KANNUR UNIVERSITY

(Abstract)

M.Sc. Mathematics programme– Revised Scheme and Syllabus of 5 core courses & 2 Elective courses - Under Credit Based Semester System in Affiliated Colleges- Implemented w.e.f 2017 admission – orders issued.

ACADEMIC C SECTION

U.O. No. Acad/C4/7538/2014 Dated, Civil Station (P.O), 19-07-2017

Read:-1.U.O of even No dated dated 24-07-2014

2. U.O of Even No. Dated 07/08/2015

3. Minutes of the meeting of the Board of Studies in Mathematics (PG) held on 11/01/2017

4.Letter dated 25/04/2017 from the Chairman, BOS in Mathematics (PG)

5 Orders of the Vice Chancellor dated 27/5/2017 in File No.Acad/C4/7538/2014

6. Letter dated 15/06/2017 from the Chairman, BOS in Mathematics(PG)

ORDER

1. As per the paper read (1) above the Scheme, Syllabus and Model Question Papers of M.Sc. Mathematics Programme Under Credit Based Semester System in affiliated colleges were implemented in the University w.e.f.2014 admission and certain modifications were effected in the same vide paper read (2) above.

2. As per the paper read (3) above the meeting of the Board of Studies in Mathematics (PG) held on 11.01.2017 recommended to modify the Scheme and syllabus of 5 core courses & 2 Elective Courses of M.Sc. Mathematics programme as per the following w.e.f 2017 admission.

a. **The Syllabus of core courses MAT1C04 Basic Topology, MAT1C05 Differential Equations, MAT2C08 Topology as Advanced Topology, MAT2C09 Complex Analysis as Foundations of Complex Analysis , MAT3C13 Complex Function Theory and the syllabus of Elective Courses MAT3E02 Probability Theory and MAT4E01 Commutative Algebra to be revised and to modify the clause " viva voce in the scheme and to change the code and pattern of elective course as one instead of the existing two courses in the 4th semester.**

   i. **The Board recommended that students may choose one of the following 3 topics for the Elective Course (MAT3E) in 3rd Semester and also to change the text book for MAT3E02 Probability Theory.**

   - **MAT3E01 Graph Theory**
   - **MAT3E02 Probability Theory**
   - **MAT3E03 Calculus of variations**

   and

   ii. **The students to choose one of the following 3 topics for the Elective Course (MAT4E) in 4th Semester**

   - **MAT4E01 Commutative Algebra**
   - **MAT4E02 Fourier & Wavelet Analysis**
   - **MAT4E03 Operations Research**

P.T.O

3. As per the paper read (4) above, the chairman BOS in Mathematics (PG) forwarded the revised Syllabus for M.Sc Mathematics Programme for implementation w.e.f 2017 admission.

4. As there was unequal distribution of marks and credits, in the Scheme and Syllabus, the Vice Chancellor vide reference (5) above ordered that marks of each paper of M.Sc Mathematics Programme to be changed to 100 marks instead of 75 marks for the calculation of OGPA / Percentage.

5. Vide paper (6) above, the Chairman BOS in Mathematics (PG) forwarded the revised Scheme & Syllabus by modifying the marks of each paper as 100 of M.Sc Mathematics Programme for implementation w.e.f 2017 admission.

6. The Vice-Chancellor, after considering the matter in detail, and in exercise of the powers of the Academic Council, conferred under Section 11 (1) of Kannur University Act, 1996 and all other enabling provisions read together with, has accorded sanction to implement the modified Scheme, Syllabus and Model Question papers for M.Sc. mathematics Programme w.e.f 2017 admission as recommended by the BOS in Mathematics (PG) vide para 2 under Credit Based Semester System in affiliated colleges subject to ratification by the Academic Council.

7. The U.O's as per paper read (1) & (2) stand modified to this extent.

8. Orders are, therefore, issued accordingly.

9. The modified pages of Scheme, Syllabus and Model Question papers are appended in University website.

KANNUR UNIVERSITY
CIVIL STATION P.O.
KANNUR
Pin-670 002
THAVAKKARA

Sd/-
JOINT REGISTRAR (ACADEMIC)
For REGISTAR

To:

The Principals of Colleges offering M.Sc. Mathematics Programme.

Copy to:

1. The Examination Branch (through PA to CE)
2. The Chairman, BOS in Mathematics (PG)
3. PS to VC/PA to PVC
4. PA to Registrar/PA to CE.
5. JR/AR-I (Academic).
6. Computer Programmer (for uploading in the website)
7. SF/DF/FC

Forwarded /By Order

SECTION OFFICER

- ***For more details log on to www. Kannur university.ac.in***

SYLLABUS

M. Sc. MATHEMATICS

KUCBSS Scheme

KANNUR UNIVERSITY

2017 ADMISSION

Appendix to U.O.No. Acad/C4/7538/2014 dated: 19/07/2017

KANNUR UNIVERSITY

M.SC DEGREE PROGRAMME IN MATHEMATICS (KUCBSS)

SCHEME AND SYLLABUS (2017 ADMISSION)

1. COURSE STRUCTURE:

Course Code	Course Title	Lecture Hours/ Week	Duration of Examination (Hours)	Credits	Marks (Internal External)

FIRST SEMESTER

MAT1C01	Basic Abstract Algebra	5	3	4	100
MAT1C02	Linear Algebra	5	3	4	100
MAT1C03	Real Analysis	5	3	4	100
MAT1C04	Basic Topology	5	3	4	100
MAT1C05	Differential Equations	5	3	4	100
			Total	20	500

SECOND SEMESTER

MAT2C06	Advanced Abstract Algebra	5	3	4	100
MAT2C 07	Measure and Integration	5	3	4	100
MAT2C08	Advanced Topology	5	3	4	100
MAT2C09	Foundations Of Complex Analysis .	5	3	4	100
MAT2C10	Partial Differential Equations& integral equations	5	3	4	100
Total				20	500

THIRD SEMESTER

MAT3C11	Number Theory	5	3	4	100
MAT3C12	Functional Analysis	5	3	4	100
MAT3C13	Complex Function Theory	5	3	4	100
MAT3C14	Advanced Real Analysis	5	3	4	100
MAT3E01/02/03	Elective-1	5	3	4	100
			Total	20	500

FOURTH SEMESTER

MAT4C15	Operator Theory	5	3	4	100
MAT4C16	Differential Geometry	5	3	4	100
MAT4E01/02/03	Elective-2	5	3	4	100
MAT4D01	Project Work	10	-	4	100
MAT4V01	Viva-Voce	-	-	4	100
			Total	20	500

Total Marks: 2000
Total Credits: 80

Elective Course for Third Semester :

1. MAT3E01 Graph Theory
2. MAT3E02 Probability Theory
3. MAT3E03 Calculus of Variations

Elective Course for Fourth Semester :

1. MAT4E01 Commutative Algebra
2. MAT4E02 Fourier and Wavelet Analysis
3. MAT4E03 Operations Research

Comprehensive Viva-Voce

A comprehensive viva-voce at the end of IV semester shall be conducted for each student to assess the overall mathematical ideas assimilated by the student during their post graduate programme. A team comprising of two teachers shall be appointed for conducting the viva- voce. The modus operandi of conducting viva-voce shall be decided by convening a meeting of Board of Examiners from time to time.

4. MODIFIED SYLLABUS

First Semester

MAT1C04 : BASIC TOPOLOGY

Text:

C. Wayne Patty, Foundations of Topology, Second Edition – Jones & Bartlett India Pvt. Ltd., New Delhi, 2012.

Unit – I

Topological Spaces: The Definition and Examples, Basis for a Topology, Closed Sets, Closures and Interiors of Sets, Metric spaces, Convergence, Continuous functions and Homeomorphisms.

[Chapter 1: Sections 1.2 to 1.7, excluding Theorem 1.46 and Theorem 1.51]

Unit – II

New spaces from old ones: Subspaces, The Product Topology on X x Y, The Product Topology, The Weak Topology and the Product Topology.

[Chapter 2: Sections 2.1 to 2.4]

Unit – III

Connectedness in metric spaces: Connected spaces, Pathwise and Local connectedness, Totally disconnected space,

[Chapter 3: Sections 3.1 to 3.3 excluding Theorem 3. 29 and Theorem 3.30]

References:

1. K. D. Joshi, Introduction to General Topology, New Age International (P) Ltd., Publishers.
2. Dugundji, Topology, Prentice Hall of India.
3. G. F. Simmons, Introduction to Topology and Modern Analysis, Mc Graw Hill.
4. S. Willard, General Topology , Addison Wesley Publishing Company.5.
5. J.R.Munkers,Topology: A First Course, Prentice Hall of India.
6. Murdeshwar M. G., General Topology, second edition, Wiley Eastern.
7. Kelley, General Topology, van Nostrand, Eastern Economy Edition.

MAT1C05: DIFFERENTIAL EQUATIONS

Text Book: G.F Simmons - Differential Equations with Historical Notes; Third Edition-CRC Press, Taylor and Francis Group.

Unit I

Introduction: A Review of Power Series, Series Solutions of First Order Equations, Second Order Linear Equations. Ordinary Points , Regular Singular Points, Regular Singular Points (Continued), Gauss's Hyper Geometric Equation, The Point at Infinity.

(Chapter-5; Sections 26 to 32)

Unit II

Legendre Polynomials, Properties of Legendre Polynomials, Bessel Functions. The Gamma Function, Properties of Bessel functions, General Remarks on Systems, Linear Systems Homogeneous Linear Systems with Constant Coefficients.

(Chapter-8; Sections 44 to 47; Chapter-10; Sections 54 to 56)

Unit III

Oscillations and the Sturm Separation Theorem, The Sturm Comparison Theorem, The Method of Successive Approximations, Picard's Theorem, Systems. The Second Order Linear Equation

(Chapter-4; Sections 24 and 25; Chapter-13; Sections 68 to 70)

Reference:

1. G.Birkoff and G.C Rota: Ordinary Differential Equations; Wiley and Sons; (1978)
2. E.A Coddington; An Introduction to Ordinary Differential Equations; Prentice Hall of India, New Delhi (1974)
3. P.Hartmon; Ordinary Differential Equations; John Wiley and Sons
4. Chakraborti; Elements of Ordinary Differential Equations and Special Functions; Wiley Eastern Ltd New Delhi (1990)
5. L.S Poutrigardian: A Course in Ordinary Differential Equations; Hindustan Publishing Corporation Delhi (1967)
6. S.G Deo & V.Raghavendra; Ordinary Differential Equations and Stability Theory; Tata McGraw Hill New Delhi (1967)

7.V.I Arnold; Ordinary Differential Equations; MIT Press, Cambridge 1981

Second Semester

MAT2C08 : ADVANCED TOPOLOGY

Text:

C. Wayne Patty, Foundations of Topology, Second Edition – Jones & Bartlett India Pvt. Ltd., New Delhi, 2012.

Unit –1

Compactness: Compactness in metric spaces, Compact spaces. Local compactness and the relation between various forms of compactness.

[Chapter 4: Sections 4.1 to 4.3 excluding Corollary 4.22]

Unit – II

The Separation and Countability Axioms: T0, T1 & T2 spaces, Regular and completely regular spaces, Normal and completely normal spaces, The countability axioms.

[Chapter 5: Sections 5.1 to 5.4 excluding Examples 3, 5 and 6 and Theorem 5.10. Also exclude the proof that the Moore Plane is Completely Regular.]

Unit – III

Urysohn's Lemma and Tietze Extension Theorem, Special Topics: Urysohn's Lemma and Tietze Extension Theorem, The Alexander Subbase and Tychonoff Theorems, Urysohn's Metrization Theorem, Homotopy of Paths.

[Chapter 5: Section 5.5, Chapter 6: Section 6.7 excluding Example 20; Chapter 7: Section 7.1; Chapter 8: Section 8.1]

References:

1. K. D. Joshi, Introduction to General Topology, New Age International (P) Ltd., Publishers.
2. Dugundji, Topology, Prentice Hall of India.
3. G. F. Simmons, Introduction to Topology and Modern Analysis, Mc Graw Hill.
4. S. Willard, General Topology , Addison Wesley Publishing Company.
5. J. R. Munkres, Topology: A First Course, Prentice Hall of India.
6. Murdeshwar M. G., General Topology, second edition, Wiley Eastern.
7. Kelley, General Topology, van Nostrand, Eastern Economy Edition.

MAT2C09: F O U N D A T I O N S O F COMPLEX ANALYSIS

Text Book: John B Conway- Functions of One Complex Variable, 2nd Edition, Springer International Student Edition.

Unit I

Analytical Functions, Complex Integration

Power Series representation of Analytic Functions, Zeroes of an analytic function, The index of a closed curve, Cauchy's Theorem and Integral Formula, The homotopic version of Cauchy's Theorem and simple connectivity, Counting zeros the Open Mapping Theorem, Goursat's Theorem

Chapter IV Sections 2 to 8 . (2.1 to 3.6 proof omitted)

Unit II

Singularities

Classification of singularities, Residues, The Argument Principle

The Maximum Modulus Theorem

The Maximum Principle, Schwarz's Lemma

Chapter V Sections 1 to 3 , Chapter VI Sections 1 and 2

Unit III

Compactness and Convergence in the Space of Analytic Functions

The Spaces of continuous functions C(G, Ω), Spaces of analytic functions, The Riemann Mapping Theorem, Weierstrass Factorization Theorem.

Chapter VII Section 1 to 2; and 4 to 5

References:

1. Louis Pennise: Elements of Complex Variable Half, Richart & Winston 1976
2. Silverman.H: Complex Variable, Haughton Miffin Complex, Boston 1975.
3. Rudin.W: Real and Complex Analysis (3rd Edition) McGraw Hill International Edition 1967.
4. E.T Copson: An Introduction to the Theory of a Complex Variables, Oxford University Press.
5. Lars V.Ahlfors-Complex Analysis (3rd Edition), Mc Graw-Hall international edition.

Third Semester

MAT3C13: COMPLEX FUNCTION THEORY

Text Book 1: Lars V Ahlfors -Complex Analysis (3rd Edition), Mc Graw-Hill Education

Text Book 2: John B Conway - Functions of One Complex Variable, 2nd Edition, Springer International Student Edition

Unit I

Elliptic Functions: Simple periodic functions, Doubly periodic functions, The Weierstrass Theory. **(Chapter 7, Sections 1, 2, 3 of Text 1)**

The Riemann Zeta function (Chapter 7, Sections 8 of Text 2)

Unit II

Runge's Theorem: Runge's Theorem, Simple Connectedness, Mittag Lefler's Theorem.

Analytic Continuation and Riemann Surfaces: Schwarz Reflection Principle, Analytic Continuation along a path, Mondromy Theorem

(Chapter VIII, Section 1, 2, 3, of text 2; IX Section 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 X, Sections 1,2,3 ; Chapter XI, Sections 1 of Text 2)

References:

1. Louis Pennise: Elements of Complex Variable, Holt, Rinehart and Winston; 2nd edition (July 1976)
2. Silverman: Complex Variable, Haughton Miffin Boston 1975.
3. Rudin.W: Real and Complex Analysis (3rd Edition) McGraw Hill International Edition 1967.
4. T Copson: An Introduction to the Theory of a Complex Variables, Oxford University Press 1974.

Elective (Third Semester)

MAT3E02: Elective PROBABILITY THEORY

Text Book: B.R Bhat: Modern Probability Theory (2nd Edition.); New Age international PVT. Ltd.New Delhi 1999)

Unit I

Sets and Classes of Events, Random Variables, Probability Spaces
(Chapter -1: Sections 1.1 to 1.4; Chapter -2: Sections 2.1 to 2.3; Chapter -3: Sections 3.1 to 3.5)

Unit II

Distribution Functions, Expectation and Moments, Convergence of Random Variables
(Chapter- 4: Sections 4.1 to 4.4; Chapter -5: Sections 5.1 to 5.3; Chapter -6: Sections 6.1 to 6.6)

Unit III

Characteristic Functions, Convergence of Distribution Functions.

(Chapter -7: Sections 7.1 to 7.5, Chapter -8: Sections 8.1 to 8.3)

References:

1. P. Billingsley: Probability and Measure, John Wiley & Sons NY (1979)
2. K.I Chung : Elementary Probability Theory with Stochastic Process Narosa Publishing House New Delhi (1980)
3. W. Feller : An Introduction to Probability Theory and its Applications Vol 1 & 2, John Wiley & Sons NY (1968, 1971)
4. E. Parzen : Modern Probability Theory and its Applications, Wiley Eastern Ltd, New Delhi (1972)
5. H.G Tucker: A Graduate Course in Probability, Academic Press NY (1967)

Elective (Fourth Semester)

MAT4E01: Elective COMMUTATIVE ALGEBRA

Text Book: Atiyah M.F and Macdonald I.G; Introduction to communicative Algebra, Addison Wiley (1969)

Unit I

Rings and Ideals, Modules; Rings and Ring Homomorphism, Ideals, Quotient Rings, Zero Divisors, Nilpotent Elements, Unit, Prime Ideals and Maximal Ideals, Nilradical and Jocobson Redical, Operations on Ideals, Extension and Contraction, Modules and Module Homomorphism, Submodules and Quotient Modules, Operations on Submodules, Direct Sum and Product, Finitely Generated Modules, Exact Sequences.

(Chapter-1; All Sections; Chapter-2; Section 2.1 to 2.11)

Unit II

Rings and Modules of Fractions, Primary Decomposition: Local Properties, Extended and Contracted Ideals. Primary Decomposition.

(Chapter-3; All sections; Chapter-4; All Section)

Unit III

Integral dependence, Chain conditions, Noetherian Rings; Integral Dependence, The Going- Up Theorem, Integrally Closed Integral Domains. The Going-Down Theorem, Chain Conditions, Noetherian Rings.

(Chapter-5; All section, except 5.18, 5.19, 5.20, 5.21, 5.22, 5.23, 5.24; Chpater-6; All sections; Chapter-7; All sections, except 7.8, 7.9 and 7.10)

References:

1. N.Bourbaki: Commutative Algebra, Paris Herman (1961)
2. D.Burton; A first course introduction to Rings and Ideals, Wesley (1970)
3. N.S Gopalakrishnan; Commutative Algebra, Oxonian Press (1984)
4. T.W Hunger ford; Algebra, Springer Verlag (1974)
5. D.G North Cott; Ideal Theory, Cambridge University Press (1953)
6. O.Zarisiki and P. Samuel; Commutative Algebra, Vol I and II, Van Nostrand, Princeton (1960