R20 Regulation *Subject code:3B2AA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B. Tech II Semester Supplementary Examinations, June 2026

ORDINARY DIFFERENTIAL EQUATIONS & VECTOR CALCULUS

(Common to CE, CSE, IT, CSE(AI&ML) & CSE(DS))

Maximum Marks: 70 Date: 15.06.2026 Duration: 3 hours

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 10 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	Define exact differential equation.	2M	1	L1
2	Find I. F. of $2xydy-(x^2+y^2+1)dx=0$	2M	1	L1
3	Solve $(D^3+3D^2+3D+1)y=0$	2M	2	L1
4	Find the P.I. of $(D^2+9)y=cos3x$	2M	2	L1
5	Find $L(e^{-t}.\cos 2t)$	2M	3	L1
6	Find $L^{-1}\{\frac{1}{s^2+2s+5}\}$	2M	3	L1
7	Prove that $div\,\bar{r}=3$	2M	4	L1
8	Define curl of a vector point function.	2M	4	L1
9	State Gauss divergence theorem.	2M	5	L1
10	State Greens theorem in a plane.	2M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
11	Prove that the system of confocal conics $\frac{x^2}{a}+\frac{y^2}{a-b}=1$, is self orthogonal. Here a is the parameter and b is the constant.	10M	1	L2
	OR			
12	a) Solve $\frac{dy}{dx}+x\sin 2y=x^3cos^2y$ b) Solve $2xydy-(x^2+y^2+1)dx=0$	5M 5M	1	L2
13	Solve by the method of variation of parameter $(D^2-2D)y=e^x\sin x$	10M	2	L2
	OR			
14	Solve$(D^3+2D^2+D)y=e^{2x}+x^2+x+\sin 2x$	10M	2	L2
15	Solve $\frac{dx}{dt}=3x+2y, \frac{dy}{dt}+5x+3y=0$	10M	3	L2
	OR			
16	Solve$(x^3D^3+3x^2D^2+xD+8)y=65\cos(\log x)$	10M	3	L2

17	Find Div$\bar{f}$ at (1,-1,1), If $\bar{f} = xy^2i + 2x^2yzj - 3yz^2k$	10M	4	L2
	OR			
18	Prove that curl $(\bar{a}\ x\ \bar{b}) = \bar{a}$ div $\bar{b} - \bar{b}$ div $\bar{a} + (\bar{b}.\nabla)\ \bar{a}$ - $(\bar{a}.\nabla)\ \bar{b}$	10M	4	L2
19	Solve $(x+1)^2\frac{d^2y}{dx^2} - 3(x+1)\frac{dy}{dx} + 4y = x^2 + x + 1$	10M	5	L2
	OR			
20	Prove that the vector $(x^2 - yz)i + (y^2 - zx)j + (z^2 - xy)k$ is irrotational and find its scalar potential.	10M	5	L2