R18 Regulation *Subject code:2B2AA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech II Semester Supplementary Examinations, July 2025

ENGINEERING MATHEMATICS-II

(Common to CE, EEE, ME, ECE, CSE &IT)

Maximum Marks: 70 Date:09.07.2025 Duration: 3 hours

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10X2M=20 Marks)		Marks	CO	BTL
1	Solve $(x^2 + y^2)\,dx + 2xy\,dy = 0$	2M	1	L1
2	Find the orthogonal trajectories of the family of curves $\frac{x^2}{a^2+\lambda} + \frac{y^2}{b^2+\lambda} = 1$ where λ is a parameter.	2M	1	L1
3	Solve $(D^2 + 9)\,y = \cos 3x + \sin 2x$	2M	2	L1
4	Find the P.I of f(D) y = Q(x) where Q(x) = Sin bx (or) Cos bx,where 'b' is a constant.	2M	2	L1
5	Find $L\{cos^3 4t\}$	2M	3	L1
6	Find $L^{-1}\left\{\log\left(\frac{1+s}{s^2}\right)\right\}$	2M	3	L1
7	Find the greatest value of the directional derivative of the function $f = x^2yz^3$ at (2,1,-1)	2M	4	L1
8	If $\bar{F} = xi - y^2j + z^3k$, find curl $\bar{F}$.	2M	4	L1
9	If L {f(t)} = $\bar{f}$(s), then L $\{e^{at}$f(t)$\}$ = $\bar{f}$(s-a),s-a > 0	2M	5	L1
10	Find $L^{-1}\{\frac{s}{s^2-a^2}\}$	2M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
11	Solve $xy\,(1 + xy^2)\,dy/dx = 1$	10M	1	L2
	OR			
12	A body kept in air with temperature 25^0 c cools from 140^0c to 80^0c in 20 minutes. Find the temperature at which the body cools down to 35^0c.	10M	1	L2
13	Solve $(D^2 + 9)\,y = (x^2 + 1)\,e^{3x}$	10M	2	L2
	OR			
14	Solve $(x^2 D^2 - 4xD + 6)\,y = x^2$	10M	2	L2
15	Using convolution theorem find $L^{-1}\{\frac{1}{(s^2+a^2)^2}\}$	10M	3	L2

	OR			
16	Using Laplace Transform solve the differential equation $(D^2 + 4D + 4)y = e^{-t}$ Given that y(0)= y'(0)=0	10M	3	L2
17	(a) Evaluate $\nabla.(\frac{\bar{r}}{r^3})$ where $\bar{r} = x\bar{\imath} + y\,\bar{\jmath} + z\,\bar{k}$, and $r = \lvert\bar{r}\rvert$ (b) Prove that $\nabla^2.(r^n) = n\,(n+1)\,r^{n-2}$	5M 5M	4	L2
	OR			
18	Show that $\nabla^2[f(r)] = \frac{d^2f}{dr^2} + \frac{2}{r}\frac{df}{dr} = f''(r) + \frac{2}{r}f'(r)$, where $r=\lvert\bar{r}\rvert$	10M	4	L2
19	Evaluate the Line integral $\int_c [(x^2 + xy)dx + (x^2 + y^2)dy]$ where 'c' is the square formed by the lines $x = \pm 1$ and $y = \pm 1$.	10M	5	L2
	OR			
20	Find the work done by $\bar{f} = 3x^2\bar{\imath} + \bar{\jmath} + 2z\,\bar{k}$ along the straight line from (0,0,0) to (2,1,3).	10M	5	L2