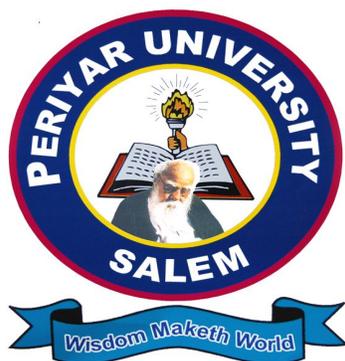


PERIYAR UNIVERSITY
PERIYAR PALKALAI NAGAR
SALEM – 636 011



DEGREE OF MASTER OF PHILOSOPHY
IN
MATHEMATICS

[CHOICE BASED CREDIT SYSTEM]

SYLLABUS FOR M.PHIL. MATHEMATICS

FOR THE STUDENTS ADMITTED FROM THE
ACADEMIC YEAR 2017 – 2018 ONWARDS

PERIYAR UNIVERSITY

PERIYAR PALKALAI NAGAR

SALEM - 11

DEGREE OF MASTER OF PHILOSOPHY

REGULATIONS AND SYLLABUS

FOR

M.PHIL. MATHEMATICS

(Under Choice Based Credit System)

(For Candidates admitted in the Colleges affiliated to Periyar University from 2017-2018 onwards)

PERIYAR UNIVERSITY
PERIYAR PALKALAI NAGAR
SALEM - 11

DEGREE OF MASTER OF PHILOSOPHY IN MATHEMATICS

(Under Choice Based Credit System)

REGULATIONS AND SYLLABUS

(For Candidates admitted in the Colleges affiliated to Periyar University from 2017-2018 onwards)

BOARD OF STUDIES

1	Dr.V.Chandrasekar, Associate Professor, Department of Mathematics, Kandaswami Kandar's College, Velur, Namakkal (Dt.) PIN – 638 182.	Chairman
2	Dr.M.K.Uma, Associate Professor, Department of Mathematics, Sri Sarada College for Women (A), Salem-636016.	Member
3	Dr.G.Balasubramanian, Associate Professor, Department of Mathematics, Govt.Arts College for Men, Krishnagiri – 635 001.	Member
4	Dr.V.Balasubramanian, Assistant Professor, Department of Mathematics, Muthayammal College of Arts and Science, Rasipuram, Namakkal (Dt.) PIN-637 408.	Member
5	Dr.A.Muthusamy, Professor, Department of Mathematics, Periyar University, Salem-11.	Member
6	Dr.M.Angayarkanni, Associate Professor, Department of Mathematics, Kandaswami Kandar's College, Velur, Namakkal (Dt.) PIN– 638 182.	Member

7	Dr.R.Kodeeswaran, Associate Professor, Department of Mathematics, Kandaswami Kandar's College, Velur Namkkal-(Dt.) PIN- 638182.	Member
8	Dr.N.Annapoorani, Assistant Professor, Department of Mathematics, Bharathiar University, Coimbatore-641 046.	Member EXTERNAL
9	Mr.D.Sivakumar, Assistant Professor, Department of Mathematics, Kongu Arts and Science College (A), Nanjanapuram, Erode-638 107.	Member EXTERNAL
10	Dr.G.Sainarayanan, Senior Technical Specialist, HCL Technologies Ltd., Chennai.	Industrial Personal
11	Dr.R.Samidurai, Assistant Professor, Department of Mathematics, Thiruvalluvar University,Serkkadu, Vellore-632 115.	Alumni

PERIYAR UNIVERSITY
PERIYAR PALKALAI NAGAR
SALEM - 11
DEGREE OF MASTER OF PHILOSOPHY
REGULATIONS AND SYLLABUS FOR M.PHIL.MATHEMATICS
(FULL-TIME / PART-TIME)

(Under Choice Based Credit System)

(For Candidates admitted in the Colleges affiliated to Periyar University from 2017-2018 onwards)

1. Objectives of the Course:

In recent days Mathematics is penetrating all fields of human endeavor and therefore it is necessary to prepare the students to cope with the advanced developments in various fields of Mathematics at research-level. The objectives of this course are the following:

- (a) To impart research-level knowledge in advanced concepts and its applications in various fields .
- (b) To provide wide and updated knowledge in the new areas of various branches of Mathematics to all students.

2. Commencement of this Regulation:

These regulations shall take effect from the academic year 2017-2018, that is, for students who are admitted to the first year of the course during the academic year 2017-2018 and thereafter.

3. Definitions:

Programme : A Programme means a course of study leading to the award of the degree in a discipline.

Course : Course refers to the subject offered under the Programme.

4. Eligibility for Admission to FULL-TIME M.PHIL.:

Candidates who have passed M.Sc. Mathematics of this University or any other University recognized by the Syndicate as equivalent thereto shall be eligible to register for the Degree of Master of Philosophy (M.Phil.) in Mathematics and to undergo the prescribed course of study in an approved institution or department of this University.

Candidates who have passed their Post-graduate Degree in Mathematics on or after 1st January 1991 shall be required to have obtained a minimum of 55% of marks to become eligible to register for the Degree of Master of Philosophy (M.Phil.) and to undergo the prescribed course of study in an approved Institution or department of this University.

For the candidates belonging to SC/ST community and those who have qualified their Master's Degree after 01.01.1991 the minimum eligibility marks shall be 50% in their Master's Degree.

5. Duration of the Course:

The duration of the M.Phil. Programme shall be ONE YEAR consist of two semesters under Choice Based Credit System.

6. Course of Study:

There are Three Courses under Part-I for Semester I and Dissertation & Viva-Voce under Part-II for Semester II. The Third Course (Guide Paper) in the first semester shall be specialization related to the dissertation. The student in consultation with the research supervisor must select the third course and the research supervisor should frame the syllabus.

The courses of study for the M.Phil. Degree in Mathematics (Choice Based Credit System) shall be with **Continuous Internal Assessment(CIA)** and **External Assessment (EA)** according to syllabi prescribed from time to time . The **Continuous Internal Assessment (CIA) Marks 25** is distributed to four components viz., **Tests, Assignments, Seminars and Attendance** as **10, 05, 05 and 05** marks, respectively.

Total Marks of the Programme:

Total Marks : **500**

Marks for Each Course : **100** (CIA - 25 + EA -75)

Dissertation : **200** [Internal Valuation -75 + External Valuation-75+ Joint Viva-Voce - 25 + 25]

7. Credits:

Weightage given to each course of study is termed as credit.

8. Credit System:

The weightage of credits are spread over to TWO different semesters during the period of study and the cumulative credit point average shall be awarded based on the credits earned by the students. A total of 24 credits are prescribed for the programme.

9. Distribution of Credit points:

The minimum credit requirement for one year M.Phil. programme shall be 24 Credits. The break-up of credits for the programme is as follows:

SEMESTER I (PART- I)

Core Course I : 4 credits

Core Course II : 4 credits

Elective Course III (Specialization Course): 4 credits

SEMESTER II (PART- II)

Dissertation: 8 credits

Viva-Voce: 4 credits

10. Structure of the Programme:

Sem.	Course Code	Title of the Course	Hours	Credit	Marks		
					CIA (Int.)	EA (Ext.)	Total
I	17MPMAT01	Research Methodology, Analysis and Differential Equations	6	4	25	75	100
	17MPMAT02	Algebra and Topology	6	4	25	75	100
	17MPMAT03	Guide Paper (Specialization Course)	6	4	25	75	100
II	17MPMATD04	Dissertation	12	8	-	150	200
		Viva-Voce	-	4	-	50	
		Total	30	24	75	425	500

11. Scheme of Examinations (Two Semesters):

SEMESTER I

Part-I Written Examination:

The examination for the Courses I, II and III under Part-I shall be held at the end of the **SEMESTER I**.

Each course carries a maximum of 100 marks of which 75 allotted for External Assessment (University Theory Examination) and 25 for Continuous Internal Assessment.

The syllabus for Course III shall be framed by the Guide and the same should be submitted to the University for Approval. The examination of Course III (Guide Paper) will be valued by the Guide and the valued answer scripts shall be sent to the university.

The examiners will be appointed from the panel of four names of each paper (I and II) submitted by the College/Departments concerned. If one examiner awards a pass mark and the other fail mark, the paper will be valued by a third examiner whose award of marks will be final.

SEMESTER II

Part –II – Dissertation:

The exact title of the dissertation shall be intimated to the COE within one month after the registration of the programme. Candidates shall submit the dissertation to the university through the supervisor and Head of the Department at the end of the **SEMESTER II** from the commencement of the programme which shall be valued by internal examiner (supervisor) and one external examiner appointed by the university from a panel of four names sent by the supervisor through the Head of the Department / Principal at the time of submitting the dissertation.

External Viva-Voce compulsory:

There is a compulsory viva-voce by an external examiner and the maximum marks for the viva-voce is **50 marks**.

The examiners who value the dissertation shall report the merit of candidates as “**Highly Commended**” (75% and above) or “**Commended**” (50% and above and below 75%) or “**Not Commended**”(below 50%).

If one examiner commends the dissertation and the other examiner, does not commend, the dissertation will be referred to the third examiner and the third valuation shall be final. Submission or resubmission of the dissertation will be allowed twice a year subject to the University rules.

12. Question Paper Pattern:

TITLE OF THE PAPER

Time: Three Hours

Maximum Marks: 75

Part – A (10 X 2 = 20 Marks)

Answer **ALL** Questions

(Two questions from each unit)

Part – B (5 X 5 = 25 Marks)

Answer **ALL** Questions

(Two questions from each unit with internal choice)

Part – C (3 X 10 = 30 Marks)

Answer any **THREE** questions

(One question from each unit).

13. Dissertation:

i) Topic:

The topic of the dissertation shall be assigned to the candidate within one month (based on paper III) after registration and a copy of the same should be submitted to the University for approval.

ii) Number of copies of Dissertation:

The students should prepare **two copies** of dissertation and submit the same to the university for the evaluation.

iii) Format to be followed:

The format for the preparation of the dissertation to be submitted by the students is given below:

Format: a) Title Page

TITLE OF THE DISSERTATION

Dissertation Submitted in partial fulfilment of the requirement for the award of Degree of Master of Philosophy in **MATHEMATICS** to the Periyar University, Periyar Palkalai Nagar, Salem – 636 011.

By

(Student's Name)

(Register Number)

Under the Guidance of

(Guide Name and Designation)

(College Logo)

(Name of the Department)

(College Address)

(Month and Year)

b) Certificate

CERTIFICATE

This is to certify that the dissertation entitled ...(Title)...submitted by(Candidate Name)..... to the Periyar University, Salem in partial fulfilment of the requirement for the award of degree of Master of Philosophy in **MATHEMATICS** is a bonafide record of work carried out by the candidate during in the Department and that no part of the dissertation has been submitted for the award of any Degree / Diploma / Associateship / Fellowship or other similar titles that the Dissertation represents independent work of the candidate under my guidance.

Date:

Place:

Signature of the Guide

Signature of the Head of the Department

c) Acknowledgement

(Drafted by the student)

d) Table of contents

CONTENTS

Chapter No.	TITLE	Page No.
1	Introduction	
2	Review of Literature	
3, 4, 5..	Results	
	References	

14. Minimum Marks for Passing:

i) **Theory papers:** The candidate shall be declared to have passed the examination if the candidate secures not less than 50 marks in Total (CIA Marks + University Theory Exam Marks) with minimum of 38 marks in the Theory Exam conducted by the University.

ii) **Project work/Dissertation and Viva-Voce:** The candidate should secure 50% of the total marks for pass. The candidate should attend viva-voce examination to secure a pass in that paper.

Candidate who does not obtain the required minimum marks for a pass in a Paper / Practical/ Project/Dissertation shall be declared RE-APPEAR (RA) and he / she has to appear and pass the same at a subsequent appearance.

15. Restriction in Number of Chances:

No candidate shall be permitted to reappear for the written examination in any paper for more than two occasions or to resubmit a Dissertation more than once. Candidates' shall have to qualify for the degree passing all the written papers and dissertation within a period of three years from the date of joining the programme.

16. Conferment of Degree:

No candidate shall be eligible for conferment of the M.Phil. Degree unless he/she is declared to have passed both the parts of the examination as per the Regulations.

17. Qualified Guide for conducting the M.Phil. Programme:

No teacher shall be recognized as a supervisor unless he/she possesses a Ph.D. degree or two years of PG teaching experience after qualifying for M.Phil. or M.Litt. Degree.

Only the postgraduate departments of affiliated colleges and departments of the university will be recognized for conducting the M.Phil. programme; provided, however, the syndicate shall have the power to decide any other institutions of higher learning/research within the university area for conducting the M.Phil. programme on merits as per the regulations of Periyar University.

PART-TIME M.PHIL. MATHEMATICS

18. i) Regulations for the Part-Time M.Phil.:

The regulations governing the full time M.Phil. programme with regard to course of study, scheme of examinations, passing minimum, etc., and qualifications of guide conducting the M.Phil., programme shall apply to Part-Time candidates also.

ii) Eligibility for Admission to Part-Time M.Phil.:

Teacher candidates with PG degree working in Educational Institutions (Schools, Colleges, Polytechnics, University Centres and University Departments) with minimum of 55% in PG degree provided that for the candidates belonging to SC/ST community a concession of 5% will be given in the minimum eligibility marks. But no minimum percentage is prescribed for the candidates qualified PG degree prior to 01.01.1991.

iii) Duration of the course and the conduct of Examinations:

The programme of study extends over **PERIOD OF TWO YEARS** from the date of admission to the programme. The examinations for Part- I shall be taken at the end of the **FIRST YEAR** and Part –II Dissertation shall be submitted at the end of the **SECOND YEAR**.

19. Restriction in number of chances:

No candidate shall be permitted to reappear for the written examination in any paper on more than two occasions or to resubmit a Dissertation more than once.

Candidates shall have to qualify for the degree passing all the written papers and dissertation within a period of four years from the date of commencement of the programme.

SYLLABUS

SEMESTER I / FIRST YEAR

(PART I)

COURSE I

PAPER I - RESEARCH METHODOLOGY, ANALYSIS AND DIFFERENTIAL EQUATIONS

Course Code: 17MPMAT01

Max. Marks: 75

Credits: 04

(L – Lecture-3, T – Tutorial -1, P – Practical-0, C –Total Credits-4)

Unit I:

Basic Elements - Identification of the Author and his Writing – Chapters and Sections-Numbering of Elements.

(Chapter 4: Sections-4.1-4.5, Chapter 5: Sections-5.1-5.4, Chapter 6 and Chapter 8 of [1])

Unit II:

The Concepts of measurability – Simple functions – Elementary properties of measures – Integration of +ve functions – Integration of complex functions – The role played by sets of measure zero- L_p – Spaces: Convex functions and inequalities – The L_p – Spaces – Approximation by continuous functions.

(Chapter 1: Page No. 8 to 18 and Page No. 19 to 31, Chapter 3: Page No. 61 to 71 of [2])

Unit III:

Elementary Hilbert Space Theory: Inner products and linear functionals – Orthonormal sets. Examples of Banach Space Techniques: Banach spaces – Consequences of Baire's Theorem - The Hahn – Banach Theorem.

(Chapter 4: Page No. 76 to 87, Chapter 5: Page No. 95 to 100 and Page No. 104 to 108 of [2]).

Unit IV: Nonlinear Differential Equations:

Analysis and Methods of Nonlinear Differential Equations – Existence Theorem – Extremal solutions – upper and lower solutions – Bihari Inequality – Variation of parameters.

(Chapter 6: Sections 6.1, 6.2, 6.3, 6.4, 6.6 and 6.7 of [3])

Unit V: Boundary Value Problems:

Boundary Value Problems – Introduction – Sturm Liouville problem – Green's function – application of Boundary Value Problems – Picard's Theorem – Oscillation of second order equations – Fundamental Results – Sturms Comparison Theorem.

(Chapter 7: Sections 7.1-7.5, 8.1-8.2 of [3]).

Text Books:

1. B.N.Basu, Technical Writing, PHI, Ltd., New Delhi, 2007. [For Unit I].
2. Real and Complex Analysis, 3rd edition by Walter Rudin, McGraw Hill Book Company, New York. [For Units II & III]
3. S.G.Deo, V.Lakshmikantham and V.Ragavendra, Text Book of Ordinary Differential Equations, Tata McGraw Hill Publ. co. New Delhi, 1997. [For Units IV & V]

Books for Reference:

1. Berry, How to write a research paper.
 2. Rajammal P.Devadas, A handbook of Methodology of Research, R.M.M Vidyalaya Press(1976).
 3. W.Coppel, Stability and Asymptotic Behavior of Differential Equations, Heath Boston, 1965.
 4. P.Bailey, L.Shampine and P.Waltman, Nonlinear Two Point Boundary Value Problems, Academic Press, New York, 1968.
-

SEMESTER I / FIRST YEAR

(PART I)

COURSE II

PAPER II - ALGEBRA AND TOPOLOGY

Course Code: 17MPMAT02

Max.Marks: 75

Credits: 04

(L – Lecture-3, T – Tutorial -1, P – Practical-0, C –Total Credits-4)

Unit I:

Homomorphisms of modules – Direct summands – Direct sums and product of modules – Decomposition of rings – Semi simple modules – The socle and the radical – Finitely generated and finitely co-generated modules – Chain conditions.

(Chapter 1: Section 3, Chapter 2: Sections 5, 6, and 7, Chapter 3: Sections 9 and 10 of [1])

Unit II:

Modules with composition series – Indecomposable - decomposition of modules – Semi simple rings – The Density theorem – The radical of a ring – Local rings and Artinian rings.

(Chapter 3: Sections 11 and 12, Chapter 4: Sections 13, 14 and 15 of [1]).

Unit III: Fundamental group and covering spaces:

Homotopy – Fundamental group – Covering spaces.

(Chapter 3: Sections 3.1, 3.2, and 3.3 of [2]).

Unit IV: Simplicial complexes:

Geometry of simplicial complexes – Bary centre subdivision – Simplicial approximation theory.

(Chapter 4: Sections 4.1, 4.2, and 4.3 of [2]).

Unit V: Manifolds:

Differential manifolds – Differential form – Miscellaneous facts.

(Chapter 5: Sections 5.1, 5.2, and 5.3 of [2]).

Text Books:

1. F.W. Anderson and K.R.Fuller, Rings and Categories of Modules, 2nd Edition, Graduate Texts in Mathematics, Vol.13, Springer – Verlag, New York, 1992.[For Units I & II]
2. I.M.Singer and J.A.Thorpe , Lecture Notes on Elementary Topology, Springer Verlag, New York, 1967 . [For Units III ,IV & V]

Books for Reference:

1. T.Y. Lam, Lectures on Modules and Rings, Graduate Texts in Mathematics, Vol.189, Springer – Verlag, New York, 1999.
2. L.H. Rowen, Ring Theory, Vol I, II, Academic Press, New York, 1988.
3. R. Wisbaver, Foundations of Module and Ring Theory, Gordon and Breach, Philadelphia, 1991.
4. J.G. Hocking and G.S. Young , Topology, Addition - Wesley Pub. Co. Mass 1961
5. L.Auslander and R.f Mackenzie,Introduction to Differentiable Manifolds, McGraw- Hill, New York, 1963.

SEMESTER I / FIRST YEAR
(PART I)
COURSE III
GUIDE PAPER III- (Specialization Course)

Course Code: 17MPMAT03

Max.Marks: 75

Credits: 04

(L – Lecture-3, T – Tutorial -1, P – Practical-0, C –Total Credits-4)

The students must select the course from advanced research areas in Mathematics and the syllabus should be framed by the respective research supervisor. The syllabus along with two different sets of question papers may be communicated to the controller of examinations. The semester examination for specialization course will be conducted by the controller of examinations along with core courses.

SEMESTER II / SECOND YEAR

(PART II)

DISSERTATION

Course Code: 17MPMATD04

Max.Marks: 200

Dissertation Credits: 08 and Viva-Voce Credits: 04
