SARDAR PATEL UNIVERSITY , VALLABH VIDYANAGAR
SYLLABUS FOR B.Sc. SEMESTER - 4
US04CMTH21(T) (ORDINARY DIFFERENTIAL EQUATIONS)
FOUR HOURS PER WEEK (4 CREDIT)
Effective from June 2019
Marks:-100 (30 Internal + 70 External)

Unit 1

Differential Equations , Exact Differential Equations , Integrating Factors , Differential Equations of the First Order and of Higher Degree , Differential Equation Solvable for p ,for y and for x , Clairaut's Equation

Unit 2

Linear Differential Equations with Constant Coefficients , Complimentary Function and Particular Integral , Operators , Products of Operators , Determination of Complimentary function , Inverse Operators , Determination of Particular Integral and Working rules for f(D)y = X where $X = e^{mx}, \sin mx, \cos mx, x^m, e^{ax}V, xV$ (where V is a function of x only). Homogeneous Linear Differential Equations, Method of Variation of Parameters for Solving Second Order Non-Homogeneous Differential Equation.

UNIT 3

Laplace Transform , Properties of Laplace Transform ,Laplace Transform of Derivatives ,Laplace Transform of Integrals , Inverse Laplace Transforms ,Properties of Inverse Laplace Transforms ,Solution of ODE with Constant Coefficients , Solution of ODE with Variable Coefficients ,

UNIT 4

Application of Differential Equations : Newton's law of cooling , Rate of growth or decay , Chemical solution , Motion of particle falling under gravity , Electric circuits, Orthogonal Trajectories .

Recommended Texts :

(1) Shanti Narayan,Integral Calculus, Fourteenth Edition, S.Chand & Company Ltd., New Delhi, 1996
Chapter : 11 (11.8,11.9 Only), 12 , 13 , 14.

(2) Nita Shah ,Ordinary and Partial Differential Equations - Theory and Applications , PHI Learning Pvt. Ltd. , New Delhi.
Chapter : 16 (Except 16.10 ,16.11)

(3) Zafar Ahsan ,Differential Equations and Their Applications , 2nd Ed., Prentice - Hall of India Pvt. Ltd.,New Delhi .

Reference texts:

(1) I.Sneddon , Elements of Partial Differential Equations , McGraw Hill Book Company , International Student Edition .

(2) T. Amaranath , An Elementary Course in Partial Differential Equations , Narosa Publishing House , New Delhi .

(3) D J Karia,N Y Patel , B P Patel, M L Patel ,Introduction to calculus and differential equations, Roopal prakashan.

(4) B.S.Grewal, Higher Engineering Mathematics, Thirty-fifth edition,Khanna Publ.

(5) Dr.K.R.Kachot, Higher Engineering Mathematics Vol- 1 ,Mahajan Pub. House, Ahmedabad

(6) M.D.Raisinghania, Ordinary and Partial differential equations,S.Chand & Company Ltd., New Delhi.

SARDAR PATEL UNIVERSITY , VALLABH VIDYANAGAR
SYLLABUS FOR B.Sc. SEMESTER - 4
US04CMTH22(T)(PARTIAL DIFFERENTIAL EQUATIONS)
FOUR HOURS PER WEEK (4 CREDIT)
Effective from June 2019
Marks:-100 (30 Internal + 70 External)

UNIT- 1

Surfaces and Curves in Three Dimensions , Methods of Solving $\dfrac{dx}{P} = \dfrac{dy}{Q} = \dfrac{dz}{R}$, Orthogonal Trajectories of a System of Curves on Surface,Pfaffian Forms and Equations , Solution of Pfaffian Differential Equations in Three Variables

UNIT- 2

Partial Differential Equations,Origin of First Order Partial Differential Equations, Linear Equations of the First Order , Integral Surfaces Through a Given Curve,Surfaces Orthogonal to a Given System of Surfaces .

UNIT - 3

Non-linear Partial Differential Equations of First Order , Compatible Systems of First Order Equations ,Charpit's Method , Special Types of First Order Equations, Solutions Satisfying Given Conditions

UNIT - 4

Jacobi's Method , Applications of First Order Equations , The Origin of Second Order Equations , Linear Partial Differential Equations With Constant Coefficients, Equations With Variable Coefficients , Solution of Equation by Separation of Variable .

Recommended texts:

I.Sneddon,Elements of Partial Differential Equations,McGraw Hill Book Company, International Student Edition.

Chapter 1 (1.1,1.3,1.4,1.5(excluding Thm.6),1.6),Chapter 2 (2.1,2.2 , 2.4 (Thm.3 without proof),2.5,2.6,2.7,2.9,2.10,2.11 , 2.12 , 2.13 , 2.14),Chapter 3 (3.1,3.4,3.5,3.9)

Reference Books :

(1) T. Amaranath ,An Elementary Course in Partial Differential Equations , Narosa Publishing House , New Delhi .
(2) Nita Shah ,Ordinary and Partial Differential Equations-Theory and Applications , PHI Learing Pvt. Ltd. , New Delhi.
(3) Zafar Ahsan , Differential Equations and Their Applications ,Prentice - Hall of India Pvt. Ltd.,New Delhi .
(4) M.D.Raisinghania, Ordinary and Partial differential equations,S.Chand & Company Ltd., New Delhi.

SARDAR PATEL UNIVERSITY ,VALLABH VIDYANAGAR
SYLLABUS FOR B.Sc. SEMESTER - 4
US04CMTH23(P) (MATHEMATICS PRACTICAL)
EIGHT HOURS PER WEEK (4 CREDIT)
Effective from June 2019
Marks:-100 (External)

PART - 1 [Marks:-50 (External)]
PROBLEMS AND EXERCISES IN ORDINARY DIFFERENTIAL EQUATIONS
List of Practical :

(1) Differential Equations ,Exact Differential Equations; Integrating Factors
(2) Differential Equations of the First Order and of Higher Degree , Differential Equation Solvable for p ,for x and for y; Clairaut's Equation
(3) Linear Differential Equations with Constant Coefficients , Complimentary Function and Particular Integral ,Determination of Particular Integral and Working rules for f(D)y = X where $X = e^{mx}, \sin mx, \cos mx, x^m$.
(4) Determination of Particular Integral and Working rules for f(D)y = X where $X = e^{ax}V, xV$ (where V is a function of x only). Homogeneous Linear Differential Equations, Method of Variation of Parameters for Solving Second Order Non-Homogeneous Differential Equation.
(5) Laplace Transform , Properties of Laplace Transform , Laplace Transform of Derivatives , Laplace Transform of Integrals , Inverse Laplace Transforms, Properties of Inverse Laplace Transforms
(6) Solution of ODE with Constant Coefficients ,Solution of ODE with Variable Coefficients
(7) Application of Differential Equations
(8) Orthogonal Trajectories in Cartesian Co-ordinates

PART-2 [Marks:-50 (External)]
PROBLEMS AND EXERCISES IN PARTIAL DIFFERENTIAL EQUATIONS
List of Practical :

(1) Surfaces and Curves in Three Dimensions , Methods of Solving $\dfrac{dx}{P} = \dfrac{dy}{Q} = \dfrac{dz}{R}$
(2) Orthogonal Trajectories of a System of Curves on Surface , Pfaffian Forms and Equations , Solution of Pfaffian Differential Equations in Three Variables
(3) Partial Differential Equations , Origin of First Order Partial Differential Equations , Linear Equations of the First Order
(4) Integral Surfaces Through a Given Curve ,Surfaces Orthogonal to a Given System of Surfaces
(5) Non-linear Partial Differential Equations of First Order , Compatible Systems of First Order Equations ,Charpit's Method

(6) Special Types of First Order Equations , Solutions Satisfying Given Conditions
(7) Jacobi's Method , Applications of First Order Equations , The Origin of Second Order Equations ,
(8) Linear Partial Differential Equations With Constant Coefficients , Equations With Variable Coefficients , Solution of Equation by Separation of Variable

NOTE :

(1) Problem solving skill in mathematics is an important aspect in the teaching of mathematics.

(2) There would be a batch of problem solving session will be of eight hours per week and they will be conducted in batches of students of size 20 to 25 per batch.

(3) The candidate shall have to produce at the time practical Examination the record of their prescribed Laboratory work, certified by the Head of the Department.

Reference Books:

(1) Shanti Narayan,Integral Calculus, Fourteenth Edition,S.Chand & Company Ltd., New Delhi, 1996
(2) Nita Shah , Ordinary and Partial Differential Equations - Theory and Applications , PHI Learning Pvt. Ltd. , New Delhi.
(3) I.Sneddon , Elements of Partial Differential Equations , McGraw Hill Book Company , International Student Edition .
(4) T. Amaranath , An Elementary Course in Partial Differential Equations , Narosa Publishing House , New Delhi .
(5) Zafar Ahsan ,Differential Equations and Their Applications , Prentice - Hall of India Pvt. Ltd.,New Delhi .
(6) D J Karia,N Y Patel , B P Patel, M L Patel ,Introduction to calculus and differential equations, Roopal Prakashan .
(7) B.S.Grewal, Higher Engineering Mathematics, Thirty-fifth edition,Khanna Publ.
(8) M.D.Raisinghania, Ordinary and Partial differential equations,S.Chand & Company Ltd., New Delhi.

SARDAR PATEL UNIVERSITY , VALLABH VIDYANAGAR
SYLLABUS FOR B.Sc. SEMESTER - 4
US04SMTH21(T)(NUMBER THEORY - 2)
TWO HOURS PER WEEK (2 CREDIT)
Effective from June 2019
Marks:-50   (External)

PREREQUISITE : Prerequisite to opt for this course is that the Student must have opted the course US03SMTH21(T) (NUMBER THEORY-1) in Sem - 3

UNIT-1
Linear indeterminate equations and its solution ,General solution of Linear indeterminate equation with three unknown , Pythagoras (Shang-gao indeterminate) equation and its solution.

UNIT-2
Congruences : Definition and examples , Properties of congruences ,Necessary and sufficient condition for a positive integer can be divided by 3,9,4,7,11 or 13 .

UNIT-3
Complete residue system(mod m) and its properties , Reduced residue system(mod m) and its properties , Euler's theorem,Fermat's theorem , Properties of Euler's function .

UNIT-4
Congruence in one unknown , Solution of Linear congruence in one unknown and two unknown, Chinese theorem ,Solution of system of congruences.

Recommended texts :

C.Y.Hsiung, Elementary Theory of numbers, Allied publishers Ltd.(1992)

Reference Books:

(1) D.Burton , elementary Number Theory, 6th Ed , Tata McGraw-Hill Edition,Indian reprint.
(2) I.Niven And H.Zuckermar , An Introduction to the theory of Numbers, Wiley-Eastern Publication.
(3) S.Barnard and J.N.Child , Higher Algebra, Mc Millan and Co. Ltd.
(4) Neville Robinns, Beginning Number Theory , 2nd Ed.,Narosa Publishing House Pvt.Ltd. Delhi,2007