**DAYANANDA SAGAR COLLEGE OF ENGINEERING**

(Autonomous Institution affiliated to VTU)

**DEPARTMENT OF MATHEMATICS**

**LESSON PLAN for EVEN semester: 2019**

**Subject: Engineering Mathematics-II** **Class:** **Sem : II**

**Subject Code: 18MA2ICMAT** **Staff:**

| Week | Hour | Date | Units | | Details of Portion coverage |
|---|---|---|---|---|---|
| | | | MODULE 1 | Linear differential equation with constant coefficient | Introduction- Linear differential equations: Solution of second and higher order equations with constant coefficients. |
| | | | | | Solution of Homogeneous and non-homogeneous Linear differential equation. |
| | | | | | Problems on Homogeneous linear differential equation. |
| | | | | | P.I of the form - $\frac{e^{ax}}{f(D)}$ |
| | | | | | P.I of the form - $\frac{sinax}{f(D)}$ , $\frac{cosax}{f(D)}$ |
| | | | | | P.I of the form - $\frac{\varphi(x)}{f(D)}$ where $\varphi(x)$ is polynomial in x. |
| | | | | | P.I of the form - $\frac{e^{ax}V}{f(D)}$ , $\frac{xV}{f(D)}$ , $\frac{x^nV}{f(D)}$ Where V is a function of x. |
| | | | | | Some problems on $\frac{xV}{f(D)}$ , $\frac{x^nV}{f(D)}$ Where V is a function of x. |
| | | | | | Applications to oscillations of a spring |
| | | | | | Applications to L-C-R circuits. |
| | | | MODULE 2 | Linear differential equation with variable coefficient and Partial differential Equations | Solution of Cauchy's, Legendre's LDE – Problems. |
| | | | | | Some more problems on cauchy's and Legendre's LDE |
| | | | | | Formation of PDE by elimination of arbitrary constants. |
| | | | | | Formation of PDE by elimination of arbitrary functions. |
| | | | | | Solution of Non homogeneous Partial differential equations by direct integration method – Problems. |
| | | | | | Solution of Linear partial differential equations of first order – Method of grouping. |
| | | | | | Solution of Linear partial differential equations of first order – Method of multipliers. |
| | | | | | Miscellaneous problems on Method of multipliers. |
| | | | | | Solution of one dimensional heat equations by variable separable method. |
| | | | | | Solution of one dimensional wave equations by variable separable method |
| | | | MODULE 5 | Elementary Numerical methods | Finite differences, Interpolation/extrapolation using Newton's forward and backward difference formulae-Problems |
| | | | | | Some more problems on forward and backward difference formulae |
| | | | | | Newton's divided difference formula (All formulae without proof) - Problems |
| | | | | | Lagrange's formulae (All formulae without proof)- Problems |
| | | | | | Solution of Algebraic and transcendental equations– Newton- Raphson ( only formulae)- Problems |
| | | | | | Regula-Falsi methods (only formulae)- Problems . |
| | | | | | **Numerical integration:** Simpson's $(1/3)^{th}$ –Problems |
| | | | | | Simpson's $(3/8)^{th}$ rules –Problems |

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| | | | MODULE 3 | **Vector calculus** | **Vector Differentiation:** Introduction, Scalar and vector fields-definitions |
| | | | | | Gradient, directional derivative -physical interpretation-definitions, problems |
| | | | | | Divergence - physical interpretation; solenoidal vector fields-problems |
| | | | | | curl - physical interpretation; irrotational vector fields-problems |
| | | | | | Some more problems on Gradient, Divergence and curl |
| | | | | | **Vector Integration :**Line integrals - problems |
| | | | | | Theorems of Green, Gauss and Stokes(without proof) |
| | | | | | Problems on theorems |
| | | | | | Applications to work done by a force and flux |
| | | | | | Miscellaneous problems |
| | | | MODULE 4 | **Infinite Series** | **Infinite series:** Inroduction,Convergence and divergence of infinite series-definition |
| | | | | | Cauchy's root test (without proof) - Problems. |
| | | | | | D'Alembert's ratio test (without proof)- Problems. |
| | | | | | Some more problems |
| | | | | | **Power series solutions**-Series solution of Bessel's differential equation leading to $J_n(x)$ |
| | | | | | Bessel's function of first kind-orthogonality. |
| | | | | | Proof of Recurrence relations for Bessel's function |
| | | | | | Proof of some more Recurrence relations for Bessel's function |
| | | | | | Series solution of Legendre's differential equation-Legendre polynomials |
| | | | | | Rodrigue's formula(without proof), problems. |

**Text Books:**


1. B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 43rd Ed., 2015.
2. E. Kreyszig: Advanced Engineering Mathematics, John Wiley &Sons, 10thEd. (Reprint), 2016.
3. E. Kreyszig: Advanced Engineering Mathematics Volume I, John Wiley & Sons, 2014.
4. E. Kreyszig: Advanced Engineering Mathematics Volume II, John Wiley & Sons, 2014.


**Referencebooks**:


1. C.RayWylie,LouisC.Barrett: "Advanced EngineeringMathematics",6thEdition, McGraw-Hill Book Co.,New York, 1995.
2. N.P.Bali and Manish Goyal: A Text Book of Engineering Mathematics, LaxmiPublishers,7th Ed., 2010.
3. B.V.Ramana:"Higher EngineeringMathematics"11thEdition,TataMcGraw-Hill, 2010.
4. Veerarajan T.,"Engineering Mathematicsfor Firstyear",TataMcGraw-Hill, 2008.
5. Thomas. G.B. and Finney. R. L."Calculus and Analytical Geometry"9thEdition, Pearson, 2012.


**Web links and Video Lectures:**

1. http://nptel.ac.in/courses.php?disciplineID=111
2. http://www.class-central.com/subject/math(MOOCs)
3. http://academicearth.org/