



R20 Regulation

Subject code: 3B2AA

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech II Semester Supplementary Examination, September 2023

ORDINARY DIFFERENTIAL EQUATIONS & VECTOR CALCULUS

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

Maximum Marks: 70

Date: 14.09.2023 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)

- 1 Define Linear differential equation.
- 2 Find I. F. of $2xydy - (x^2 + y^2 + 1)dx = 0$.
- 3 Find the C.F. of $(D^2 + 9)y = \cos 3x$.
- 4 Find General solution of $(D^2 + 2D + D)y = 0$.
- 5 Find the wronskin of the differential equation $(D^2 + 4)y = 0$
- 6 Transform the differential equation $x^2 \frac{d^2y}{dx^2} + 4x \frac{dy}{dx} + 2y = 0$ with constant coefficients.
- 7 Define divergence of a vector point function
- 8 If $\vec{f} = (x^2y)\vec{i} + (2y^2z)\vec{j} + (3z^2y)\vec{k}$ then find curl \vec{f} .
- 9 State Gauss divergence theorem.
- 10 State Greens theorem in a plane.

Part-B

Answer All the following questions.

(5X10M=50Marks)

- 11 Solve $x \frac{dy}{dx} + y = x^3y^6$ [10]
OR
- 12 Solve $y(1 + xy)dx + x(1 - xy)dy = 0$ [10]
- 13 Solve $(D^3 + 2D^2 + D)y = e^{2x} + \sin 2x$ [10]
OR
- 14 Solve $(D^2 + 2D - 3)y = x^2e^{-3x}$ [10]
- 15 Solve $x^2 \frac{d^2y}{dx^2} + 4x \frac{dy}{dx} + 2y = x^2 + \frac{1}{x^2}$ [10]
OR
- 16 Solve $(x^3D^3 + 3x^2D^2 + xD + 8)y = 65\cos(\log x)$ [10]
- 17 Prove that $\vec{f} = (y^2 \cos x + z^3)\vec{i} + (2y \times \sin x - 4)\vec{j} + (3xz^2)\vec{k}$ is irrotational. [10]
OR

- 18 Find the directional derivative of $\phi = x^2 - 2y^2 + 4z^2$ at $(1,1,-1)$ in the direction of $2\bar{i} + \bar{j} - \bar{k}$. [10]
- 19 Verify greens theorem in the plane for $\int_C (x^2 - xy^3) dx + (y^2 - 2xy) dy$ where c is a square with vertices $(0,0)$, $(2,0)$, $(2,2)$, $(0,2)$ [10]
- OR
- 20 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 $y=\pm 1$ [10]