DON BOSCO ARTS & SCIENCE COLLEGE
ANGADIKADAVU
(Affiliated to Kannur University Approved by Government of Kerala)
ANGADIKADAVU P.O., IRITTY, KANNUR – 670706

COURSE PLAN

Mathematics

(2019 – 22)

SEMESTER - V

ACADEMIC YEAR - (2021-22)

V Semester B.Sc. Mathematics (2019 - 22)			
SL. No.	**Name of Subjects with Code**	**Name of the Teacher**	**Duty Hours per week**
1.	**5B05 MAT - Set Theory, Theory Of Equations Of Complex Numbers**	**Ajeena Joseph**	
2.	**5B06 MAT - Real Analysis**	**Athulya P**	
3.	**5B07 MAT - Abstract Algebra**	**Anil M V**	
4.	**5B08 MAT - Differential Equations And Laplace Transforms**	**Prija V**	
5.	**5B09 MAT - Vector Calculas**	**Noble Philip**	
	Name of Class In charge	**Noble Philip**	

TIME TABLE

Day	09.50 Am - 10.45 Am	10.45 Am -11.40 Am	11.55 Am -12.50 Pm	01.40 Pm - 02.35 Pm	02.35 Pm - 03.30 Pm
1	5B09 MAT Vector Calculas	5B06 MAT Real Analysis	5B08 MAT Differential Equations And Laplace Transforms	5B07 MAT Abstract Algebra	5B05 MAT Set Theory,Theory Of Equations Of Complex Numbers
2	5B06 MAT Real Analysis	Open Course	5B07 MAT Abstract Algebra	5B09 MAT Vector Calculas	5B08 MAT Differential Equations And Laplace Transforms
3	5B05 MAT Set Theory,Theory Of Equations Of Complex Numbers	Open Course	5B06 MAT Real Analysis	5B07 MAT Abstract Algebra	5B09 MAT Vector Calculas
4	5B07 MAT Abstract Algebra	5B08 MAT Differential Equations And Laplace Transforms	5B05 MAT Set Theory,Theory Of Equations Of Complex Numbers	5B09 MAT Vector Calculas	5B06 MAT Real Analysis
5	5B08 MAT Differential Equations And Laplace Transforms	5B05 MAT Set Theory,Theory Of Equations Of Complex Numbers	5B09 MAT Vector Calculas	5B06 MAT Real Analysis	5B07 MAT Abstract Algebra
6	5B05 MAT Set Theory,Theory Of Equations Of Complex Numbers	5B08 MAT Differential Equations And Laplace Transforms	5B06 MAT Real Analysis	5B07 MAT Abstract Algebra	5B09 MAT Vector Calculas

Subject Code:	**5B05 MAT**
Subject Name:	**Set theory, Theory of Equations and Complex numbers**
No. of Credits:	**4**
No. of Contact Hours:	**72**
Hours per Week:	**5**
Name of the Teacher:	**Ajeena Joseph**

Syllabus

Unit I : Finite and Infinite sets (14 hours)

Finite and Infinite sets, Countable sets, Uncountable sets , Cantor's theorem
(section 1.3 of text I)

Unit II: Theory of equations I (20 hours)

Roots of equations, Relation connecting roots and coefficient of an equation, Transformation of equations, Special cases, The cubic equation, Character and position of roots of an equation, Some general theorems, Descartes rule of signs, Corollaries, De Gua' s rule, Limits to the roots of an equation, To find rational roots of an equation,
Newton's method of divisors, Symmetric function of roots of an equation, symmetric function involving only the difference of roots of $f(x)= 0$, Equation whose roots are symmetric functions
(Sections 1 to 17 in chapter VI of text 2)

Unit II: Theory of equations II (20 hours)

Reciprocal equation (proof omitted) (section 1 in chapter XI of text 2)
The cubic equation, Equation whose roots are the squares of the difference of the roots, Character of roots, Cardan' s solutions
(section 5 of chapter VI and sections 1 to 4 of chapter XII in text 2)

Unit III: Complex numbers (18 hours)

Quick review of complex numbers, Roots of complex numbers, General form of De Moivre's theorem, the nth root of unity, factors, imaginary cube root of unity
(Sections 15 to 20 of chapter V of text 2)
Polar form of complex numbers, powers and roots (section 13.2 of text 3)

Texts:

(1) R.G. Bartle and D.R.Sherbert, Introduction to real analysis, 4th edition, Wiley
(2) Bernard and Child, Higher algebra, A.I.T.B.S publishers
(3) E.Kreyzig, Advanced Engineering Mathematics, 10th edition, Wiley.

TEACHING SCHEDULE

No of Weeks	Dates	Session	Topic
1	12-07-2021 To 17-07-2021	1	Finite set and infinite set
		2	Examples
		3	Uniqueness theorem
		4	Theorem
		5	Theorem
2	19-07-2021 To 24-07-2021	6	Theorem
		20 July	**Bakrid- Holiday**
		7	Examples
		8	Countable set
		9	Countable set
		10	Examples
3	26-07-2021 To 31-07-2021	11	Class test
		12	Examples
		13	Theorem
		14	Theorem
		15	Theorem
4	02-08-2021 To 07-08-2021	16	Theorem
		17	Theorem
		18	Assignment
		19	Cantor's theorem
		20	Examples
5	09-08-2021 To 14-08-2021	21	Theorem
		22	Introduction to roots of an equation
		23	Problems
		24	Problems
		25	Examples
6	16-08-2021 To 21-08-2021	26	Relation connecting roots and coefficient of an eauation
		27	Assignment
		19 August	**Moharam/Onam Vacation**
		20 August	Onam Vacation
		21 August	Onam Vacation
7	23-08-2021 To 28-08-2021	23 August	Onam Vacation
		24 August	Onam Vacation
		25 August	Onam Vacation
		26 August	Onam Vacation

No of Weeks	Dates	Session	Topic
		27 August	Onam Vacation
		28 August	Onam Vacation
8	30-08-2021 To 04-09-2021	30 August	Onam Vacation
		28	Problems
		29	Transformation of equations
		30	Problems
		31	Problems
9	06-09-2021 To 11-09-2021	32	Problems
		33	Special cases
		34	Problems
		35	The cubic equation
		36	Character and roots of an equation
10	13-09-2021 To 18-09-2021	37	Problems
		38	Problems
		39	Some general theorems
		40	Descarte's rule of signs
		41	Corollaries
11	20-09-2021 To 25-09-2021	42	Problem
		21 September	Sree Narayana Guru Samadhi
		43	Problems
		44	De Gua' s rule
		45	Limits to the roots of an equation
		46	Problems
12	27-09-2021 To 02-10-2021	47	Problems
		48	Rational roots of an equation
		49	Newton's method of divisors
		50	Problems
		2 October	**Gandhi Jayanthi**
13	04-10-2021 To 09-10-2021	51	Class Test
		52	Problems
		53	Symmetric functions of roots of an equation
		54	Problems
		55	Problems
14	11-10-2021 To 16-10-2021	56	Symmetric functions
		57	Problems
		14 October	**Mahanavami/Study Leave**
		15 October	**Vijayadasami/ Study Leave**
		16 October	**Study Leave**

No of Weeks	Dates	Session	Topic
15	18-10-2021 To 23-10-2021	18 October	**Study Leave**
		19 October	Milad-i-Sherif/ **Study Leave**
			Study Leave
			IV Semester University Examination
			IV Semester University Examination
			IV Semester University Examination
16	25-10-2021 To 30-10-2021		**IV Semester University Examination**
			IV Semester University Examination
			IV Semester University Examination
			IV Semester University Examination
			IV Semester University Examination
			IV Semester University Examination
17	01-11-2021 To 06-11-2021		**IV Semester University Examination**
			IV Semester University Examination
		58	Reciprocal equation
		4 November	Diwali
		59	Problems
		60	Problems
18	08-11-2021 To 13-11-2021	61	Equation whose roots are squares of the difference of roots
		62	Problems
		63	Character of the roots
		64	Class test
		65	Cardans solutions
19	15-11-2021 To 19-11-2021	66	Problems
		67	Problems
		68	Introduction to complex numbers
		69	Problems
		70	Problems
20	22-11-2021 To 26-11-2021	71	De Moviers formula
		72	Roots of unity
21	29-11-2021 To 03-12-2021		
			Internal Examination
			Internal Examination
			Internal Examination
			Internal Examination
			Internal Examination

No of Weeks	Dates	Session	Topic
22	06-12-2021 To 10-12-2021		Internal Examination
			Study Leave
			Study Leave
			Study Leave
			Study Leave
23	13-12-2021 To 17-12-2021		Study Leave
			Study Leave
			Study Leave
			Study Leave
			Study Leave
24	20-12-2021 To 24-12-2021		Study Leave
			Study Leave
			Study Leave
			Christmas Vacation
			Christmas Vacation
25			Christmas Vacation
			Christmas Vacation
			Christmas Vacation
			Christmas Vacation

Subject Code:	**5B06 MAT**
Subject Name:	**Real Analysis I**
No. of Credits:	**4**
No. of Contact Hours:	**90**
Hours per Week:	**6**
Name of the Teacher:	**Athulya P**

5B06 MAT: Real Analysis I

Unit I - The Real Numbers (20 hours)
Algebraic and Order Properties of $\mathbb{R}$, Absolute Value and Real Line, The Completeness Property of $\mathbb{R}$, Applications of the Supremum Property, Intervals
(Sections 2.1, 2.2, 2.3, 2.4, 2.5 of the Text).

Unit II – Sequences (30 hours)
Sequences and their Limits, Limit Theorems, Monotone Sequences, Subsequences and the Bolzano-Weierstrass Theorem, The Cauchy Criterion
(Sections 3.1, 3.2, 3.3, 3.4, 3.5 of the Text).

Unit III - Series (20 hours)
Introduction to Infinite Series, Absolute Convergence, Tests for Absolute Convergence, Tests for Non Absolute Convergence (Sections 3.7, 9.1, 9.2, 9.3
of the Text).

Unit IV - Continuous Functions (20 hours)
Continuous Functions, Combination of Continuous Functions, Continuous
Functions on Intervals (Sections 5.1, 5.2, 5.3 of the Text).
Text
R.G. Bartle and D.R. Sherbert, Introduction to Real Analysis (4th edition),
Wiley.

TEACHING SCHEDULE

No of Weeks	Dates	Session	Topic
1	12-07-2021 To 17-07-2021	1	The real numbers - introduction
		2	Algebraic properties of real numbers
		3	Theorem
		4	Rational and Irrational numbers
		5	The order properties of real numbers
		6	Theorem
2	19-07-2021 To 24-07-2021	7	Inequalities
		20 July	**Bakrid- Holiday**
		8	AM-GM inequality
		9	Bernoullis inequality
		10	Absolute value and the real line
		11	Class Test
3	26-07-2021 To 31-07-2021	12	Triangle inequality
		13	The completeness property of real number
		14	Lemma
		15	Examples
		16	Applications of supremum property
		17	Archimedian property & Corollary
4	02-08-2021 To 07-08-2021	18	Intervals
		19	Nested interval property
		20	Theorem
		21	Periodic decimals
		22	Sequences- Definition
		23	The limit of a sequence
5	09-08-2021 To 14-08-2021	24	Theorem
		25	Tails of sequences
		26	Theorem
		27	Limit theorems
		28	Theorem
		29	Examples
6	16-08-2021 To 21-08-2021	30	Theorem
		31	Monotone Sequences
		32	Monotone convergence theorem
		19 August	**Moharam/Onam Vacation**

		20 August	Onam Vacation
		21 August	Onam Vacation
7	23-08-2021 To 28-08-2021	23 August	Onam Vacation
		24 August	Onam Vacation
		25 August	Onam Vacation
		26 August	Onam Vacation
		27 August	Onam Vacation
		28 August	Onam Vacation
8	30-08-2021 To 04-09-2021	30 August	Onam Vacation
		33	Example
		34	Class Test
		35	Subsequences
		36	Theorem
		37	Divergence criteria
9	06-09-2021 To 11-09-2021	38	Monotone subsequence theorem
		39	Cauchy Criterion
		40	Cauchy convergence criterion
		41	Contractive sequences
		42	Theorem
		43	Class Test
10	13-09-2021 To 18-09-2021	44	Series – introduction
		45	Definitions
		46	Examples
		47	Cauchy Criterion for series
		48	Integral test
		49	Comparison test
11	20-09-2021 To 25-09-2021	50	Limit comparison test
		21 September	Sree Narayana Guru Samadhi
		51	Examples
		52	Examples
		53	Absolute Convergence
		54	Theorem
12	27-09-2021 To 02-10-2021	55	Grouping of series
		56	Theorem
		57	Class Test
		58	Rearrangement of series
		59	Test for absolute convergence
		2 October	**Gandhi Jayanthi**
13	04-10-2021	60	Test for absolute convergence
		61	Test for absolute convergence

	To 09-10-2021	62	Test for absolute convergence
		63	Examples
		64	Examples
		65	Raabes test
14	11-10-2021 To 16-10-2021	66	Integral Test
		67	Examples
		68	Theorem
		14 October	**Mahanavami/Study Leave**
		15 October	**Vijayadasami/ Study Leave**
			Study Leave
15	18-10-2021 To 23-10-2021		**Study Leave**
		19 October	Milad-i-Sherif/ **Study Leave**
			Study Leave
			IV Semester University Eeamination
			IV Semester University Eeamination
			IV Semester University Eeamination
16	25-10-2021 To 30-10-2021		**IV Semester University Eeamination**
			IV Semester University Eeamination
			IV Semester University Eeamination
			IV Semester University Eeamination
			IV Semester University Eeamination
			IV Semester University Eeamination
17	01-11-2021 To 06-11-2021		**IV Semester University Eeamination**
			IV Semester University Eeamination
		69	Theorem
		4 November	Diwali
		70	Theorem
		71	Class Test
18	08-11-2021 To 13-11-2021	72	Continuous functions – introduction
		73	Theorem
		74	Theorem
		75	Examples
		76	Theorem
		77	Theorem
19	15-11-2021 To 19-11-2021	78	Combinations of continuous functions
		79	Combinations of continuous functions
		80	Combinations of continuous functions
		81	Combinations of continuous functions
		82	Theorem
		83	Theorem

20	22-11-2021 To 26-11-2021	84	Theorem
		85	Continuous functions on intervals
		86	Continuous functions on intervals
		87	Continuous functions on intervals
		88	Example
		89	Revision
21	29-11-2021 To 03-12-2021	90	Class Test
			Internal Examination
			Internal Examination
			Internal Examination
			Internal Examination
			Internal Examination
22	06-12-2021 To 10-12-2021		**Internal Examination**
			Study Leave
			Study Leave
			Study Leave
			Study Leave
23	13-12-2021 To 17-12-2021		**Study Leave**
			Study Leave
			Study Leave
			Study Leave
			Study Leave
24	20-12-2021 To 24-12-2021		**Study Leave**
			Study Leave
			Study Leave
			Christmas Vacation
			Christmas Vacation
25			**Christmas Vacation**
			Christmas Vacation
			Christmas Vacation
			Christmas Vacation

Subject Code:	**5B07 MAT**
Subject Name:	**Abstract Algebra**
No. of Credits:	**4**
No. of Contact Hours:	**90**
Hours per Week:	**6**
Name of the Teacher:	**Anil M V**

5B07 MAT: Abstract Algebra

Unit I (27 hours)
Groups and Subgroups - Binary Operations, Groups, Subgroups, Cyclic Groups (Sections 2, 4, 5, 6 of the Text).

Unit II (28 hours)
Groups of Permutations, Orbits, Cycles and the Alternating Groups, Cosets and Theorem of Lagrange (Sections 8, 9, 10 of the Text).(Proof of Theorem 9.15 omitted).

Unit III (20 hours)
Homomorphisms, Factor Groups (Sections 13, 14 of the Text).

Unit IV (15 hours)
Rings and Fields, Integral Domains (Sections 18, 19 of the Text).
(*Problems involving direct products are omitted from all sections*)

Text
J.B. Fraleigh, A First Course in Abstract Algebra (7th edition), Pearson.

References
1. I.N. Herstein, Topics in Algebra (2nd edition), Wiley
2. M. Artin, Algebra, Prentice Hall
3. D. Chaterjee, Abstract Algebra (2nd edition), PHI
4. J.A. Gallian, Contemporary Abstract Algebra, Narosa
5. P.B. Bhatacharya, S.K. Jain and S.R. Nagpaul, Basic Abstract Algebra (2nd edition), Cambridge University Press.

TEACHING SCHEDULE

No of Weeks	Dates	Session	Topic
1	12-07-2021 To 17-07-2021	1	Binary operations
		2	Examples of binary operations
		3	Examples of binary operations
		4	Commutative and associative operations
		5	Tables
		6	Examples
2	19-07-2021 To 24-07-2021	7	**Groups**
		20 July	**Bakrid- Holiday**
		8	Examples
		9	Examples
		10	Examples
		11	Properties of groups
3	26-07-2021 To 31-07-2021	12	Properties of groups
		13	Group tables
		14	Subgroups
		15	Theorem
		16	Examples of subgroups
		17	Theorem
4	02-08-2021 To 07-08-2021	18	Cyclic groups
		19	Examples
		20	Theorem
		21	Order of an element
		22	Cyclic group and Generators
		23	Theorem
5	09-08-2021 To 14-08-2021	24	Structure of cyclic groups
		25	Subgroups of finite cyclic groups
		26	Examples
		27	Class test
		28	Permutations-definition and examples
		29	Permutation groups
6	16-08-2021 To 21-08-2021	30	Examples
		31	Symmetric group
		32	Theorem
		19 August	**Moharam/Onam Vacation**
		20 August	Onam Vacation

No of Weeks	Dates	Session	Topic
		21 August	Onam Vacation
7	23-08-2021 To 28-08-2021	23 August	Onam Vacation
		24 August	Onam Vacation
		25 August	Onam Vacation
		26 August	Onam Vacation
		27 August	Onam Vacation
		28 August	Onam Vacation
8	30-08-2021 To 04-09-2021	30 August	Onam Vacation
		33	Cayley's theorem
		34	Examples
		35	Orbits-definition and examples
		36	Examples
		37	Cycles-definition and examples
9	06-09-2021 To 11-09-2021	38	Disjoint cycles
		39	Theorem
		40	Permutation as a product of disjoint cycles
		41	Transpositions
		42	Theorem
		43	Even and odd permutations
10	13-09-2021 To 18-09-2021	44	Theorem
		45	Theorem
		46	Examples
		47	Alternating group-definition and examples
		48	Assignment
		49	Cosets
11	20-09-2021 To 25-09-2021	50	Left and right cosets
		21 September	Sree Narayana Guru Samadhi
		51	Examples
		52	Theorem of Lagrange
		53	Examples
		54	Definition-index of a subgroup
12	27-09-2021 To 02-10-2021	55	Theorem
		56	Homomorphisms
		57	Examples
		58	Evaluation homomorphism
		59	Theorem
		2 October	**Gandhi Jayanthi**
13	04-10-2021	60	Theorem

No of Weeks	Dates	Session	Topic
	To 09-10-2021	61	Kernel of a homomorphism
		62	Theorem
		63	Normal subgroups-definition and examples
		64	Theorem
		65	Theorem
14	11-10-2021 To 16-10-2021	66	Theorem
		67	Canonical map
		68	Assignment
		14 October	**Mahanavami/Study Leave**
		15 October	**Vijayadasami/ Study Leave**
			Study Leave
15	18-10-2021 To 23-10-2021		**Study Leave**
		19 October	Milad-i-Sherif/ **Study Leave**
			Study Leave
			IV Semester University Examination
			IV Semester University Examination
			IV Semester University Examination
16	25-10-2021 To 30-10-2021		**IV Semester University Examination**
			IV Semester University Examination
			IV Semester University Examination
			IV Semester University Examination
			IV Semester University Examination
			IV Semester University Examination
17	01-11-2021 To 06-11-2021		**IV Semester University Examination**
			IV Semester University Examination
		69	Factor groups
		4 November	Diwali
		70	Theorem
		71	Examples
18	08-11-2021 To 13-11-2021	72	Computing in a factor group
		73	Theorem
		74	Fundamental homomorphism theorem
		75	Automorphisms
		76	Rings-definition and examples
		77	Examples
19	15-11-2021	78	Theorem
		79	Ring homomorphism
		80	Isomorphism of rings

No of Weeks	Dates	Session	Topic
	To 19-11-2021	81	Commutative rings
		82	Ring with unity
		83	Theorem
20	22-11-2021 To 26-11-2021	84	Field-definition and examples
		85	Sub ring and sub field-definitions
		86	Examples
		87	Zero divisors
		88	Integral domains-definition and examples
		89	Theorems
21	29-11-2021 To 03-12-2021	90	Revision
			Internal Examination
			Internal Examination
			Internal Examination
			Internal Examination
			Internal Examination
22	06-12-2021 To 10-12-2021		**Internal Examination**
			Study Leave
			Study Leave
			Study Leave
			Study Leave
23	13-12-2021 To 17-12-2021		**Study Leave**
			Study Leave
			Study Leave
			Study Leave
			Study Leave
24	20-12-2021 To 24-12-2021		**Study Leave**
			Study Leave
			Study Leave
			Christmas Vacation
			Christmas Vacation
25			**Christmas Vacation**
			Christmas Vacation
			Christmas Vacation
			Christmas Vacation

Subject Code:	**5B08 MAT**
Subject Name:	**Differential Equations and Laplace Transforms**
No. of Credits:	**3**
No. of Contact Hours:	**72**
Hours per Week:	**5**
Name of the Teacher:	**Prija V**

5B08 MAT: Differential Equations and Laplace Transforms

Unit I - First Order ODEs (25Hours)

First Order ODEs: Basic concepts (Modelling excluded), Separable ODEs(Modelling excluded), Exact ODEs. Integrating factors, Linear ODEs, Bernoulli equation (except Population Dynamics), Orthogonal Trajectories, Existence and uniqueness of solutions (Sections 1.1, 1.3, 1.4, 1.5, 1.6, 1.7 in Chapter 1of the Text).

Unit II – Second-Order Linear ODEs (22 Hours)

Second-Order Linear ODEs: Homogeneous Linear ODEs of Second Order, Homogeneous Linear ODEs with Constant Coefficients, Differential Operators, Euler-Cauchy Equations, Statement of Existence and Uniqueness theorem for initial value problems, linear independence of solutions, Wronskian, general solution, Nonhomogeneous ODEs, Method of undetermined coefficients, Solution by Variation of Parameters (Sections 2.1, 2.2, 2.3, 2.5, 2.6, 2.7, 2.10 in Chapter 2 of the Text).

Unit III - Laplace Transforms (25 hours)

Laplace Transform, Inverse Transform, Linearity. s-Shifting, Transforms of Derivatives and Integrals. ODEs, Unit Step Function. t-Shifting, Short Impulses, Dirac's Delta Function, Partial Fractions, Convolution, Integral Equations, Differentiation and Integration of Transforms (Sections 6.1 to 6.6 in Chapter 6 of the Text).

Texts

E. Kreyzig, Advanced Engineering Mathematics, 10th Edition, John Wiley

References:

1. S.L. Ross, Differential Equations, 3rd Edition, Wiley.
2. G. Birkhoff and G.C. Rota, Ordinary Differential Equations, 3rd Edition, Wiley and Sons
3. E.A. Coddington, An Introduction to Ordinary Differential Equtions, Printice Hall
4. W.E. Boyce and R.C. Diprima, Elementary Differential Equations and Boundary Value Problems, 9th Edition, Wiley.

TEACHING SCHEDULE

No of Weeks	Dates	Session	Topic
1	12-07-2021 To 17-07-2021	1	Unit I: First Order ODEs-Introduction
		2	Basic concepts
		3	Theorems based on Existence and uniquenes of solution.
		4	Separable ODEs, Examples
		5	Exercise questions.
2	19-07-2021 To 24-07-2021	6	Equations reducible to separable form-examples.
		20 July	**Bakrid- Holiday**
		7	Exact ODEs- examples, Exercise questions.
		8	Integrating factors, Non-exact differential equations.
		9	Exercise questions.
3	26-07-2021 To 31-07-2021	10	Exercise questions.
		11	Class Test.
		12	Linear ODEs-Examples
		13	Exercise questions.
		14	Bernoulli equation-Examples
4	02-08-2021 To 07-08-2021	15	Orthogonal trajectories
		16	Exercise questions.
		17	Class test.
		18	Exercise questions.
		19	Assignment.
5	09-08-2021 To 14-08-2021	20	Existence and uniqueness of solutions
		21	Exercise questions.
		22	Class test.
		23	Second-Order Linear ODEs- Examples
		24	Homogeneous Linear ODEs of Second Order- Examples
6	16-08-2021 To 21-08-2021	25	Homogeneous Linear ODEs with Constant Coefficients-Examples
		26	Exercise questions.
		27	Exercise questions.
		19 August	**Moharam/Onam Vacation**
		20 August	Onam Vacation
		21 August	Onam Vacation
7	23-08-2021	23 August	Onam Vacation
		24 August	Onam Vacation

No of Weeks	Dates	Session	Topic
	To 28-08-2021	25 August	Onam Vacation
		26 August	Onam Vacation
		27 August	Onam Vacation
		28 August	Onam Vacation
8	30-08-2021 To 04-09-2021	30 August	Onam Vacation
		28	Differential Operators- Examples
		29	Class test.
		30	Euler-Cauchy Equations- Examples
		31	Exercise questions.
9	06-09-2021 To 11-09-2021	32	Exercise questions.
		33	Statement of Existence and Uniqueness theorem for initial value problems- Examples
		34	Exercise questions.
		35	linear independence of solutions- Wronskian
		36	Exercise questions.
10	13-09-2021 To 18-09-2021	37	General solution-Theorem
		38	Exercise questions.
		39	Assignment.
		40	Non-homogeneous ODEs
		41	Exercise questions.
11	20-09-2021 To 25-09-2021	42	Exercise questions.
		21 September	Sree Narayana Guru Samadhi
		43	Method of undetermined coefficients- Examples
		44	Exercise questions.
		45	Solution by Variation of Parameters- Examples
12	27-09-2021 To 02-10-2021	46	Exercise questions.
		47	Method of undetermined coefficients- Examples
		48	Class test.
		49	Unit III-Introduction.
		2 October	**Gandhi Jayanthi**
13	04-10-2021 To 09-10-2021	50	Laplace Transform-definitions, Examples.
		51	Exercise questions.
		52	Exercise questions.
		53	Inverse Transform -definitions, Examples.
		54	Exercise questions.
14	11-10-2021 To	55	Linearity, s-Shifting- definitions, Examples.
		56	Exercise questions.
		57	Class test.

No of Weeks	Dates	Session	Topic
	16-10-2021	14 October	**Mahanavami/Study Leave**
		15 October	**Vijayadasami/ Study Leave**
			Study Leave
15	18-10-2021 To 23-10-2021		**Study Leave**
		19 October	Milad-i-Sherif/ **Study Leave**
			Study Leave
			IV Semester University Examination
			IV Semester University Examination
			IV Semester University Examination
16	25-10-2021 To 30-10-2021		**IV Semester University Examination**
			IV Semester University Examination
			IV Semester University Examination
			IV Semester University Examination
			IV Semester University Examination
			IV Semester University Examination
17	01-11-2021 To 06-11-2021		**IV Semester University Examination**
			IV Semester University Examination
		58	Transforms of Derivatives and Integrals- definitions, Examples.
		4 November	Diwali
		59	ODEs- definitions, Examples.
18	08-11-2021 To 13-11-2021	60	Exercise questions.
		61	Unit Step Function- definitions, Examples.
		62	Exercise questions.
		63	t-Shifting- definitions, Examples.
19	15-11-2021 To 19-11-2021	64	Exercise questions.
		65	Short Impulses, Dirac's Delta Function- definitions, Examples.
		66	Exercise questions.
		67	Partial Fractions- definitions, Examples.
20	22-11-2021 To 26-11-2021	68	Convolution- definitions, Examples.
		69	Integral Equations, Differentiation and Integration of Transforms- definitions, Examples.
		70	Class test.
		71	Revision.
21	29-11-2021 To 03-12-2021	72	Revision.
			Internal Examination
			Internal Examination
			Internal Examination

No of Weeks	Dates	Session	Topic
			Internal Examination
			Internal Examination
22	06-12-2021 To 10-12-2021		**Internal Examination**
			Study Leave
			Study Leave
			Study Leave
			Study Leave
23	13-12-2021 To 17-12-2021		**Study Leave**
			Study Leave
			Study Leave
			Study Leave
			Study Leave
24	20-12-2021 To 24-12-2021		**Study Leave**
			Study Leave
			Study Leave
			Christmas Vacation
			Christmas Vacation
25			**Christmas Vacation**
			Christmas Vacation
			Christmas Vacation
			Christmas Vacation

Subject Code:	**5B09 MAT**
Subject Name:	**Vector Calculus**
No. of Credits:	**4**
No. of Contact Hours:	**90**
Hours per Week:	**6**
Name of the Teacher:	**Noble Philip**

5B09 MAT: Vector Calculus

Unit I (25 Hours)

Geometry of space and motion in space : Lines and planes in space, curves in space and their tangents, arc length in space, curvature and normal vector of a curve, tangential and normal components of acceleration

(Sections 12.5, 13.1, 13.3, 13.4, 13.5 of the Text).

Unit II (25 Hours)

Partial derivatives : Directional derivatives and gradient vectors, Tangent planes and differentials, Extreme values and saddle points, Lagrange multipliers, Partial derivatives with constrained variables, Taylor's formula for two variables

(Sections 14.5, 14.6, 14.7, 14.8, 14.10 of the Text).

Unit III (20 Hours)

Integration in vector fields I :Line integrals, Vector fields and line integrals: work, circulation, flux, Path independence, conservative fields and potential functions, Green's theorem in the plane (Sections 16.1, 16.2, 16.3, 16.4 of the Text).

Unit IV (20 Hours)

Integration in vector fields II : Surfaces and area, surface integrals, Stokes' theorem (theorem without proof) (paddle wheel interpretation of $\nabla\times F$ is excluded), the Divergence Theorem (theorem without proof) (Gauss' law: one of the four great laws of Electromagnetic Theory, continuity equation of hydrodynamics, unifying the integral theorems are excluded)

(Sections 16.5, 16.6, 16.7, 16.8 of the Text).

Text

G.B, Thomas Jr., M.D. Weir and J.R. Hass, Thomas' Calculus (12th edition), Pearson Education

References

1. E. Kreyzig, Advanced Engineering Mathematics (10th Edition), Wiley 2. H. F. Davis and A. D. Snider, Introduction to Vector Analysis (6th Edition), Universal Book Stall, New Delhi.
3. F. W. Bedford and T. D. Dwivedi, Vector Calculus, McGraw Hill Book Company
4. S.S. Sastry, Engineering Mathematics , Vol 2 (4th edition), PHI
5. B.S. Grewal, Higher Engineering Mathematics (43rd edition), Khanna Publishers

TEACHING SCHEDULE

No of Weeks	Dates	Session	Topic
1	12-07-2021 To 17-07-2021	1	Geometry of space and motion in space
		2	Introduction
		3	Examples
		4	Lines and planes in space
		5	Lines and planes in space
		6	Problems
2	19-07-2021 To 24-07-2021	7	Problems
		20 July	**Bakrid- Holiday**
		8	Curves in space and their tangents
		9	Curves in space and their tangents
		10	Examples
		11	Examples
3	26-07-2021 To 31-07-2021	12	Arc length in space
		13	Arc length in space
		14	Problems
		15	Problems
		16	Curvature and normal vector of a curve
		17	Curvature and normal vector of a curve
4	02-08-2021 To 07-08-2021	18	Problems
		19	Problems
		20	Problems
		21	Tangential and normal components of acceleration
		22	Tangential and normal components of acceleration
		23	Class Test
5	09-08-2021 To 14-08-2021	24	Partial derivatives
		25	Partial derivatives
		26	Examples
		27	Examples
		28	Directional derivatives and gradient vectors
		29	Directional derivatives and gradient vectors
6	16-08-2021 To 21-08-2021	30	Directional derivatives and gradient vectors
		31	Problems
		32	Problems
		19 August	**Moharam/Onam Vacation**
		20 August	Onam Vacation

No of Weeks	Dates	Session	Topic
		21 August	Onam Vacation
7	23-08-2021 To 28-08-2021	23 August	Onam Vacation
		24 August	Onam Vacation
		25 August	Onam Vacation
		26 August	Onam Vacation
		27 August	Onam Vacation
		28 August	Onam Vacation
8	30-08-2021 To 04-09-2021	30 August	Onam Vacation
		33	Tangent planes and differentials
		34	Tangent planes and differentials
		35	Problems
		36	Problems
		37	Extreme values and saddle points
9	06-09-2021 To 11-09-2021	38	Extreme values and saddle points
		39	Problems
		40	Problems
		41	Assignment
		42	Seminar
		43	Seminar
10	13-09-2021 To 18-09-2021	44	Lagrange multipliers
		45	Lagrange multipliers
		46	Problems
		47	Problems
		48	Problems
		49	Partial derivatives with constrained variables
11	20-09-2021 To 25-09-2021	50	Partial derivatives with constrained variables
		21 September	Sree Narayana Guru Samadhi
		51	Problems
		52	Problems
		53	Taylor’s formula for two variables
		54	Taylor’s formula for two variables
12	27-09-2021 To 02-10-2021	55	Problems
		56	Class Test
		57	Integration in vector fields I
		58	Integration in vector fields I
		59	Examples
		2 October	**Gandhi Jayanthi**
13	04-10-2021	60	Problems

No of Weeks	Dates	Session	Topic
	To 09-10-2021	61	Problems
		62	Line integrals
		63	Line integrals
		64	Vector fields and line integrals
		65	Vector fields and line integrals
14	11-10-2021 To 16-10-2021	66	Work, circulation
		67	Flux, Path independence
		68	Flux, Path independence
		14 October	**Mahanavami/Study Leave**
		15 October	**Vijayadasami/ Study Leave**
			Study Leave
15	18-10-2021 To 23-10-2021		**Study Leave**
		19 October	Milad-i-Sherif/ **Study Leave**
			Study Leave
			IV Semester University Examination
			IV Semester University Examination
			IV Semester University Examination
16	25-10-2021 To 30-10-2021		**IV Semester University Examination**
			IV Semester University Examination
			IV Semester University Examination
			IV Semester University Examination
			IV Semester University Examination
			IV Semester University Examination
17	01-11-2021 To 06-11-2021		**IV Semester University Examination**
			IV Semester University Examination
		69	Flux, Path independence
		4 November	Diwali
		70	Conservative fields and potential functions
		71	Conservative fields and potential functions
18	08-11-2021 To 13-11-2021	72	Conservative fields and potential functions
		73	Green's theorem in the plane
		74	Green's theorem in the plane
		75	Problems
		76	Problems
		77	Class Test
19	15-11-2021	78	Integration in vector fields II
		79	Surfaces and area
		80	Surface integrals

No of Weeks	Dates	Session	Topic
	To 19-11-2021	81	Stokes' theorem (theorem without proof)
		82	Paddle wheel interpretation of $\nabla \times F$ is excluded
		83	The Divergence Theorem (theorem without proof)
20	22-11-2021 To 26-11-2021	84	Gauss' law: one of the four great laws of Electromagnetic Theory
		85	Gauss' law: one of the four great laws of Electromagnetic Theory
		86	Continuity equation of hydrodynamics
		87	Unifying the integral theorems
		88	Class Test
		89	Viva
21	29-11-2021 To 03-12-2021	90	Viva
			Internal Examination
			Internal Examination
			Internal Examination
			Internal Examination
			Internal Examination
22	06-12-2021 To 10-12-2021		**Internal Examination**
			Study Leave
			Study Leave
			Study Leave
			Study Leave
23	13-12-2021 To 17-12-2021		**Study Leave**
			Study Leave
			Study Leave
			Study Leave
			Study Leave
24	20-12-2021 To 24-12-2021		**Study Leave**
			Study Leave
			Study Leave
			Christmas Vacation
			Christmas Vacation
25			**Christmas Vacation**
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