TEACHING PLAN
FOR EVEN SEMETER
Jan-2022-July 2022

Name of the Faculty: Mr. Dulal Baruah, M.Sc. MPhil.
Department: Mathematics

Semester: B.A. 2nd Semester (Honours) (CBCS)
Paper Name: Differential Equation **Paper Code: C2.2**
Contact Hour(s): 35 Hrs.

Objectives: After going through this course the students will be able to
• Use the techniques to solve differential equations.
• Apply these techniques in various mathematical models used in real life problems.

Sl. No.	Topics (As per University Syllabus)	Hours	Remarks/Books
1	General solution of homogeneous equation of second order	**3**	Books: S.L. Ross, *Differential Equations,* 3rd Ed.,
2	principle of super position for homogeneous equation	**3**	
3	Wronskian: its properties and applications	**3**	
4	Linear homogeneous and non-homogeneous equations of higher	**5**	
	Euler's equation, method of undetermined coefficients, method of	**4**	
	Evaluation of the Unit (problem practice)	**5**	
5	Tutorial	**2**	
Total		**25 Hrs**	
Unit-4		**Marks: 10**	**Contact hrs: 10**
6	Equilibrium points	**1**	Book: E. A. Codding ton, An Introduction to Ordinary Differential Equation,
7	Interpretation of the phase plane	**2**	
8	predatory-prey model and its analysis	**2**	
9	Epidemic model of influenza and its analysis,	**1**	
10	Battle model and its analysis	**1**	
11	Evaluation of the Unit (problem practice)	**2**	
12	Tutorial	**1**	
	Total	**10 Hrs**	

Teaching Plan
Department of Mathematics
Session: 2022-23(Jul-Dec)
Name of the Teacher: Dr. Abhijit Mukherjee
BA. 5th Semester(Hons: Mathematics)
Allotted Paper: C 5.1 (Multivariate Calculus)

Objective: After going through this course the students will be able to:

1)Extend the concepts from one variable calculus to function of several variables

2) Demonstrate the ability to think critically and solving application of real world problems involving double/triple integrals

Paper/Unit	Detailed Teaching Plan	Teaching Hours Required
Unit-I	1. Functions of several variables, limit and continuity of functions of two variables.	3
	2. Partial differentiation, total differentiability and differentiability.	3
	3. Sufficient condition for differentiability. Chain rule for one and two independent parameters.	4
	4. Directional derivatives, the gradient, maximal and normal property of the gradient.	5
	5. Tangent planes, Extrema of functions of two variables.	4
	6. Method of Lagrange multipliers, constrained optimization problems.	4
	7. Definition of vector field, divergence and curl.	5
	8. Tutorial.	2
Unit-II	1. Double integration over rectangular region, double integration over non-rectangular region.	4
	2. Double integrals in polar co-ordinates.	3
	3. Triple integrals, Triple integral over a parallelepiped and solid regions.	4
	4. Volume by triple integrals .	3
	5. Cylindrical and spherical co-ordinates.	4
	6. Tutorial	2
Unit-III	1. Change of variables in double integrals and triple integrals.	6

	2. Line integrals, Applications of line integrals: Mass and work.	6
	3. Fundamental theorem for line integrals.	3
	4. Conservative vector fields, independence of path.	3
	5. Tutorial	2
Unit-IV	1. Green's theorem.	5
	2. Surface integrals, integrals over parametrically defined surfaces.	4
	3. Stoke's theorem.	5
	4. Divergence Theorem	4
	5. Tutorial	2

Teaching Plan
Department of Mathematics
Session: 2022-23(Jul-Dec)
Name of the Teacher: Dr. Abhijit Mukherjee
BA. 3rd Semester(Hons: Mathematics)
Allotted Paper: C 3.1 (Theory of Real Functions)

Objective: After going through this course the students will be able to:
1) Discuss limit, continuity and differentiability of real valued functions
2)Expand functions in series and different form of remainders

Paper/Unit	Detailed Teaching Plan	Teaching Hours Required
Unit-I	1. Limits of functions (approach), sequential criterion for limits, divergence criteria.	4
	2. Limit theorems, one sided limits.Infinite limits and limits at infinity.	5
	3. Continuous functions, sequential criterion for continuity and discontinuity.	4
	4. Algebra of continuous functions. Continuous functions on an interval.	4
	5. Intermediate value theorem, location of roots theorem, preservation of intervals theorem.	5
	6. Uniform continuity, non-uniform continuity criteria, uniform	6

	continuity theorem.	
	7. Tutorial	2
Unit-II	1. Differentiability of a function at a point and in an interval	5
	2. Caratheodory's theorem, algebra of differentiable functions.	5
	3. Relative extrema, interior extremum theorem.	5
	4. Rolle's theorem, Mean value theorem, intermediate value property of derivatives, Darboux's theorem	8
	5. Applications of mean value theorem to inequalities and approximation of polynomials, Taylor's theorem to inequalities.	5
	6. Tutorial	2
Unit-III	1. Cauchy's mean value theorem.	3
	2. Taylor's theorem with Lagrange's form of remainder, Taylor's theorem with Cauchy's form of remainder	7
	3. Application of Taylor's theorem to convex functions, relative extrema.	7
	4. Taylor's series and Maclaurin's series expansions of exponential and trigonometric functions, ln(1 + x), 1/ax+b and (1 +x)n	8
	5. Tutorial	5

Teaching Plan
Department of Mathematics
Session: 2022-23(Jul-Dec)
Name of the Teacher: Dr. Abhijit Mukherjee
BA. 1ST Semester(Generic: Mathematics)
Allotted Paper: GE-1.1 (Differential Calculus)

Objective: After going through this course the students will be able to:
1) Differentiate functions
2) Find tangent normal, curvature, asymptotes etc.

Paper/Unit	Detailed Teaching Plan	Teaching Hours Required

Unit-II	1. Tangents and normals	4
	2. Curvature, Asymptotes, Singular points	8
	3. Tracing of curves	8
	4. Parametric representation of curves and tracing of parametric curves	4
	5. Polar coordinates and tracing of curves in polar coordinates	4
	6. Tutorial	2

Women's College, Tinsukia

TEACHING PLAN

Name of the teacher : SANGEETA GOHAIN BORUAH

Subject : Mathematics

Session : Odd Semester, 2022

Allotted Paper Code/Title	Method to be applied	Teaching material	Unit	Topic	Period required Class + test	Time In hour
C3.2 Group Theory I	Discussion on the topic, solving examples & problems, after completion a class test on that topic	Text book, reference book, black board, e-learning	Unit-1 Marks:15	Definition and examples of groups including permutation groups and quaternion groups (illustration through matrices)	6 +1	6
				Elementary properties of groups.	3+ 1	4
				Symmetries of a square, Dihedral groups	4 +1	5
			Unit-II Marks:15	Subgroups and examples of subgroups,	4 +1	5
				Centralizer, normalizer, center of a group	4 +1	5
				Product of two subgroups.	3 + 1	4
			Unit-3 Marks:20	Properties of cyclic groups	3 + 1	4
				Classification of subgroups of cyclic groups.	3 + 1	4
				Cycle notation for permutations, properties of permutations, even and odd permutations	2 + 1	3
				Alternating group, properties of cosets	5 + 1	6
				Lagrange's theorem and consequences including Fermat's Little theorem.	3 + 1	4
			Unit-4 Marks:15	External direct product of a finite number of groups	4 + 1	5
				Normal subgroups, factor groups	4 + 1	5
				Cauchy's theorem for finite abelian groups.	4 + 1	5
			Unit-5 Marks:15	Group homomorphisms, properties of homomorphisms,	4 + 1	5
				Cayley's theorem, properties of isomorphisms, First, Second and Third isomorphism theorems. convergence.	4 + 1 4 + 1 4 + 1	5 5 5

Allotted Paper Code/Title	Method to be applied	Teaching material	Unit	Topic	Period required Class + test	Time In hour
C5.2 Group Theory-II			Unit-1 Marks: 30	Automorphism, inner automorphism	3 + 1	4
				Automorphism groups, automorphism groups of finite and infinite cyclic groups	5 + 1	6
				Applications of factor groups to automorphism groups	5 + 1	6
				Characteristic subgroups, Commutator subgroup and its properties.	5 + 1	6
			Unit-2 Marks: 20	Properties of external direct products,	5 + 1	6
				The group of units modulo n as an external direct product	3 + 1	4
				Internal direct products	3 + 1	4
				Fundamental Theorem of finite abelian groups.	3 + 1	4
			Unit-3 Marks: 30	Groups acting on themselves by conjugation	3 + 1	4
				Class equation and consequences Conjugacy in Sn	4 + 1	5
				p-groups, Sylow's theorems and consequences	4 + 1	5
				Cauchy's theorem, Simplicity of Anfor n ≥ 5, non-simplicity tests.	4 + 1	5
GE-1.1 Differential Calculus				Rolle's theorem	3 + 1	4
			Unit-3 Marks: 30	Mean Value theorems	3 + 1	4
				Taylor's theorem with Lagrange's and Cauchy's forms of remainder	3 + 1	4
				Taylor's series, Maclaurin's series of sin x, cos x, ex, log(l+x), (l+x)m,	3 + 1 6 + 1	4 7
				Maxima and Minima, Indeterminate forms.	5 + 1	6

TEACHING PLAN -2022(ODD SEMESTER)
WOMEN'S COLLEGE, TINSUKIA

- **Name of the Faculty: Dr. Bandita Phukan**
- **Department : Mathematics**

Semester: B.A. 5th Semester (Honours)	**Total No. of Students: 01**
Paper Name: Number Theory	**Paper Code: DSE-2**
Allotted Hour(s)of Lecture: (72+18) Hours	**Actual Hour(s): (72+18) Hours**

Sl. No.	Class	Topics (As per University Syllabus)	Hrs.	Remarks/Books
		Unit – I		
1	1 & 2	Linear Diophantine equation	**2**	*Elementary Number Theory* By D. M. Burton *A first course in Number theory* By K. C. Choudhury
2	3,4& 5	prime counting function	3	
3	6 &7	statement of prime number theorem	**2**	
4	8, 9 & 10	Goldbach conjecture	**3**	
5	11,12,13& 14	linear congruences	**4**	
6	15,16,17& 18	complete set of residues	**4**	
7	19,20,21, &22	Chinese Remainder theorem	**4**	
8	23,24&25	Fermat's Little theorem	**3**	
9	26,27&28	Wilson's theorem	**3**	
10	29,30	Review/Remedial class	**2**	
		Unit – II		
11	31 & 32	Number theoretic functions	2	*Elementary Number Theory*
12	33,34 & 35	sum and number of divisors	3	
13	36,37 & 38	totally multiplicative functions	3	

14	39,40&41	definition and properties of the Dirichlet product	**3**	By D. M. Burton
15	42,43& 44	The Mobius Inversion formula	**3**	
16	45, 46 &47	The greatest integer function	**3**	
17	48,49 & 50	Euler's phi- function	**3**	*A first course in Number theory* By K. C. Choudhury
18	51,52 & 53	Euler's theorem	**3**	
19	54, 55& 56	reduced set of residues	**3**	
20	57,58&59	some properties of Euler's phi-function	**3**	
21	60	Review/Remedial class	**1**	
		UNIT III		
22	61 & 62	Order of an integer modulo n	**2**	
23	63 & 64	Primitive roots for primes	**2**	
24	65,66 & 67	Composite numbers having primitive roots	3	
25	68	Euler's criterion	**1**	*Elementary Number Theory* By D. M. Burton
26	69&70	The Legendre symbol and its properties	**2**	
27	71,72, 73&74	Quadratic reciprocity	**4**	
28	75,76,77&78	Quadratic congruences with composite moduli	**4**	*A first course in Number theory* By K. C. Choudhury
29	79,80&81	Public key encryption	**3**	
30	82,83&84	RSA encryption and decryption	**3**	
31	85 &86	The equation $x^2 + y^2 = z^2$	**2**	
32	87,88&89	Fermat's Last theorem	**3**	
33	90	Review/Remedial class	**1**	

TEACHING PLAN -2022(ODD SEMESTER)
WOMEN'S COLLEGE, TINSUKIA

Semester: B.A. 3rd Semester (Honours)	**Total No. of Students: 03**
Paper Name: PDE and Systems of ODE	**Paper Code: C.3.3**
Allotted Hour(s)of Lecture: (60+30) Hours	**Actual Hour(s): (60+30) Hours**

Sl. No.	Class	Topics (As per University Syllabus)	Hrs.	Remarks/Books
		Unit – I		
1	1,2 &3	Partial Differential Equations – Basic concepts and Definitions, Mathematical Problems.	**3**	*Elements of Partial Differential Equations* By I. N. Sneddon; *Partial Differential Equation for Scientists and Engineers,* by T. Myint-U and LokenathDebnath,
2	4,5,6 &7	First- Order Equations: Classification, Construction and Geometrical Interpretation.	4	
3	8 &9	Method of Characteristics for obtaining General Solution of Quasi Linear Equations.	**2**	
4	10	Non-linear partial differential equations	**1**	
5	11,12,13& 14	Charpit's method	**4**	
6	15,16 &17	Jacobi's method	**3**	
7	18,19,20 &21	Canonical Forms of First-order Linear Equations.	**4**	
8	22,23 &24	Method of Separation of Variables for solving first order partial differential equations.	**3**	
9	25	Review/Remedial class	**1**	
		Unit – II		
10	26 & 27	Classifications of second order linear equations as hyperbolic, parabolic or elliptic.	2	*Differential equations* By S.L. Ross (Chapter 14.1,14.3)
11	28	Derivations of Heat equation,	1	
12	29	Derivations of Wave equation	1	

13	30	Derivations of Laplace equation	**1**	
14	31 & 32	Solutions of Heat equation, Wave equation and Laplace equation	**2**	
15	33 & 34	Reduction of second order Linear Equations to canonical forms.	**2**	
16	35	Review/Remedial class	**1**	
Unit – III				
17	36, 37& 38	Method of separation of variables,	3	*Advanced Partial Differential Equations* by M. D. Raisinghania
18	39, 40 &41	Solving the Vibrating String Problem,	3	
19	42, 43& 44	Solving the Heat Conduction problem	3	
20	45	Review/Remedial class	**1**	
Unit – IV				
21	46	Systems of linear differential equations, types of linear systems	1	*Differential equations* By S.L. Ross (Chapter 7.1 –7.4; 8.3,8.4)
22	47	differential operators	1	
23	48 & 49	an operator method for linear systems with constant coefficients	2	
24	50 & 51	Basic Theory of linear systems in normal form	2	
25	52 & 53	homogeneous linear systems with constant coefficients: Two Equations in two unknown functions	2	
26	54	The method of successive approximations	1	
27	55 & 56	Euler method	2	
28	57	Modified Euler method	1	
29	58& 59	The Runge-Kutta method upto fourth order approximation.	2	
30	60	Review/Remedial class	**1**	

Practical				
31	46	Solution of Cauchy problem for first order PDE.	5	
32	47	Finding the characteristics for the first order PDE	6	
33	48 & 49	Plot the integral surfaces of a given first order PDE with initial data.	6	
34	50 & 51	Solution of the wave equation $\frac{\partial^2 u}{\partial t^2} - c^2 \frac{\partial^2 u}{\partial x^2} = 0$ for some associated conditions.	7	
35	52 & 53	Solution of wave equation $\frac{\partial u}{\partial t} - k^2 \frac{\partial^2 u}{\partial x^2} = 0$ for some associated conditions.	6	

TEACHING PLAN -2022(ODD SEMESTER)
WOMEN'S COLLEGE, TINSUKIA

- **Name of the Faculty: Dr. Bandita Phukan**
- **Department : Mathematics**

Semester: B.A. 1st Semester	**Total No. of Students: 02**
Paper Name: Differential Calculus	**Paper Code: GE:1.1**
Allotted Hour(s)of Lecture: (24+6) Hours	**Actual Hour(s): (24+6) Hours**

Sl. No.	Class	Topics (As per University Syllabus)	Hrs.	Remarks/Books
		Unit – I		
1	1,2 &3	Limit and Continuity (ε and δ definition)	**4**	*Calculus* by H. Anton, I. Birens and S. Davis
2	4,5,6 &7	Types of discontinuities	4	
3	8 &9	Differentiability of functions	**4**	
4	10	Successive differentiation	**4**	
5	11,12,13& 14	Leibnitz's theorem	**4**	
6	15,16 &17	Partial differentiation	**5**	
7	18,19,20 &21	Euler's theorem on homogeneous functions.	**4**	
8	22	Review/Remedial class	**1**	