

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

B.Tech I Year II Semester Supplementary Examinations May/June-2024
DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

(Common to CE, ME, ECE,EEE & AGE)

Time: 3 Hours

Max. Marks: 60

(Answer all Five Units 5 x 12 = 60 Marks)

UNIT-I

1 a Solve $(x+1)\frac{dy}{dx} - y = e^{3x}(x+1)^2$

CO1 L1 6M

b Solve $(D^2-3D+2)y = \cos(3x)$

CO1 L2 6M

OR

2 Solve $(D^2-3D+2)y = xe^{3x} + \sin(2x)$

CO1 L2 12M

UNIT-II

3 Solve $\frac{d^2y}{dx^2} + 4y = \tan 2x$ by the Method of variation of Parameters

CO2 L2 12M

OR

4 Solve $x^2\frac{d^2y}{dx^2} - x\frac{dy}{dx} + y = \log x$

CO2 L2 12M

UNIT-III

5 a Form the partial differential equation by eliminating the arbitrary constants a & b from $2z = \frac{x^2}{a^2} + \frac{y^2}{b^2}$

CO3 L2 6M

b Form the partial differential equation by eliminating the arbitrary function $z = xy + f(x^2 + y^2)$

CO3 L2 6M

OR

6 Solve $4u_x + u_y = 3u$, by the method of separation of variables.

CO3 L2 12M

UNIT-IV

7 Find the directional derivative of $f = 2xy + z^2$ at $(1, -1, 3)$ in the direction of the vector $\bar{i} + 2\bar{j} + 3\bar{k}$.

CO4 L2 12M

OR

8 a Show that $\nabla r^n = n r^{n-2} \bar{r}$ when $\bar{r} = xi + yj + zk$ and $r = |\bar{r}|$

CO4 L2 6M

b Prove that $\text{div}(\text{curl } \bar{f}) = 0$

CO4 L2 6M

UNIT-V

9 Evaluate $\int_S \bar{F} \cdot \bar{n} dS$, where $\bar{F} = 18zi - 12j + 3yk$, and S is the part of the surface of the plane $2x+3y+6z=12$ located in the first octant.

CO5 L2 12M

OR

10 a State Gauss Divergence theorem.

CO5 L2 2M

b Verify Stoke's theorem for the function $\bar{F} = x^2\bar{i} + xy\bar{j}$ integrated round the square in the plan $z=0$ whose sides are along the lines $x=0, y=0, x=a, y=a$.

CO5 L2 10M

*** END ***

