

DON BOSCO ARTS & SCIENCE COLLEGE
ANGADIKADAVU

(Affiliated to Kannur University Approved by Government of Kerala)

ANGADIKADAVU P.O., IRITTY, KANNUR – 670706



COURSE PLAN

MSc Mathematics

(2021 – 23)

SEMESTER - III

ACADEMIC YEAR - (2022-23)

III Semester MSc Mathematics (2021 - 23)

SL. No.	Name of Subjects with Code	Name of the Teacher	Duty Hours per week
1.	MAT3C11 Number Theory	Najumunnisa.K	5
2.	MAT3C12 Functional Analysis	Anil M V	5
3.	MAT3C13 Complex function theory	Riya Baby	5
4.	MAT3C14 Advanced Real Analysis	Athulya P	5
5.	MAT3E01: Elective Graph Theory (Elective)	PRIJA .V	5
	Name of Class Incharge	PRIJA .V	

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	Athulya P	Prija V	Anil M V	Riya Baby	Najumunnisa K
2	Najumunnisa K	Athulya P	Prija V	Anil M V	Riya Baby
3	Anil M V	Athulya P	Riya Baby	Najumunnisa K	Prija V
4	Prija V	Najumunnisa K	Riya Baby	Anil M V	Athulya P
5	Riya Baby	Athulya P	Najumunnisa K	Prija V	Anil M V

Subject Code:	MAT3C11
Subject Name:	Number Theory
No. of Credits:	4
No. of Contact Hours:	90
Hours per Week:	5
Name of the Teacher:	Najumunnisa.K

Text books

1. Tom M Apostol: Introduction to Analytic Number Theory; Springer International Student Edition
2. D.M Burton: Elementary Number Theory (6th Edition) Mc Graw Hill
3. Ian Stewart and David Tall: Algebraic Number Theory and Fermat's last theorem (Third Edition) A K Peters Natick Massachussets

Unit I

The Fundamental theorem of Arithmetic: Introduction-Divisibility-Greatest common divisor- prime numbers- The fundamental theorem of arithmetic-The series of reciprocals of primes- The Euclidean algorithm-The greatest common divisor of more than two numbers.
(Text 1, Sectons1.1-1.8)

Arithmetical Functions and Dirichlet multiplication: Introduction- The Mobius function $\mu(n)$
-The Euler totient function $\phi(n)$ -The relation connecting μ and ϕ -the product formula for $\phi(n)$ -The Dirichlet product of arithmetical functions- Dirichlet inverses and Mobius inversion formula- The Mangolt function $\Lambda(n)$ -Multiplicative functions- Multiplicative functions and Dirichlet multiplication- The inverse of a completely multiplicative function- Liouville's function $\lambda(n)$ - The divisor function $\sigma_\alpha(n)$.
(Text 1, Section 2.1-2.13)

Congruences: Definition and basic properties of congruences- Residue classes and complete residue system- Liner Congruences-Reduced residue system and the Euler- Fermat theorem-

Polynomial congruences modulo P and Lagrange's theorem- Applications of Lagrange's theorem- Simultaneous linear congruences and Chinese Remainder theorem- Applications of Chinese remainder theorem- Polynomial congruences with prime power moduli.
(Text 1, Section 5.1-5.9)

Unit II

Quadratic Residues and Quadratic Reciprocity Law: Quadratic residues- Legendre's symbol and its properties- Evaluation of $(-1|p)$ and $(2|p)$ Gauss lemma-The quadratic reciprocity law –Applications of the reciprocity law – The Jacobi symbol- Applications to Diophantine equations.
(Text 1, Sections 9.1 –9.8)

Primitive Roots: The exponent of number mod m and primitive roots- Primitive roots and reduced residue system- The nonexistence of primitive roots mod 2^a for $a \geq 3$ - The existence of primitive roots mod p for odd primes p - Primitive roots and quadratic residues – The existence of primitive roots mod 2^a
- The existence of primitive roots mod 2^a –The nonexistence of Primitive roots in the remaining cases- The number of primitive roots mod m .
(Text 1, Sections 10.1-10.9)

Introduction to Cryptography; From Caesar Cipher to Public Key Cryptography-The Knapsack Crypto system- An application of primitive roots to Cryptography.
(Text 2, Sections 10.1-10.3)

Unit III

Algebraic Backgrounds: Symmetric polynomials- modules- free abelian groups
(Text 3, Section 1.4-1.6)
Algebraic Numbers: Algebraic numbers- Conjugates and Discriminants- Algebraic integers- Integral bases- Norms and Traces- Rings of integers.
(Text 3, Section 2.1-2.6)
Quadratic and Cyclotomic fields: Quadratic fields-Cyclotomic fields.
(Text 3, Sections 3.1-3.2)

TEACHING SCHEDULE

No of Weeks	Dates	Session	Topic
1	04-07-2022 To 08-07-2022	1	Introduction-Divisibility
		2	Properties of divisibility
		3	Greatest common divisor
		4	Greatest common divisor
		5	Theorem
2	11-07-2022 To 15-07-2022	6	Prime numbers
		7	The fundamental theorem of arithmetic
		8	Theorem
		9	The fundamental theorem of arithmetic
		10	The series of reciprocals of primes
3	18-07-2022 To 22-07-2022	11	Arithmetical Functions and Dirichlet multiplication: Introduction
		12	The Mobius function $\mu(n)$
		13	The Euler totient function $\phi(n)$
		14	The relation connecting μ and ϕ
		15	The product formula for $\phi(n)$
4	25-07-2022 To 29-07-2022	16	The Dirichlet product of arithmetical functions
		17	Dirichlet inverses and Mobius inversion formula
		18	Dirichlet inverses and Mobius inversion formula
		28 July	Karkidavav
		19	Multiplicative functions
5	01-08-2022 To 05-08-2022	20	Examples
		21	Multiplicative functions and Dirichlet multiplication
		22	The inverse of a completely multiplicative function
		23	Liouville's function $\lambda(n)$
		24	The divisor function $\sigma(n)$
6	08-08-2022 To 12-08-2022	08 August	Muharam
		25	Definition and basic properties of congruences
		26	Residue classes and complete residue system
		27	Residue classes and complete residue system
		28	Linear Congruences
7	15-08-2022	15 August	Independence Day
		29	Euler- Fermat theorem

No of Weeks	Dates	Session	Topic
	To 19-08-2022	30	Polynomial congruences modulo P
		18 August	Sree Krishna Jayanthi
		31	Discussion
8	22-08-2022 To 26-08-2022	32	I internal Examination
		33	I internal Examination
		34	I internal Examination
		35	I internal Examination
		36	I internal Examination
9	29-08-2022 To 02-09-2022	37	Applications of Langrange's theorem
		38	Simultaneous linear congruences
		39	Chinese Remainder theorem
		40	Applications of Chinese remainder theorem
		41	Polynomial congruences with prime power moduli.
10	05-09-2022 To 09-09-2022	05 September	ONAM VACATION
		06 September	ONAM VACATION
		07 September	ONAM VACATION
		08 September	ONAM VACATION
		09 September	ONAM VACATION
11	12-09-2022 To 16-09-2022	42	Quadratic residues
		43	Legendre's symbol and its properties-
		44	Gauss lemma
		45	The quadratic reciprocity law
		46	Applications of the reciprocity law
12	19-09-2022 To 23-09-2022	47	The Jacobi symbol-
		48	Theorems
		21 September	Sree Narayana Guru Samadhi
		49	Applications to Diophantine equations.
		50	The exponent of number mod m and primitive roots
13	26-09-2022 To 30-09-2022	51	Primitive roots and reduced residu; system
		52	The nonexistence of primitive roots mod $2a$ for $a \geq 3$
		53	The existence of primitive roots mod p for odd primes p
		54	Primitive roots and quadratic residues

No of Weeks	Dates	Session	Topic
		55	The number of primitive roots mod m .
14	03-10-2022 To 07-10-2022	56	Seminar
		04 October	Mahanavami
		05 October	Vijayadasami
		57	Seminar
		58	Seminar
15	10-10-2022 To 14-10-2022	59	Seminar
		60	Norms and traces
		61	Rings of integers.
		62	Class Test
		63	Quadratic fields
16	17-10-2022 To 21-10-2022	64	Theorems
		65	Symmetric polynomials
		66	Symmetric polynomials
		67	Modules
		68	Modules
17	24-10-2022 To 28-10-2022	24 October	Deepavali
		69	II Internal Examination
		70	II Internal Examination
		71	II Internal Examination
		72	II Internal Examination
18	31-0-2022 To 04-11-2022	73	Discussion
		74	Class Test
		75	free abelian group
		76	free abelian group
		77	Algebraic numbers
19	07-11-2022 To 11-11-2022	78	Algebraic numbers
		79	Conjugates and Discriminant
		80	Algebraic integers
		81	Integral bases
		82	Norms and traces
20	14-11-2022 To 18-11-2022	83	III Semester University Examination
		84	III Semester University Examination
		85	III Semester University Examination
		86	III Semester University Examination
		87	III Semester University Examination
		88	III Semester University Examination
21	21-11-2022	89	III Semester University Examination

No of Weeks	Dates	Session	Topic
	To 25-12-2022	90	III Semester University Examination

Subject Code:	MAT3C12
Subject Name:	Functional Analysis
No. of Credits:	4
No. of Contact Hours:	90
Hours per Week:	5
Name of the Teacher:	Anil M V

MAT3C12: FUNCTIONAL ANALYSIS

Unit I

Fundamentals of Normed Spaces; Normed Spaces, Continuity of Linear Maps, Hahn-Banach Theorems, Banach spaces.

(Chapter-2, Sections 5, 6, 7 and 8 [omitting Banach Limits from Section 7])

Unit II

Bounded Linear Maps on Banach Spaces; Uniform Boundedness Principle, Closed Graph and Open Mapping Theorems, Bounded Inverse Theorem

(Chapter-3, Sections 9, 10 and 11, Omitting Divergence of Fourier Series of Continuous Functions, Quadrature Formula and Matrix Transformation and Summability Methods of Section 9)

Unit III

Geometry of Hilbert Spaces; Inner Product Spaces, Orthonormal Sets. Approximation and Optimization, Projection and Riesz Representation Theorems.

(Chapter-6, Sections 21, 22, 23 and 24 [Omit 23.2, 23.6 from section 23 and Weak Convergence and Weak Boundedness from Section 24])

Text Book; Balmohan V Limaye; Functional Analysis (Third Edition); New Age International Publishers.

Reference:

1. E.Kreyszig; Introductory Functional Analysis with Applications, John Wiley
2. Walter Rudin; Functional Analysis, TMH Editions 1978
3. M.T Nair; Functional Analysis A First Course; Prentice Hall of India.
4. Chaudhary and Sudarsan Nanda; Functional Analysis with Applications, Wiley Eastern Ltd.
5. Walter Rudin; Introduction to Real and Complex Analysis, McGraw Hill International Edition
6. J.B Conway; Functional Analysis, Narosa Publishing Company
7. Bachman and Narici; Functional Analysis

TEACHING SCHEDULE

No of Weeks	Dates	Session	Topic
1	04-07-2022 To 08-07-2022	1	Fundamentals of normed spaces
		2	Normed spaces-definition and examples
		3	Properties of normed spaces
		4	Properties of normed spaces
		5	Examples of normed spaces
2	11-07-2022 To 15-07-2022	6	Theorem
		7	Riesz lemma
		8	Theorem
		9	Theorem
		10	Definitions
3	18-07-2022 To 22-07-2022	11	Theorem
		12	Continuity of linear maps
		13	Theorem
		14	Theorem
		15	Bounded linear maps
4	25-07-2022 To 29-07-2022	16	Lemma
		17	Lemma
		18	Hahn Banach separation theorem
		28 July	Karkidaka Vav
		19	Class test
5	01-08-2022 To 05-08-2022	20	Hahn Banach Extension theorem
		21	Banach spaces
		22	Characterization of Banach spaces
		23	Theorem
		24	Theorem
6	08-08-2022 To 12-08-2022	08 August	Muharam
		25	Embedding a normed space
		26	Theorem
		27	Bounded linear maps on Banach spaces
		28	Uniform boundedness principle
7	15-08-2022 To 19-08-2022	15 August	Independence Day
		29	Resonance theorem
		30	Corollary
		18 August	Sree Krishna Jayanthi
		31	Closed map

No of Weeks	Dates	Session	Topic
8	22-08-2022 To 26-08-2022	32	I internal Examination
		33	I internal Examination
		34	I internal Examination
		35	I internal Examination
		36	I internal Examination
9	29-08-2022 To 02-09-2022	37	Examples
		38	Examples
		39	Lemma
		40	Closed graph theorem
		41	Open map
10	05-09-2022 To 09-09-2022	05 September	ONAM VACATION
		06 September	ONAM VACATION
		07 September	ONAM VACATION
		08 September	ONAM VACATION
		09 September	ONAM VACATION
11	12-09-2022 To 16-09-2022	42	Theorem
		43	Corollary
		44	Projection maps
		45	Open map
		46	Theorem
12	19-09-2022 To 23-09-2022	47	Examples
		48	Examples
		21 September	Sree Narayana Guru Samadhi
		49	Class test
		50	Definitions
13	26-09-2022 To 30-09-2022	51	Theorem
		52	Theorem
		53	Definitions
		54	Open mapping theorem
		55	Examples
14	03-10-2022 To 07-10-2022	56	Bounded inverse theorem
		04 October	Mahanavami
		05 October	Vijayadasami
		57	Examples
		58	Two norm theorem
15	10-10-2022	59	Examples
		60	Class test

No of Weeks	Dates	Session	Topic
	To 14-10-2022	61	Inner product spaces
		62	Seminar
		63	Seminar
16	17-10-2022 To 21-10-2022	64	Seminar
		65	Seminar
		66	Seminar
		67	Seminar
17	24-10-2022 To 28-10-2022	24 October	Deepavali
		69	II Internal Examination
		70	II Internal Examination
		71	II Internal Examination
18	31-0-2022 To 04-11-2022	72	II Internal Examination
		73	Hilbert spaces
		74	Theorem
		75	Lemma
19	07-11-2022 To 11-11-2022	76	Theorem
		77	Theorem
		78	Examples
		79	Projection theorem
20	14-11-2022 To 18-11-2022	80	Riez representation theorem
		81	Revision
		82	Revision
		83	III Semester University Examination
21	21-11-2022 To 25-12-2022	84	III Semester University Examination
		85	III Semester University Examination
		86	III Semester University Examination
		87	III Semester University Examination
		88	III Semester University Examination
		89	III Semester University Examination
		90	III Semester University Examination

Subject Code:	MAT3C13
Subject Name:	Complex function theory
No. of Credits:	4
No. of Contact Hours:	90
Hours per Week:	5
Name of the Teacher:	RIYA BABY

Syllabus

Unit I:

Elliptic functions: Simple periodic functions, doubly periodic functions, the Weierstrass theory.

(Chapter 7 (sections 1,2,3) of text 1).

The Reimann zeta function

(chapter 7(section 8) of text 2).

Unit II:

Runge's theorem, simple connectedness, Mittag-Leffler's theorem. Analytic Continuation and Riemann surfaces: Schwartz reflection principle, analytic continuation along a path, monodrama theorem.

(Chapter 8 (sections 1,2,3) and chapter 9 (sections 1,2,3) of text 2)

Unit III:

Harmonic functions: Basic properties of harmonic functions, Harmonic functions on a disk, sub- harmonic and super harmonic functions. Entire functions: Jensen's formula.

(Chapter 10 (sections 1,2,3), chapter 11 (section 1) of text 2).

Text 1: Lars V Ahlfors- Complex Analysis 3rd edition

Text 2: John B Coway- Functions of one complex variable 2nd edition.

TEACHING SCHEDULE

No of Weeks	Dates	Session	Topic
1	04-07-2022 To 08-07-2022	1	Introduction to simply periodic functions
		2	Representation of exponentials
		3	The Fourier development
		4	Functions of finite orders
		5	Examples
2	11-07-2022 To 15-07-2022	6	Doubly periodic functions
		7	Period module
		8	Theorem 1
		9	Theorem 1
		10	Unimodular transformation
3	18-07-2022 To 22-07-2022	11	Class test
		12	Theorem 2
		13	Theorem 2
		14	General properties of elliptic functions
		15	Theorem 3
4	25-07-2022 To 29-07-2022	16	Theorem
		17	Theorem
		18	Theorem 3
		28 July	Karkidaka Vav
		19	The Weierstrass P function
5	01-08-2022 To 05-08-2022	20	Properties of Weierstrass P function
		21	Legendre's relation
		22	Differential equations
		23	Riemann zeta function
		24	Properties of Riemann zeta function
6	08-08-2022 To 12-08-2022	08 August	Muharam
		25	Lemma 8.3
		26	Lemma 8.3
		27	Corollary 8.4
		28	Sigma function
7	15-08-2022 To	15 August	Independence Day
		29	Proposition 8.5
		30	Riemann functional equation

No of Weeks	Dates	Session	Topic
	19-08-2022	18 August	Sree Krishna Jayanthi
		31	Harnack' s inequality and Harnack's theorem
8	22-08-2022 To 26-08-2022	32	I internal Examination
		33	I internal Examination
		34	I internal Examination
		35	I internal Examination
		36	I internal Examination
9	29-08-2022 To 02-09-2022	37	Theorem
		38	Riemann hypothesis
		39	Euler's theorem
		40	Class test
		41	Lemma 1.8
10	05-09-2022 To 09-09-2022	05 September	ONAM VACATION
		06 September	ONAM VACATION
		07 September	ONAM VACATION
		08 September	ONAM VACATION
		09 September	ONAM VACATION
11	12-09-2022 To 16-09-2022	42	Proposition 1.1
		43	Lemma 1.5
		44	Runge's theorem
		45	Lemma 1.9
		46	Lemma 1.10
12	19-09-2022 To 23-09-2022	47	Corollary 1.14
		48	Corollary 1.15
		21 September	Sree Narayana Guru Samadhi
		49	Polynomially convex hull
		50	Homeomorphic sets
13	26-09-2022 To 30-09-2022	51	Theorem 2.2
		52	Mittag- Loffler's theorem
		53	Mittag- Loffler's theorem
		54	Schwartz reflection principle
		55	Schwartz reflection principle
14	03-10-2022 To 07-10-2022	56	Schwartz reflection principle
		04 October	Mahanavami
		05 October	Vijayadasami
		57	Analytic continuation along a path
		58	Analytic continuation along a path

No of Weeks	Dates	Session	Topic
15	10-10-2022 To 14-10-2022	59	Function element
		60	Proposition 2.4
		61	Lemma 3.1
		62	Lemma 3.2
		63	Monodromy theorem
16	17-10-2022 To 21-10-2022	64	Monodromy theorem
		65	Corollary 3.9
		66	Class test
		67	Basic properties of harmonic function
		68	Basic properties of harmonic function
17	24-10-2022 To 28-10-2022	24 October	Deepavali
		69	II Internal Examination
		70	II Internal Examination
		71	II Internal Examination
		72	II Internal Examination
18	31-0-2022 To 04-11-2022	73	Mean value theorem
		74	Maximum principle first version
		75	Maximum principle second version
		76	Maximum principle second version
		77	Corollary 1.9
19	07-11-2022 To 11-11-2022	78	Minimum principle
		79	Poisson kernel
		80	Revision
		81	Revision
		82	Revision
20	14-11-2022 To 18-11-2022	83	III Semester University Examination
		84	III Semester University Examination
		85	III Semester University Examination
		86	III Semester University Examination
		87	III Semester University Examination
		88	III Semester University Examination
21	21-11-2022 To 25-12-2022	89	III Semester University Examination
		90	III Semester University Examination

Subject Code:	MAT3C14
Subject Name:	ADVANCED REAL ANALYSIS
No. of Credits:	4
No. of Contact Hours:	90
Hours per Week:	5
Name of the Teacher:	ATHULYA P

MAT3C14: ADVANCED REAL ANALYSIS

Text Book: Walter Rudin: Principles of Mathematical Analysis; (3rd Edition) Mc. Graw Hill, 1986.

Unit I

Sequence and series of Functions: Discussion of Main Problem, Uniform Convergence,

Uniform Convergence Continuity, Uniform Convergence and Integration, Uniform Convergence and Differentiation, Equicontinuous Family of Functions, The Stone-Weierstrass

Theorem,

(Chapter-7; Sections 7.1 to 7.33 and Theorem 7.33)

Unit II

Some Special Functions; Power Series, The Exponential and Logarithmic Functions, The

Trigonometric Functions, The Algebraic Completeness of the Complex Field, Fourier Series.

The Gamma Function

(Chapter-8: Sections 8.1 to 8.22)

Unit III

Functions of Several Variables: Liner Transformations, Differentiation The Contraction

Principle, The Inverse Function Theorem, The Implicit Function Theorem,

(Chater-9; Sections 9.1 to 9.29)

TEACHING SCHEDULE

No of Weeks	Dates	Session	Topic
1	04-07-2022 To 08-07-2022	1	Introduction
		2	Sequence and series of Functions
		3	Pointwise convergence
		4	Pointwise convergence
		5	Examples
2	11-07-2022 To 15-07-2022	6	Interchange of limit
		7	Examples
		8	Examples
		9	Formal Definition of pointwise convergence.
		10	Discussion of Main Problem
3	18-07-2022 To 22-07-2022	11	Uniform convergence
		12	Cauchy criterion for uniform convergence
		13	Theorem
		14	Definition
		15	Weierstrass-M Test
4	25-07-2022 To 29-07-2022	16	Examples
		17	Examples
		18	Examples
		28 July	Karkidaka Vav
		19	Assignment
5	01-08-2022 To 05-08-2022	20	Uniform Convergence and Continuity
		21	Theorem
		22	Theorem
		23	Definition
		24	Theorem
6	08-08-2022 To 12-08-2022	08 August	Muharam
		25	Theorem
		26	Class test
		27	Uniform Convergence and Integration
		28	Theorem
7	15-08-2022 To 19-08-2022	15 August	Independence Day
		29	Corollary
		30	Uniform Convergence and Differentiation
		18 August	Sree Krishna Jayanthi
		31	Theorem

No of Weeks	Dates	Session	Topic
8	22-08-2022 To 26-08-2022	32	I internal Examination
		33	I internal Examination
		34	I internal Examination
		35	I internal Examination
		36	I internal Examination
9	29-08-2022 To 02-09-2022	37	Theorem
		38	Theorem
		39	Examples
		40	Equicontinuous Family of Functions
		41	Equicontinuous Family of Functions
10	05-09-2022 To 09-09-2022	05 September	ONAM VACATION
		06 September	ONAM VACATION
		07 September	ONAM VACATION
		08 September	ONAM VACATION
		09 September	ONAM VACATION
11	12-09-2022 To 16-09-2022	42	Pointwise Bounded
		43	Uniform Bounded
		44	Examples
		45	Examples
		46	Class test
12	19-09-2022 To 23-09-2022	47	Equicontinuous Functions
		48	Theorem
		21 September	Sree Narayana Guru Samadhi
		49	Theorem
		50	The Stone-Weierstrass Theorem
13	26-09-2022 To 30-09-2022	51	Introduction
		52	Some Special Functions
		53	Theorem
		54	Theorem
		55	Power Series
14	03-10-2022 To 07-10-2022	56	Examples
		04 October	Mahanavami
		05 October	Vijayadasami
		57	The Exponential and Logarithmic Functions
		58	The Exponential and Logarithmic Functions
15	10-10-2022	59	Theorem
		60	Theorem

No of Weeks	Dates	Session	Topic
	To 14-10-2022	61	The Trigonometric Functions
		62	The Algebraic Completeness of the Complex Field
		63	The Algebraic Completeness of the Complex Field
16	17-10-2022 To 21-10-2022	64	Assignment
		65	Class test
		66	Fourier Series
		67	Examples
		68	The Gamma Function
17	24-10-2022 To 28-10-2022	24 October	Deepavali
		69	II Internal Examination
		70	II Internal Examination
		71	II Internal Examination
		72	II Internal Examination
18	31-0-2022 To 04-11-2022	73	Examples
		74	The Contraction Principle
		75	Examples
		76	Assignment
		77	The Inverse Function Theorem
19	07-11-2022 To 11-11-2022	78	The Implicit Function Theorem
		79	Class test
		80	Revision
		81	Revision
		82	Revision
20	14-11-2022 To 18-11-2022	83	III Semester University Examination
		84	III Semester University Examination
		85	III Semester University Examination
		86	III Semester University Examination
		87	III Semester University Examination
		88	III Semester University Examination
21	21-11-2022 To 25-12-2022	89	III Semester University Examination
		90	III Semester University Examination

Subject Code:	MAT3E01
Subject Name:	Graph Theory (Elective)
No. of Credits:	4
No. of Contact Hours:	90
Hours per Week:	5
Name of the Teacher:	Prija V

MAT3E01: Elective Graph Theory (Elective)

Text 1 J.A Bondy and U.S Murty, Graph Theory with Applications, The MacMillan Press Ltd, 1976 Text 2 John Clark and Derek Allan Holtan, A First Look at Graph Theory, Allied Publishers, Ltd

Unit I

Independent Sets and Cliques; Independent Sets, Ramsey's Theorem, Turan's Theorem, Shur's Theorem Vertex Colorings: Chromatic Number, Book's Theorem Hajo's Conjecture, Chromatic Polynomials, Girth and Chromatic Number. (Chapter 7; Except Section 7.5, Chapter 8 Except Section 8.6, Text 1)

Unit II

Edge Colourings: Edge Chromatic Number, Vizing's Theorem, The Timetabling Problem Planar Graphs; Plane and Planar Graphs, Dual Graphs, Euler's Formula Bridges, Kuratowski's Theorem. The Five Colour Theorem Non Hamiltonian Planar Graphs. (Chapter 6, All sections; Chapter 9; Except section 9.8 of Text 1)

Unit III

Matchings: Matchings, Matchings and Coverings in bipartite Graphs, Perfect Matchings, The Personnel Assignment Problem, The Optimal Assignment Problem. (Chapter 5, Sections 5.1, 5.2, 5.3, 5.4, 5.5 of text 1) Networks; Flows and Cuts, Separating sets (Chapter 8; Sections 8.1 & 8.3 of text 2)

TEACHING SCHEDULE

No of Weeks	Dates	Session	Topic
1	04-07-2022 To 08-07-2022	1	Unit I-Introduction.
		2	Independent Sets –Definition and examples.
		3	Cliques–Definition and examples
		4	Examples
		5	Assignment
2	11-07-2022	6	Theorem .
		7	Class test.

No of Weeks	Dates	Session	Topic
	To 15-07-2022	8	Ramsey's Theorem.
		9	Corollary.
		10	Theorem .
3	18-07-2022 To 22-07-2022	11	Theorem .
		12	Turan's Theorem.
		13	Assignment
		14	Corollary.
		15	Shur's Theorem.
4	25-07-2022 To 29-07-2022	16	Corollary.
		17	Theorem .
		18	Exercises questions.
		28 July	Karkidaka Vav
		19	Corollary.
5	01-08-2022 To 05-08-2022	20	Theorem .
		21	Seminar.
		22	Class test.
		23	Vertex Colorings Definition and examples.
		24	Chromatic Number Definition and examples.
6	08-08-2022 To 12-08-2022	08 August	Muharam
		25	Book's Theorem
		26	Hajo's Conjecture
		27	Girth and Chromatic Number
		28	Assignment
7	15-08-2022 To 19-08-2022	15 August	Independence Day
		29	Chromatic Polynomials- Definition and examples.
		30	Class test.
		18 August	Sree Krishna Jayanthi
		31	Unit II-Introduction.
8	22-08-2022 To 26-08-2022	32	I internal Examination
		33	I internal Examination
		34	I internal Examination
		35	I internal Examination
		36	I internal Examination
9	29-08-2022 To 02-09-2022	37	Edge Colourings -Definition and examples.
		38	Edge Chromatic Number -Definition and examples.
		39	Vizing's Theorem.
		40	Corollary.
		41	Theorem .

No of Weeks	Dates	Session	Topic
10	05-09-2022 To 09-09-2022	05 September	ONAM VACATION
		06 September	ONAM VACATION
		07 September	ONAM VACATION
		08 September	ONAM VACATION
		09 September	ONAM VACATION
11	12-09-2022 To 16-09-2022	42	The Timetabling Problem
		43	Exercises questions.
		44	Planar Graphs-Definition and examples.
		45	Plane and Planar Graphs.
		46	Theorem .
12	19-09-2022 To 23-09-2022	47	Theorem .
		48	Dual Graphs-Definition and examples.
		21 September	Sree Narayana Guru Samadhi
		49	Euler's Formula
		50	Theorem .
13	26-09-2022 To 30-09-2022	51	Bridges- Definition and examples.
		52	Theorem .
		53	Assignment.
		54	Seminar.
		55	Kuratowski's Theorem.
14	03-10-2022 To 07-10-2022	56	The Five Colour Theorem.
		04 October	Mahanavami
		05 October	Vijayadasami
		57	Non Hamiltonian Planar Graphs -Definition and examples.
15	10-10-2022 To 14-10-2022	58	Theorem.
		59	Class Test.
		60	Unit III-introduction.
		61	Matchings-Definition and examples
		62	Matchings and Coverings in bipartite Graphs.
16	17-10-2022 To 21-10-2022	63	Definition and examples
		64	Theorem.
		65	Theorem .
		66	Perfect Matchings- Definition and examples
		67	Theorem .
17	24-10-2022	68	Assignment.
		24 October	Deepavali
		69	II Internal Examination

No of Weeks	Dates	Session	Topic
	To 28-10-2022	70	II Internal Examination
		71	II Internal Examination
		72	II Internal Examination
18	31-0-2022 To 04-11-2022	73	The Personnel Assignment Problem.
		74	Definition and examples
		75	Class Test.
		76	The Optimal Assignment Problem.
		77	Theorem.
19	07-11-2022 To 11-11-2022	78	Networks; Flows and Cuts.
		79	Definition and examples
		80	Theorem.
		81	Separating sets- Definition and examples
		82	Class test.
20	14-11-2022 To 18-11-2022	83	Revision.
		84	III Semester University Examination
		85	III Semester University Examination
		86	III Semester University Examination
		87	III Semester University Examination
		88	III Semester University Examination
21	21-11-2022 To 25-12-2022	89	III Semester University Examination
		90	III Semester University Examination