SADAKATHULLAH APPA COLLEGE

(AUTONOMOUS)

(Reaccredited by NAAC at an 'A' Grade with a CGPA of 3.40 out of 4.00 in the III cycle An ISO 9001:2008 Certified Institution)

RAHMATH NAGAR, TIRUNELVELI- 11.

Tamilnadu

PG AND RESEARCH DEPARTMENT OF MATHEMATICS

(Unaided)

MY LORD
VOUCHSAFE ME WISDOM

CBCS SYLLABUS

For

M.Phil. MATHEMATICS

(Applicable for students admitted in June 2017 and onwards)
(As per the Resolutions of the Academic Council Meeting held on 27.02.2017)

CONTENTS

SADAKATHULLAH APPA COLLEGE (AUTONOMOUS)
PG AND RESEARCH DEPARTMENT OF MATHEMATICS
M.Phil. Mathematics Syllabus
(Applicable for students admitted in June 2017 and onwards)
COURSE STRUCTURE

I SEMESTER				II SEMESTER		
COURSE	**H/W**	**C**		**COURSE**	**H/W**	**C**
Core 1	6	5		Elective (Area paper)	6	5
Core 2	6	5		Dissertation and Viva - voce	6	15
TOTAL	**12**	**10**		**TOTAL**	**12**	**20**

DISTRIBUTION OF HOURS, CREDITS, NO. OF PAPERS, & MARKS				
SUBJECT	**HOURS**	**CREDITS**	**NO. OF PAPERS**	**MARKS**
Core	12	10	2	**200**
Elective (Area paper)	6	5	1	**100**
Dissertation and Viva-voce	**6**	15	1	**200**
TOTAL	**24**	**30**	**4**	**500**

TITLE OF THE PAPERS
M. PHIL. MATHEMATICS
(The candidate should select any one of the Area Papers in the second semester related to their proposed topics of research)

SEM	P	TITLE OF THE PAPER	SUB. CODE	H/W	C	MARKS		
						I	**E**	**T**
I	C1	Research Methodology in Mathematics	15MMAC11	6	5	25	75	100
	C2	Advanced Algebra	15MMAC12	6	5	25	75	100
II	E	A) Advanced Analysis	15MMAE2A	6	5	25	75	100
		B) Advanced Graph Theory	15MMAE2B					
	D	Dissertation and Viva-voce	15MMAD21	6	15	--	200	200
		TOTAL		24	30	75	425	500

M. PHIL. MATHEMATICS SYLLABUS
(Applicable for students admitted in June 2017 and onwards)

I SEMESTER		
C1	**RESEARCH METHODOLOGY IN MATHEMATICS**	**15MMAC11**
Hrs/Week: 6	**Hrs/ Sem: 90** **Hrs/Unit: 18**	**Credits: 5**

UNIT I

   Research Methodology: What is Research - Literature Collection - Research Report - Research Report (Formatting and Typing).

UNIT II

   LaTeX: **Introduction**: Basics of Latex file. **Text, Symbols and Commands:** Command names and arguments – Environments – Declarations – Lengths – Special Characters – Exercises. **Document Layout and Organization, Displaying Text:** Changing font style – Centering and Indenting – Lists – Generalized Lists – Theorem like declarations. **Text in Boxes**, **Tables**, **Mathematical Formulas.**

UNIT III

   Banach Algebra and Spectral Theory: Banach Algebras: Symbolic Calculus - The group of invertible elements. **Commmutative Banach Algebras:** Ideals and Homomorphism's – Gelfand Transforms – Involutions – Applications to non commutative algebras - Positive functional.

UNIT IV

   Bounded Operators on a Hilbert Space: Basic Facts – Bounded operators – A Commutativity theorem – Resolutions of the Identity - Spectral Theorem.

UNIT V

   Eigen values of normal operators – Positive operators and square roots – The group of invertible operators - A characterization of B*-algebras – An ergodic theorem.

TEXT BOOKS:

1. N.Gurumani - Research Methodology for Biological Sciences – MJP Publishers.

   UNIT I- Chapters 1,2,4,7

2. Guide to LATEX by Helmut Kopka and Patric W. Daly, Fourth Edition, Addison –Wesley.

   UNIT II- Sections: 1.5, 2.1 – 2.6, 3.1 – 3.4, 4.1 – 4.5, 5.1 – 5.2, 6.1-6.2, 7.1-7.6.

3. Functional Analysis, Walter Rudin, Tata McGraw-Hill Publishing Company Ltd, New Delhi (Second Edition)

UNIT III – Chapter 10: Sections 10.21–10.34; Chapter 11: Sections 11.1–11.33

UNIT IV – Chapter 12: Sections 12.1–12.27

UNIT V   – Chapter 12 : Sections 12.28 – 12.44

I SEMESTER		
C2	**ADVANCED ALGEBRA**	**15MMAC12**
Hrs/Week: 6	**Hrs/ Sem: 90**	**Hrs/Unit: 18**	**Credits: 5**

UNIT I

Rings and Ideals: Rings and ring homomorphisms – Ideals Quotient rings – Zero-divisors Nilpotent elements Units – Prime ideals and maximal ideals – Nilradical and Jacobson radical – Operations on ideals – Extension and contraction.

Modules: Modules and module homomorphisms – Submodules and quotient modules – Operations on submodules – Direct sum and product – Finitely generated modules – Exact sequences – Tensor product of modules – Restriction and extension of scalars – Exactness properties of the tensor product – Algebras – Tensor product of algebras.

UNIT II

Rings and Modules fractions: Local properties – Extended and contracted ideals in rings of fractions. **Primary Decomposition**

UNIT III

Integral Dependence and Valuations: Integral dependence – The going-up theorem – Integrally closed integral domains. The going-down theorem – Valuation rings. **Chain Conditions**

UNIT IV

Noetherian Rings: Primary decomposition in Northerian Rings.
Artin Rings

UNIT V

Discrete Valuation Rings and Dedekind Domains: Discrete valuation rings – Dedekind domains – Fractional ideals.

TEXTBOOKS:
1. M.F Atiyah and I.G.Macdonald, Introduction to Commutative Algebra-Addison Wesley Publishing Company.

   UNIT I- Chapters 1 and 2

   UNIT II- Chapters 3 and 4

   UNIT III- Chapters 5 and 6

   UNIT IV- Chapters 7 and 8

   UNIT V- Chapter 9

II SEMESTER		
E A	**ADVANCED ANALYSIS**	**15MMAE2A**
Hrs/Week: 6	**Hrs/ Sem: 90** **Hrs/Unit: 18**	**Credits: 5**

UNIT I

Abstract Integration: Set theoretic notations and terminology – The concept of measurability – Simple functions - Elementary properties of measures – Arithmetic in [0, ∞] - Integration of positive functions – Integration of complex functions – The role played by sets of measure zero.

UNIT II

Positive Borel Measures: Vector spaces – Topological preliminaries – The Riesz representation theorem – Regularity properties of Borel measures - Lebesgue measures – Continuity properties of measurable functions.

UNIT III

L^p-Spaces: Convex functions and inequalities – The L^p-spaces - Approximations by continuous functions.

UNIT IV

Complex Measures: Total variations – Absolute continuity – Consequence of Radon-Nikodym theorem – Bounded linear functional on L^p – Riesz representation theorem.

UNIT V

Integration on Product Spaces: Measurability on cartesian products – Product measures – The Fubini theorem - Completion of product measures - Convolutions – Distributions functions.

TEXTBOOK: Content and Treatment as in

1. Walter Rudin, Real and Complex Analysis, Tata McGraw Hill, Thrid Edition.

   UNIT I - Chapter 1
   UNIT II - Chapter 2
   UNIT III - Chapter 3
   UNIT IV - Chapter 6
   UNIT V - Chapter 8

II SEMESTER (2017 - 2020)			
E B	**ADVANCED GRAPH THEORY**		**15MMAE2B**
Hrs/Week: 6	**Hrs/ Sem: 90**	**Hrs/Unit: 18**	**Credits: 5**

UNIT I

Graph Theoretic Foundations: Basic Definitions and Notations-Intersection Graphs-Interval Graphs - A Sneak Preview of the Notions Coming Up. **The Design of Efficient Algorithms:** The Complexity of Computer Algorithms- Data Structures- How to Explore a Graph - Transitive Tournaments and Topological Sorting

UNIT II

Perfect Graphs: The perfect graphs theorem – P-critical and partitionable graphs – A polyhedral characterization of perfect graphs and P-critical graphs – the strong perfect graph conjecture and recent theorem.

UNIT III

Triangulated Graphs: Introduction - Characterizing Triangulated Graphs - Recognizing Triangulated Graphs by Lexicographic Breadth-First Search- The Complexity of Recognizing Triangulated Graphs-Triangulated Graphs as Intersection Graphs-Triangulated Graphs Are Perfect-Fast Algorithms for the COLORING, CLIQUE, STABLE SET, and CLIQUE-COVER Problems on Triangulated Graphs.

UNIT IV

Domination in Graphs: Introduction – Terminology and concepts – Applications – Np completeness – History of domination in graphs – Bounds in terms of order.

UNIT V

Bounds in terms of order, degree and packing – Bounds in terms of order and size – Bounds in terms of degree, diameter and girth – product graphs and vizing's conjecture.

TEXTBOOKS:

1. Martin Charles Golumbic, Algorithmic Graph Theory and Perfect graphs, Academic press.
   Unit I - Chapters 1 and 2
   Unit II- Chapter 3
   Unit III- Chapter 4

2. Teresa W. Haynes, Stephen T. Hedetniemi and Peter J. Slater, Fundamentals of Domination in graphs, Marcel Decker.

   Unit IV and V-Chapters 1 and 2.

	II SEMESTER	
D	**DISSERTATION**	**15MMAD21**
Hrs/Week: 6	**Hrs/ Sem: 90**	**Credits: 15**

The following guidelines have to be followed by every candidate while preparing his/her M.Phil. Dissertation:

➢ The Dissertation should be typed in English.

➢ The first page, declaration and certificate of the dissertation should be according to the model given at the end of this.

➢ Dissertation text should be typed in LaTeX with size 12 / 13 on A4 size Executive bond quality paper with double line spacing. Each page should contain at least 20 lines.

➢ The dissertation should be submitted in duplicate.

➢ The number of pages in M.Phil. Dissertation should be not less than 80 pages inclusive of bibliography and Annexure.

➢ Two bound copies of the M.Phil. Dissertation duly signed by the Guide and Head of the Department should be submitted through the Controller of Examinations along with the CD containing the softcopy of the Dissertation in PDF format.

➢ Candidates shall submit the dissertation to the Controller of Examinations through the Supervisor and Head of the Department within 6 months but not earlier than 5 months from the date of start of the second semester.

➢ The M.Phil. scholars should attend at least one of the following – training programmes, Workshops, Seminars, Symposiums, etc., and that they should also have a paper either published or received for acceptance in an ISSN / Reputed Journal before submitting the Dissertation. **Scholars who fail to comply with the above are not eligible for the submission of their Dissertation.** Photo copy of the publication/Letter of acceptance for publication should be given as Annexure at the end of the Dissertation.

➢ Both the Internal as well as External Examiner award 200 marks each for the Dissertation. The distribution of mark will be **120 marks for the Dissertation and 80 marks for the Public Viva-voce Examination**. In the Public Viva-voce Examination the M.Phil. Scholars should present their

Dissertation work with PowerPoint Presentation. The Division of marks for the Dissertation is as mentioned below:

Particulars	Internal Examiner	External Examiner
Wording of Title	10	10
Objectives/ Formulation including Hypothesis	10	10
Review of Literature	20	20
Relevance of Dissertation to Social Needs	10	10
Methodology/ Technique/ Procedure Adopted	30	30
Summary/ Findings/ Conclusion	10	10
Bibliography/ Annexure/ Foot notes	20	20
Training/ Seminar/ Workshop	10	10
	120	**120**

The average marks of Internal and External examiners is considered as marks of project report.

The medium of instruction in all PG courses is English and students shall write the CIA and Semester Examinations in English.

DISTRIBUTION OF MARKS FOR CIA AND SEMESTER EXAMINATIONS

SUBJECT	TOTAL MARKS	CIA TEST	SEMESTER EXAM.	PASSING MINIMUM		
				CIA EXAM.	SEM. EXAM.	OVER ALL
Theory	100	25	75	Nil	38	50
Project	200	Nil	Report - 120 marks Viva - 80 marks	Nil	---	100

DIVISION OF MARKS FOR CIA

SUBJECT	MARKS	ASSIGNMENT OR SEMINAR FOR PG	REGULARITY	RECORD NOTE	TOTAL MARKS
Theory	20	5	--	--	**25**

1. The duration of CIA theory examination is **ONE** hour and the semester examination is **THREE** hours.

2. **Three CIA tests of 20 marks each will be conducted** and the average marks of the best two tests out of the three tests will be taken.

3. The I test will be based on the first 1.5 units of the syllabus, the II test will be based on the next 1.5 units of the syllabus and the III test will be based on the next 1.5 units of the syllabus.

4. Two seminars for M.Phil. Courses.

QUESTION PAPER PATTERN FOR CIA TEST (THEORY)

Duration: 1 Hr   **Maximum Marks: 20**

Section	Question Type	No. of Questions & Marks	Marks
A	No Choice Answer should not exceed 75 words	2 Questions - 2 mark each	2 x 2 = 4
B	Internal choice (Either or type) Answer should not exceed 200 words	2 Questions - 4 marks each	2 x 4 = 8
C	Open Choice (Answer ANY ONE out of Two) Answer should not exceed 400 words	1 Question - 8 marks each	1 x 8 = 8
		TOTAL	**20 MARKS**

QUESTION PAPER PATTERN FOR SEMESTER EXAMINATION (THEORY)

Duration: 3 Hrs   **Maximum Marks: 75**

Section	Question Type	No. of Questions & Marks	Marks
A	No Choice Answer should not exceed 75 words	10 Questions - 2 marks each (2 Questions from each unit)	10 x 2 = 20
B	Internal choice (Either or type) Answer should not exceed 200 words	5 Questions with internal choice. Each carries 5 marks (Two questions from each unit)	5 x 5 = 25
C	Open Choice (Answer ANY THREE out of FIVE) Answer should not exceed 400 words	3 Questions out of 5 - 10 marks each (1 Question from each unit)	3 x 10 = 30
		TOTAL	**75 MARKS**

(Model for the Title Page of the Dissertation)

TITLE OF THE DISSERTATION

*Dissertation Submitted to the Sadakathullah
Appa College (Autonomous) in partial fulfillment of the
requirements for the award of the degree of*

MASTER OF PHILOSOPHY (MAJOR)
Submitted by

NAME OF THE CANDIDATE
(REGISTER NO. XXXXXXXX)

Under the guidance of

NAME OF THE GUIDE
Designation of the Guide
Sadakathullah Appa College (Autonomous)
Tirunelveli – 627011

PG & RESEARCH CENTRE IN (MAJOR)
SADAKATHULLAH APPA COLLEGE (AUTONOMOUS)
TIRUNELVELI – 627011
MONTH, YEAR

Name and Qualification of the Guide,

Designation of the Guide,

Sadakathullah Appa College (Autonomous)

Rahmath Nagar,

Tirunelveli – 627011

CERTIFICATE

Certified that the dissertation work with the title, **"TITLE OF THE DISSERTATION"** submitted by **NAME OF THE CANDIDATE** with the register number XXXXXXX in partial fulfillment of the requirements for the award of the degree of **Master of Philosophy in (Major) at the PG & Research Centre in (Major), Sadakathullah Appa College (Autonomous),** is a work done by the candidate during the period 20XX-XX, under my guidance and supervision and this dissertation or any part thereof has not been submitted elsewhere for any other Degree or Diploma.

Tirunelveli – 627011
DD-MM-YEAR   **(NAME OF THE GUIDE)**

Forwarded

Name of the candidate,

M.Phil. Scholar, (Register No.: XXXXXXX)

PG & Research Centre in XXXXXXXX,

Sadakathullah Appa College (Autonomous),

Rahmath Nagar, Tirunelveli – 627011

<u>DECLARATION BY THE CANDIDATE</u>

      I hereby declare that, the dissertation with the title, ***"TITLE OF THE DISSERTATION"*** submitted in partial fulfillment of the requirements for the award of the degree of **Master of Philosophy in <u>XXXXXXXX</u>** at **the PG & Research Centre in <u>XXXXXXXX</u> , Sadakathullah Appa College (Autonomous)**, is my original work done under the guidance of **Name of the Guide, Designation of the Guide, Sadakathullah Appa College (Autonomous), Tirunelveli – 11** and this work has not been submitted elsewhere for any other Degree or Diploma.

Tirunelveli – 627011
DD-MM-YEAR   **(Signature of the Candidate)**

Counter signed

(Signature and Seal of the Guide)

Examiner 1:

Examiner 2: