



R20 Regulation

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

Subject code: 3B2AE

## B.Tech II Semester Supplementary Examinations, January 2024

### ORDINARY DIFFERENTIAL EQUATIONS, TRANSFORMS AND VECTOR CALCULUS (EEE)

Maximum Marks: 70

Date: 19.01.2024 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

Answer All the following questions.

(2X10M=20Marks)

		CO	Bloom Tx
1	Define Linear differential equation.	CO1	L1
2	Check whether the D.E. is exact or not $(y^2 - x^2)dx + 2xydy = 0$ .	CO1	L2
3	Find the P.I. of $(D^2 + 9)y = \cos 3x$ .	CO2	L3
4	Find P.I of $(D^2 + 6D + 9)Y = 2e^{-3x}$ .	CO2	L3
5	State second shifting theorem.	CO3	L1
6	Find $L\{e^{-t}(3\cos 5t - 4\sin 5t)\}$ .	CO3	L3
7	Define divergence of a vector point function.	CO4	L1
8	Prove that $\text{curl grad } \phi = 0$ .	CO4	L3
9	State Greens theorem in a plane.	CO5	L1
10	write the formulas when the projections is in XY, YZ, ZY planes.	CO5	L1

#### Part-B

Answer All the following questions.

(5X10M=50Marks)

- 11 Solve  $3\frac{dy}{dx} - y\cos x = y^4(\sin 2x - \cos x)$ . [10M]

CO1 L3

OR

- 12 Prove that the system of confocal conics  $\frac{x^2}{a^2 + \lambda} + \frac{y^2}{b^2 + \lambda} = 1$ , where  $\lambda$  is a parameter is self orthogonal. [10M]

CO1 L3

- 13 Solve  $(D^2 + D + 1)y = x\sin x$ . [10M]

CO2 L3

OR

- 14 Solve by the method of variation of parameters  $(D^2 + a^2)y = \tan ax$ . [10M]

CO2 L3

- 15 Using Laplace transform evaluate,  $\int_0^\infty \frac{\cos at - \cos bt}{t} dt$ . [10M]

CO3 L3

OR

- 16 Solve the D.E  $\frac{d^2 y}{dx^2} - 4 \frac{dy}{dx} + 12y = e^{3x}$  given that  $y(0) = 0$  and  $y'(0) = 0$ . [10M] CO3 L3

- 17 Prove that  $\text{div}(\phi \bar{a}) = (\text{grad} \phi) \cdot \bar{a} + \phi \text{div} \bar{a}$ . [10M] CO4 L3

OR

- 18 Prove that  $\nabla x(\nabla x \bar{a}) = \nabla(\nabla \cdot \bar{a}) - \nabla^2 \bar{a}$ . [10M] CO4 L3

- 19 Verify gauss divergence theorem for  $F = x^3 \bar{i} + y^3 \bar{j} + z^3 \bar{k}$  taken over the cube bounded by  $x=0, x=a, y=0, y=a, z=0, z=a$ . [10M] CO5 L4

OR

- 20 Find the work done by  $\bar{F} = (2x - y - 3) \bar{i} + (x + y - z) \bar{j} + (3x - 2y - 5z) \bar{k}$  along a curve C,  $x^2 + y^2 = 4 : z = 0$ . [10M] CO5 L3