



# DTL Assignments

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# Assignment - Mathematical

$$Eq^n s$$

## **1 ODEMC Syllabus**

### **1.1 Unit 1**

1. Review of first order differential equations
2. Reduction of order
3. Linear Differential Equations

### **1.2 Unit 2**

1. Laplace Transform
2. Properties
3. Unit step function

### **1.3 Unit 3**

1. Functions of several variables
2. Level curves and level surfaces
3. Partial and directional derivatives

Q.1) Solve the following:

(a)  $3x(xy - 2)dx + (x^3 + 2y)dy = 0$  [CO 2] [2]

(b)  $(2 \cos y + 4x^2)dx - x \sin y dy = 0$  [CO 2] [3]

Q.2) Find a homogeneous linear second order ordinary differential equation whose solution is the set of all straight lines in the  $xy$ -plane. [CO 1] [1]

Q.3) State whether the following differential equations are linear or non linear, justify and solve:

(a)  $xy' + 2y = \frac{e^{3x}}{x}, x > 0$  with  $y(1) = 1 + \frac{e^3}{3}$ . [CO 2] [3]

(b)  $x^2 y \frac{dy}{dx} - xy^2 = 1$  [CO 2] [3]

Q.4) If  $x^2$  and 1 are solutions of  $yy'' - xy' = 0$  then so is any linear combination of these. State true or false and justify. [CO 4] [2]

Q.5) Find a linear ordinary differential equation for which the function  $e^{-x} \cos 2x$  and  $e^{-x} \sin 2x$  are linearly independent solutions. [CO 2] [3]

Q.6) Find the Rank and Nullity of following Matrix:

$$A = \begin{pmatrix} 1 & -2 & -4 & 1 \\ 3 & 7 & 8 & 2 \\ 2 & 0 & 3 & 4 \\ 5 & 2 & 4 & 7 \end{pmatrix}$$

Q.7) Solve the given equation of form  $AX = B$

$$A = \begin{pmatrix} 1 & 1 & 1 \\ 1 & 2 & 3 \\ 1 & 4 & 7 \end{pmatrix}, X = \begin{pmatrix} x \\ y \\ z \end{pmatrix} B = \begin{pmatrix} 6 \\ 14 \\ 30 \end{pmatrix}$$

Q.8) Show that the following matrix is diagonalizable:

$$A = \begin{pmatrix} 1 & 0 & 1 \\ 1 & 2 & 1 \\ 2 & 2 & 3 \end{pmatrix}$$

Here are some examples of simple usage of subscripts and superscripts:

$$\int_0^1 x^2 + y^2 \, dx$$

Using superscript and subscripts in the same expression

$$a_1^2 + a_2^2 = a_3^2$$

Longer subscripts and superscripts:

$$x^{2\alpha} - 1 = y_{ij} + y_{ij}$$

Nested subscripts and superscripts

$$(a^n)^{r+s} = a^{nr+ns}$$

Example of a mathematical equation with subscripts and superscripts

$$\sum_{i=1}^{\infty} \frac{1}{n^s} = \prod_p \frac{1}{1 - p^{-s}}$$

Squared root usage

$$\sqrt[4]{4ac} = \sqrt{4ac}\sqrt{4ac}$$

## 2 Table of Raw Contents

Table 1: Price of various fruits

Sr. no.	Fruits	Price
1	Apple	20
2	Orange	40
3	Guava	50
4	Banana	60
5	Pineapple	10

## 3 Include table from CSV

MIS No.	Name	Div Batch
142203001	Sarvesh Mankar	SY 5
142203002	Test 1	SY 5
142203003	Test2	SY 5
142203004	Test 3	SY 5
142203005	Test 4	SY 5
142203006	Test 5	SY 5
142203007	Test 6	SY 5
142203008	Test 7	SY 5
142203009	Test 8	SY 5
142203010	Test 9	SY 5
142203011	Test 10	SY 6
142203012	Test 11	SY 6
142203013	Test 12	SY 6
142203014	Test 13	SY 6
142203015	Test 14	SY 6
142203016	Test 15	SY 6
142203017	Test 16	SY 6
142203018	Test 17	SY 6