UNIVERSITY OF CALICUT

(Abstract)

MSc programme in Mathematics under Credit Semester System (PG)-Scheme and Syllabus -approved –implemented with effect from 2010 admn onwards-Orders issued

GENERAL & ACADEMIC BRANCH-IV 'J' SECTION

No. GA IV/J2/ 4477/10 Dated, Calicut University PO, 02.08.2010

Read:1. U.O.No. GAIV/J1/1373/08 dated, 23.07.2010.

2. Item no.2 of the minutes of the meeting of the Board of Studies in Mathematics (PG) held on 22.06.2010

3. Orders of the Vice-Chancellor in file of even no.dtd 02.08.2010

O R D E R

As per University Order read as first, Credit Semester System was implemented to PG programmes in affiliated Arts and Science Colleges and Self Financing Centres of the University with effect from 2010 admission onwards.

The Board of Studies in Mathematics (PG),vide paper read as second, discussed the implementation of Credit Semester System at PG level in the affiliated colleges and the Board decided to implement the same and approved the syllabus of the first Semester of the Programme and resolved that the programme will have a total of 80 credits.

The Vice Chancellor approved the minutes subject to ratification by the Academic Council,vide paper read as 3 above.

Sanction has therefore been accorded for implementing the Syllabus of Ist Semester of MSc programme in Mathematics under CSS for affiliated Colleges with effect from 2010 admission.

Orders are issued accordingly. Scheme and Syllabus appended.

Sd/-

ASSISTANT REGISTRAR (G & A-IV)

For

REGISTRAR

To

The Principals of affiliated Colleges offering MSc programme in Mathematics

Copy to:

PS to VC/PA to Registrar/Chairman,B/S in Mathematics/CE/EX/DRIII/ DR-PG/EGI/Enquiry/System Administrator(with a request to upload in the University website)/Information Centres/GAI`F``G`Sections GAII/III

Forwarded/By Order

Sd/-

SECTION OFFICER.

APPENDIX - I

UNIVERSITY OF CALICUT

SYLLABUS FOR THE M.Sc. MATHEMATICS COURSE UNDER CUCSS – PG – 2010
(Total Credits : 80)

EFFECTIVE FROM 2010 ADMISSIONS

Semester I

Sl. No.	Course Code	Title of the Course	No. of Credits	Core/Elective
1.	MT1C01	Algebra 1	4	Core
2.	MT1C02	Linear Algebra	4	Core
3.	MT1C03	Real Analysis - I	4	Core
4.	MT1C04	ODE and Calculus of Variations	4	Core
5.	MT1C05	Discrete Mathematics	4	Core

Total Credit for the First Semester: 20 (All are core courses)

Question Paper Pattern

For each course there will be an external examination of duration 3 hours. The valuation will be done by Direct Grading System. Each question paper will consists of 14 short answer questions, each of weightage 1, 10 paragraph type questions each of weightage 2 and 4 essay type questions, each of weightage 4. All short answer questions are to be answered while 7 paragraph type questions and 2 essay type questions are to be answered with a total weightage of 36. The questions are to be evenly distributed over the entire syllabus.

DETAILED SYLLABI

SEMESTER I

MT1C01 : ALGEBRA - I

No. of Credits : 4
No.of hours of Lectures/week : 5

TEXT : **FRALEIGH, J.B**. : A FIRST COURSE IN ABSTRACT ALGEBRA. (Fifth edn.) Narosa (1999.)

UNIT I

Plane Isometries (page 113), Direct products & finitely generated Abelian Groups, Binary Linear Codes, Factor Groups, Factor-Group Computations and Simple Groups, Series of groups.
[§§ 2.2(only Plane Isometries) 2.4, 2.5, 3.3, 3.4, 3.5]

UNIT II

Group action on a set, Applications of G-set to counting, Isomorphism theorems: Proof of the Jordan-Holder Theorem (Omit Butterfly Lemma and proof of the Schreier Theorem), Sylow theorems, Applications of the Sylow theory, Free Groups (Omit Another look at free abelian groups).
[§§ 3.6, 3.7, 4.1, 4.2, 4.3, 4.5]

UNIT III

Group Presentations, Rings of polynomials, Factorization of polynomials over a field, Non commutative examples, Homomorphism and factor rings.
[§§ 4.6, 5.5, 5.6, 5.7, 6.1]

REFERENCES

1. I.N. Herstein : Topics in Algebra
   Wiley Eastern (Reprint)
2. N.H. McCoy and R.Thomas : Algebra.
   Allyn & Bacon Inc. (1977).
3. J. Rotman : The theory of groups
   Allyn & Bacon Inc. (1973)
4. Hall,Marshall : The theory of groups.
   Chelsea Pub. Co. NY. (1976)
5. Clark, Allan : Elements of Abstract Algebra
   Dover Publications (1984)
6. L.W. Shapiro : Introduction to Abstract Algebra
   McGraw Hill Book Co. NY (1975)
7. N. Jacobson : Basic Algebra , Vol. I.
   Hindustan Publishing Corporation (India),

Delhi 110 007 Reprint (1991)
8. T.W. Hungerford : Algebra
Springer Verlag GTM 73 (1987) 4th Printing.
9.D.M. Burton : A First Course in Rings and Ideals
Addison Wesley 1970
10. Mac Lane & Brikhoff : Algebra
Macmillian
11. Joseph A. Gallian : Contemporary Abstract Algebra (4th Edition)
Narosa 1999

MT1C02 : LINEAR ALGEBRA

No. of Credits : 4

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No. of hours of Lectures/week : 5

TEXTS : 1. **HOFFMAN, K., and KUNZE, R**., LINEAR ALGEBRA, (2nd Edn.) , Printice-Hall of India, 1991.

UNIT I

Vector Spaces & Linear Transformations
[Chapter 2 Sections 2.1 – 2.4; Chapter 3 Sections 3.1 to 3.3 from the text]

UNIT II

Linear Transformations (continued) and Elementary Canonical Forms
[Chapter 3 Sections 3.4 – 3.7;Chapter 6 Sections 6.1 to 6.4 from the text]

UNIT III

Elementary Canonical Forms (continued), Inner Product Spaces
[Chapter 6. Sections 6.6 & 6.7; Chapter 8 Sections 8.1 & 8.2 from the text]

REFERENCES

1. P.R. Halmos : Finite Dimensional Vector spaces
Narosa Pub House, New Delhi (1980)
2. S. Lang : Linear Algebra
Addison Wesley Pub.Co.Reading, Mass (1972)
3. I.N. Herstein : Topics in Algebra
Wiley Eastern Ltd Reprint (1991)
4. N.H. McCoy and R. Thomas : Algebra
Allyn Bacon Inc NY (1977)
5. S. Mac Lane and G. Bikhrkhoff: Algebra
Macmillan Pub Co NY (1967)
6. R.R. Stoll and E.T.Wong : Linear Algebra
Academic Press International Edn (1968)

7. G.D. Mostow and J.H. Sampson: Linear Algebra
McGraw-Hill Book Co NY (1969
8. T.W. Hungerford : Algebra
Springer Verlag GTM No 73 (1974)
9. S. Kumaresan : Linear Algebra-A Geometric Approach
Prentice Hall of India (2000)
10. J. B. Fraleigh& R.H. Beauregard: Linear Algebra
Addison Wesley
11. Henry Helson : Linear Algebra (Second Edition) Hindustan Book Agencies, 1994.
12. E.D. Nering : Linear Algebra and Matrix Theory
Wiley International Edition 1963
13. Sheldon Axler : Linear Algebra Done Right (Second Edition)
Springer 1997
14. David C. Lay : Linear Algebra and its Application, Pearson Education 2003.

MT1C03 : REAL ANALYSIS - I

No. of Credits : 4

No.of hours of Lectures / week : 5

TEXT: **RUDIN, W**., PRINCIPLES OF MATHEMATICAL ANALYSIS (3^{rd} Edn.) Mc. Graw-Hill, 1986.

UNIT – I

Basic Topololgy – Finite, Countable and Uncountable sets Metric Spaces, Compact Sets, Perfect Sets, Connected sets.

Continuity - Limits of function, Continuous functions, Continuity and compactness, continuity and connectedness, Discontinuities, Monotonic functions, Infinite limits and Limits at Infinity.

[Chapter 2 & Chapter 4]

UNIT – II

Differentiation_– The derivative of a real function, Mean Value theorems, The continuity of Derivatives, L Hospital's Rule, Derivatives of Higher Order, Taylor's Theorem, Differentiation of Vector – valued functions.

The Riemann – Stieltjes Integral, - Definition and Existence of the integral, properties of the integral, Integration and Differentiation.

[Chapters 5 & Chapter 6 up to and including 6.22]

UNIT – III

The Riemann – Stieltjes Integral (Continued) - Integration of Vector vector-valued Functions, Rectifiable curves.

Sequences and Series of Functions - Discussion of Main problem, Uniform convergence, Uniform convergence and continuity, Uniform convergence and Integration, Uniform convergence and Differentiation. Equicontinuous Families of Functions, The Stone – Weierstrass Theorem.

[Chapters 6 (from 6.23 to 6.27) & Chapter 7 (upto and including 7.27 only)]

REFERENCES

1. a) R.G. Bartle : Element of Real Analysis
   Wiley International Edn
   (Second Edn) (1976)
   b) R.G. Bartle and D.R. Sherbert : Introduction to Real Analysis
   John Wiley Bros (1982)
2. L.M. Graves : The theory of functions of a real variable
   Tata McGraw-Hill Book Co (1978)
3. M.H. Protter & C.B. Moray : A first course in Real Analysis
   Springer Verlag UTM (1977)
4. S.C. Saxena and SM Shah : Introduction to Real Variable Theory
   Intext Educational Publishers
   San Francisco (1972)
5. I.K.Rana : An Introduction to Measure and Integration,
   Narosa Publishing House, Delhi, 1997..
6. Hewitt and Stromberg K : Real and Abstract Analysis
   Springer Verlag GTM 25 (1975) Reprint
7. S.R. Ghorpade & B.V. Limaye : A course in Calculus and Real Analysis, Springer 2006
8. Terence Tao : Analysis I &II
   : Hindustan Book agency

MT1C04 : ODE AND CALCULUS OF VARIATIONS

No. of Credits : 4

No.of hours of Lectures / week : 5

TEXT: **SIMMONS, G.F.**,: DIFFERENTIAL EQUATIONS WITH APPLICATIONS AND HISTORICAL NOTES, TMH Edition, New Delhi, 1974.

UNIT I

Power Series Solutions and Special functions; Some Special Functions of Mathematical Physics.

[Chapter 5: Sections 26, 27, 28, 29, 30, 31 ; Chapter 6: Sections 32, 33]

UNIT II

Some special functions of Mathematical Physics (continued)

Systems of First Order Equations; Non linear Equations
Chapter 6 : Sections 34, 35 : Chapter 7 :Sections 37, 38, Chapter 8 : Sections 40, 41, 42, 43, 44]

UNIT III

Oscillation Theory of Boundary Value Problems, The Existence and Uniqueness of Solutions, The Calculus of Variations.
[Chapter 4 : Sections 22, 23 & Appendix A. (Omit Section 24) ; Chapter 11 : Sections 55, 56,57: Chapter 9 : Sections 47, 48, 49]

REFERENCES

1. G. Birkhoff & G.C. Rota : Ordinary Differential Equations Edn. Wiley & Sons 3rd Edn (1978)
2. E.A. Coddington : An Introduction to Ordinary Differential Equtions Printice Hall of India, New Delhi (1974)
3. P. Hartman : Ordinary Differential Equations John Wiley & Sons (1964)
4. L.S. Pontriyagin : A course in ordinary Differential Equations Hindustan Pub. Corporation,Delhi (1967)
5. Courant R and Hilbert D : Methods of Mathematical Physics , vol I Wiley Eastern Reprint (1975)
6. W.E. Boyce & R.C. Deprima : Elementary Differential Equations and boundary value problems John Wiley & Sons NY 2nd Edn (1969)
7. A. Chakrabarti : Elements of ordinary Differential Equations and special functions Wiley Eastern Ltd New Delhi (1990)
8. Ian Sneddon : Elements of Partial Differential Equations McGraw-Hill International Edn., (1957)

MT1C05 : DISCRETE MATHEMATICS

No. of Credits 4

Number of hours of Lectures / week: 5

TEXTS: **DOUGLAS B**. **WEST**, INTODUCTION TO GRAPH THEORY (Second Edition) Pearson Education

1) **K.D.JOSHI**, FOUNDATIONS OF DISCRETE MATHEMATICS, New Age International (P) Ltd. New Delhi 1989
2) **PETER LINZ**, AN INTRODUCTION TO FORMAL LANGUAGES AND AUTOMATA. (Second Edition) Narosa Publishing House, New Delhi, 1997.

UNIT I

Order Relations, Lattices; Boolean Algebra – Definition and Properties, Boolean Functions.
[Chapter 3 (section.3 (3.1-3.11), chapter 4 (sections 1& 2) from text 2]

UNIT II

What is a graph? Graphs as Models, Matrices and Isomorphism, Paths, Walks, Connected Graphs, Bipartite Graphs, Eulerian circuits, Vertex Degrees, Degree sum formula. Directed Graphs – Definitions and examples. Trees-Basic Properties. Connectivity. Planar Graphs. Embedding and Eulers formula – Restricted Jordan Curve Theorem (Statement only), Dual Graphs, Eulers formula. [Chapter 1: section 1.1 (up to and including 1.1.40), 1.2 (Up to and including 1.2.27), 1.3 (Up to and including 1.3.6), 1.4 (Up to and including 1.4.13)
Chapter 2: section 2.1 (Up to and including 2.1.5, 2.1.9 to 2.1.11)
Chapter 4; section 4.1 (4.1.1, 4.1.2, 4.1.7 to 4.1.11)
Chapter 6: section 6.1 (Up to and including 6.1.13, 6.1.21 to 6.1.24) from text 1]

UNIT III

Automata and Formal Languages: Introduction to the theory of Computation, Finite Automata, Regular Expressions.
[Chapter 1 (sections 1.2 & 1.3); Chapter 2 (sections 2.1, 2.2 & 2.3); Chapter 3 (section 3.1) from Text 3]

REFERENCES:

[1] J.A. Bondy and U.S.R.Murty : Graph Theory with applications. Macmillan

[2] F. Harary : Graph Theory, Narosa publishers

[3] John Clark and Derek Allan Holton : A First look at Graph Theory, Prentice Hall

[4] K.R. Parthasarathy : Basic Graph Theory, Tata-Mc Graw Hill

[5] R. Balakrishnan & K. Ranganathan : A Text Book of Graph Theory, Springer Verlag.

[6] C.L. Liu : Elements of Discrete Mathematics (Second Edition) Mc Graw Hill Book Company 1985.

[7] K.H. Rosen : Discrete Mathematics and its Applications (5^{th} Edition) MC Graw Hill 2003.