MARRI LAXMAN REDDY
INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AN AUTONOMOUS INSTITUTION)
(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)
Accredited by NBA and NAAC with 'A' Grade & Recognized Under Section2(f) & 12(B)of the UGC act,1956

I B.Tech II Sem Regular/Supply End Examination, September-2022
Engineering 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)	Define Exact differential equations	2M	CO1	BL1
	b)	Solve $y = px + \sqrt{a^2p^2 + b^2}$	2M	CO1	BL3
	c)	Solve $(D^2 + 1)y = 0$	2M	CO2	BL3
	d)	Define Legendre's linear differential equation.	2M	CO2	BL1
	e)	State the Cauchy's nth root test.	2M	CO3	BL3
	f)	Test for the convergence the series $\sum \dfrac{1}{2^n}$	2M	CO3	BL4
	g)	Define divergence of a vector	2M	CO4	BL3
	h)	Find $curl\overline{f}$ where $\overline{f} = grad(x^3 + y^3 + z^3 - 3xyz)$.	2M	CO4	BL3
	i)	Is the work done by a force in moving a particle from one point to another point in an irrotational field is independent of the path of integration? Justify the answer	2M	CO5	BL3
	j)	State Divergence Theorem	2M	CO5	BL1

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

2	a)	Solve $(\cos x \tan y + \cos(x + y))dx + (\sin x \sec^2 y + \cos(x + y))dy = 0$	5M	CO1	BL3
	b)	Solve $(y - px)(p - 1) = p$; where $p = \dfrac{dy}{dx}$	5M	CO1	BL3

OR

3		If the air is maintained at 30°C and the temperature of the body cools from 80°C to 60°C in 12 minutes, find (i) the temperature of the body after 24 minutes. (ii) When will be temperature of the body 40° C.	10M	CO1	BL3

4	a)	Solve $(D^2 + 1)y = \sin x . \sin 2x$.	5M	CO2	BL3
	b)	Solve the differential equation $\left(x^3 D^3 + x^2 D^2\right)y = x + x^2$.	5M	CO2	BL3

OR

5		Solve $(D^2 - 4D + 4)y = 8x^2e^{2x}\sin 2x$.	10M	CO2	BL3
6	a)	Test for convergence of series $\dfrac{n}{n^3 - 2n + 1}$	5M	CO3	BL3
	b)	Test for convergence of series $\dfrac{1}{n\log n}$ use integral test	5M	CO3	BL5

OR

7		Test for convergence of series $\dfrac{x^{2n}}{(n+1)\sqrt{n}}$	10M	CO3	BL5

8	a)	Prove that $\bar{f} = (x^2 + xy^2)i + (y^2 + x^2y)j$ is conservative and find the scalar potential.	5M	CO4	BL3
	b)	Find the maximum value of the directional derivative of $f = x^2yz$ at $(1, 4, 1)$.	5M	CO4	BL3

OR

9	a)	Prove that $\text{curl}(\vec{a} \times \vec{b}) = \vec{a}\,\text{div}\,\vec{b} - \vec{b}\,\text{div}\,\vec{a} + (\vec{b} \cdot \nabla)\vec{a} - (\vec{a} \cdot \nabla)\vec{b}$	5M	CO4	BL3
	b)	Find the directional derivative of the function $f = x^2 - y^2 + 2z^2$ at the point $P(1,2,3)$ in the direction of the line PQ where Q is the point $(5,0,4)$	5M	CO4	BL3

10	a)	Evaluate $\oint_C (3x + 4y)dx + (2x - 3y)dy$, where C is the circle $x^2 + y^2 = 4$.	5M	CO5	BL5
	b)	Find the work done in moving in a particle in the force field $\bar{f} = 3x^2i + (2zx - y)j + zk$, along the curve defined by $x^2 = y, 3x^3 = z$ from $x = 0$ to $x = 2$.	5M	CO5	BL3

OR

11		Verify Gauss divergence theorem for $\bar{f} = (x^3 - yz)i - 2x^2yj + zk$ 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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Co: Course Outcome   **BL : Blooms Taxonomy Levels**