = x^2+y^2-3$ at the point $(2, -1, 2)$.	5M	CO4	BL1

OR

9	Show that the vector $(x^2 - yz)\bar{i} + (y^2 - zx)\bar{j} + (z^2 - xy)\bar{k}$ is irrotational and find its scalar potential.	10M	CO4	BL5
10	Evaluate $\int_S \bar{F}.\bar{n}\,dS$ where $\bar{F} = 18z\,\bar{i} - 12\bar{j} + 3y\,\bar{k}$ and S is the part of the surface of the plane $2x + 3y + 6z = 12$ located in the first octant.	10M	CO5	BL5

OR

11	Verify Green's theorem in the plane for $\oint_c (3x^2 - 8y^2)dx + (4y - 6xy)\,dy$ where c is the region bounded by $y = \sqrt{x}$ and $y = x^2$.	10M	CO5	BL5

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CO: Course Outcome

BL - Blooms Taxonomy Levels