R20 Regulation *Subject code:3B2AE*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B. Tech II Semester Supplementary Examinations, June 2026

ORDINARY DIFFERENTIAL EQUATIONS, TRANSFORMS AND VECTOR CALCULUS

(EEE)

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	Find I. F. of $(x^2)dy - (x^2+y^2)dx = 0$.	2M	1	L1
2	State Newton's law of cooling.	2M	1	L1
3	Solve $(D^2+D+1)y=0$.	2M	2	L1
4	Solve $(D^3+3D^2+3D+1)y = 0$.	2M	2	L1
5	State second shifting theorem.	2M	3	L1
6	Find L $\{e^{-t}(3cos5t - 4sin5t)\}$.	2M	3	L1
7	Define gradient of a scalar point function.	2M	4	L1
8	If $\bar{f}=(x^2y)\,\bar{\imath}+(2y^2z)\bar{\jmath}+(3z^2y)\bar{K}$ then find curl $\bar{f}$.	2M	4	L1
9	State Stoke's theorem.	2M	5	L1
10	Define surface integral.	2M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
11	Solve $(1+y^2) + \left(x - e^{tan^{-1}y}\right)\frac{dy}{dx} = 0$.	10M	1	L2
	OR			
12	A Bacterial culture , growing exponentially, increases from 100 to 400 grams in 10 hours. How much was present after 3 hours.	10M	1	L2
13	Solve $(D^2 - 4D + 4)y = 8x^2e^{2x}sin2x$.	10M	2	L2
	OR			
14	Solve by the method of variation of parameters $(D^2 + a^2)y = secax$.	10M	2	L2
15	Using Laplace transform evaluate, $\int_0^\infty \frac{\cos at - \cos bt}{t}\,dt$.	10M	3	L2
	OR			
16	Solve the D.E $\frac{d^2y}{dx^2} - 4\frac{dy}{dx} + 12y = e^{3x}$ given that $y(0) = 0$ and $y'(0) = 0$.	10M	3	L2
17	Prove that if $\bar{r}$ is the position vector of any point in space, then $r^n\bar{r}$ is irrotational.	10M	4	L2

	OR			
18	Prove that $\nabla x(\nabla x\bar{a}) = \nabla(\nabla.\bar{a}) - \nabla^2\bar{a}$.	10M	4	L2
19	Verify gauss divergence theorem for $F = x^3\bar{\imath} + y^3\bar{\jmath} + z^3\bar{k}$ taken over the cube bounded by x=0,x=a,y=0,y=a,z=0,z=a.	10M	5	L2
	OR			
20	Find the work done by $\bar{F}$=(2x – y -3) $\bar{\imath}$ + (x +y -z)$\bar{\jmath}$ + (3x – 2y – 5z) $\bar{k}$ along a curve C, $x^2 + y^2 = 4 : z = 0$.	10M	5	L2