STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI
COURSE PLAN June - November 2024

Department : MATHEMATICS
Name/s of the Faculty : Dr. CHINTHAMANI. S
Course Title : PARTIAL DIFFERENTIAL EQUATIONS
Course Code : 23MT/PC/PD34
Shift : I

COURSE OUTCOMES (COs)

COs	Description	CL
CO1	recall the basic concepts of differential equations and to acquire skill to classify first and second order PDEs	K1
CO2	understand the geometrical behavior of solution space of first and second order PDEs	K2
CO3	apply in-depth knowledge of mathematical techniques for solving first and second order partial differential equations	K3
CO4	analyse the physical problems of first and second order PDEs under given constraints and to compare the solutions obtained by analytical and numerical methods	K4
CO5	investigate and explore possible solutions of a system of partial differential equations for problems arising from real-life situations	K5

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Jun 19 – 26, 2024 (Day Order 1 - 6)	1	**Partial Differential Equations of the First Order** 1.1 Integral Surfaces Passing through a Given Curve 1.2 Cauchy Problem for First order Equations 1.3 First order Non-Linear Equations	K1-5	05	CO1-5	Presentation, Lecture & Problem Solving using Mind map	Group Discussion
Jun 27 – July 4, 2024 (Day Order 1 - 6)	1	**Partial Differential Equations of the First Order** 1.4 Compatible Systems of First-order Equations 1.5 Charpit's Method	K1-5	05	CO1-5	Lecture & Problem solving through technical forum LUMI etc	Short Q/A
July 5 – 12, 2024 (Day Order 1 - 6)	1 & 2	**Partial Differential Equations of the Second Order** 1.6 Classification of Second Order PDE 1.7 Canonical Forms **Elliptic Differential Equations** 2.1 Occurrence and Derivation of Laplace Equation	K1-5	05	CO1-5	Lecture & Problem Solving	Quiz using software like Lumi

July 15 – 23, 2024 (Day Order 1 - 6)	2	**Elliptic Differential Equations** 2.1 Occurrence and Derivation of Laplace Equation – Contd 2.2 Separation of Variables 2.3 Dirichlet and Neumann Problem for a Rectangle	K1-5	05	CO1-5	Lecture & Problem Solving	Modelling by Graphing Calculator
July 24 – 31, 2024 (Day Order 1 - 6)	2	**Elliptic Differential Equations** 2.3 Dirichlet and Neumann Problem for a Rectangle - Contd 2.4 Interior and Exterior Dirichlet Problem for a Circle	K1-5	05	CO1-5	Lecture & Problem Solving	**III COMPONENT TEST :** Written Test – 20 marks on Unit 1
Aug 1 – 5, 2024 (Day Order 1 - 3)	2 & 3	**Elliptic Differential Equations** 2.4 Interior and Exterior Dirichlet Problem for a Circle - Contd 2.5 Interior Neumann Problem for a Circle	K1-5	03	CO1-5	Lecture & Problem Solving	Modelling
Aug 6 – 10, 2024	**C.A. Test – I [Unit 1 & Unit 2 : sec 2.1 – 2.4]**						
Aug 12 – 14, 2024 (Day Order 4-6)	3	**Parabolic Differential Equations** 3.1 Occurrence of the Diffusion Equation 3.2 Boundary Conditions	K1-5	02	CO1-5	Lecture & Problem Solving	Experiment
Aug 16 – 23, 2024 (Day Order 1-6)	3	**Parabolic Differential Equations** 3.3 Elementary Solutions of the Diffusion Equation	K1-5	05	CO1-5	Lecture & Problem Solving	Experiment

Aug 27 – Sep 3, 2024 (Day Order 1-6)	3	**Parabolic Differential Equations** 3.4 Dirac Delta Function 3.5 Separation of Variables method	K1-5	05	CO1-5	Lecture & Problem Solving	Mind map
Sep 4 – 11, 2024 (Day Order 1-6)	4	**Hyperbolic Differential Equations** 4.1 Occurrence and Derivation of One-dimensional Wave Equation 4.2 Solution of One-dimensional Wave Equation by Canonical Reduction	K1-5	05	CO1-5	Lecture & Problem Solving	Quiz by using ICT tool Kahoot
Sep 12 - 20, 2024 (Day Order 1-6)	4	**Hyperbolic Differential Equations** 4.3 The Initial Value Problem; D'Alembert's Solution 4.4 Vibrating String – Variables Separable Solution	K1-5	05	CO1-5	Lecture & Problem Solving	**III COMPONENT TEST :** Written Test – 20 marks on Unit 3
Sep 23 - 26, 2024 (Day Order 1-4)	4	**Hyperbolic Differential Equations** 4.5 Forced Vibrations – Solution of nonhomogeneous Equation	K1-5	04	CO1-5	Lecture & Problem Solving	Quiz
Sep 27 – Oct 3, 2024	**C.A. Test – II [Unit 3 & Unit 4: sec 4.1 – 4.4]**						
Oct 4 – 5, 2024 (Day 5 & 6)	5	**Green's Function** 5.1 Green's Function for Laplace equation	K1-5	01	CO1-5	Lecture & Problem Solving	**III COMPONENT TEST :** Presentation – 10 marks on Unit 5

Oct 7 - 15, 2024 (Day Order 1 to 6)	5	**Green's Function** 5.2 The Methods of Images 5.3 The Eigen Function Method	K1-5	05	CO1-5	Lecture & Problem Solving	Presentation
Oct 16 - 22, 2024 (Day Order 1 to 6)	5	**Green's Function** 5.4 Green's Function for the Wave Equation - Helmholtz theorem 5.5 Green's Function for the Diffusion Equation	K1-5	05	CO1-5	Lecture & Problem Solving	Presentation
Oct 23 - 24, 2024 (Day Order 1 to 2)	**REVISION**						