DTL Assignment 2 - Mathematical Equations and Formatting

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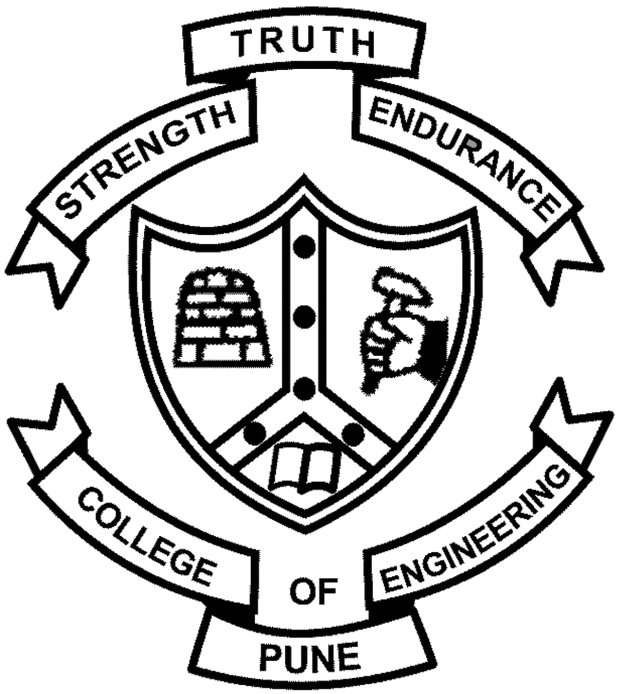

January 18, 2023

1 LAUC Syllabus

1.1 Unit 1

1. Linear Algebra
2. Vector Spaces
3. Differential Equations

1.2 Unit 2

1. Laplace Inverse Transform
2. Transfer Function
3. Time Domain Analysis

1.3 Unit 3

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

College of Engineering, Pune.

B.Tech II Year

November 2022, Odd Semester

Linear Algebra and Uni-variate Calculus

TEST - 1

Duration-1.5 hours

Marks 30

Q.1) Solve the following:

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

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

Q.2) Prove the following matrices equal if $AB=A^T.B^T$. [CO 1] [1]

$$B_{m\times n}=\begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{m1} & a_{m2} & \cdots & a_{mn} \end{bmatrix}$$

$$A_{m\times n}=\begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{m1} & a_{m2} & \cdots & a_{mn} \end{bmatrix}$$

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)$x^2y\frac{dy}{dx}-xy^2=1$ [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) Solve the given equation of form $AX=B$

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