Endurance
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College of Engineering
★ Pune ★
Estd.1854

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:

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

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