MSc MATHS

UNIVERSITY OF CALICUT
(Abstract)

M.Sc. Mathematics – Syllabus & Scheme of examination under Choice Based Credit Semester System Programme implemented with effect from 2008 admission – Orders Issued.

GENERAL AND ACADEMIC BRANCH –I 'J' SECTION

No. GA I/J2/7930/07 Dated, Calicut University P.O, 9/01/2009.

Read : 1.U.O.No.GAI/J1/1373/08 dated 01/07/2008.

2. Item No.I of the minutes of the meeting of the Boards of Studies in Mathematics (PG) of 27/08/2008.
3. Item No.2(xxxv) of the minutes of the meeting of the Faculty of Science of 29/08/2008.
4. Item No.II A (29) of the minutes of the meeting of the Academic Council of 07/10/2008.

ORDER

As per paper read as 1st above, Choice Based Credit Semester System was introduced for all regular PG Programmes in the teaching Departments/Schools of this University.

The Board of Studies in Mathematics (PG) vide paper read as 2nd above, approved the Syllabus & Scheme of examination for the M.Sc. Degree course (Choice Based Credit Semester System) in Mathematics at the Department of Mathematics, University of Calicut with effect from 2008 admission.

The Faculty of Science vide paper read as 3rd above, endorsed the minutes of the Board of Studies in Mathematics (PG) and the Academic Council vide paper 4th above approved the same.

Sanction has therefore been accorded for implementing the Syllabus and Scheme of Examination of M.Sc. Mathematics course under Choice Based Credit Semester System at the University Department of Mathematics with effect from 2008 admission onwards. The Syllabus is appended herewith (Syllabus of 1st and 2nd semesters).

Orders are issued accordingly.

Sd/-
Deputy Registrar G &A I
For Registrar

To

The Head, Department of Mathematics
University of Calicut.

Copy to:

Controller of Examinations/ EX Sn./ DR (PG)/
Tabulation Sn./All Information Centres/
GAI, 'F' Sns./GAIII Branch/
Choice Based Credit Semester System Sn./SF/DF/FC

Forwarded/By Order

A Parvathi
SECTION OFFICER

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UNIVERSITY OF CALICUT

DEPARTMENT OF MATHEMATICS

SYLLABUS FOR THE M.Sc MATHEMATICS COURSE UNDER THE CCSS

(I & II SEMESTER)

EFFECTIVE FROM 2008 ADMISSIONS

UNIVERSITY OF CALICUT
DEPARTMENT OF MATHEMATICS
SYLLABUS FOR THE M.Sc MATHEMATICS COURSE
UNDER THE CCSS EFFECTIVE FROM 2008ADMISSIONS

Semester I

Sl. No	Title of the Course	No. of Credits	No. of Units	Core/ Elective
MATH 101	Algebra I	4	4	Core
MATH102	Real Analysis I	4	4	Core
MATH103	Linear Algebra	4	4	Core
MATH104	Discrete Mathematics	4	4	Core
MATH105	Number Theory	4	4	Core

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

Semester II

Sl. No	Title of the Course	No. of Credits	No. of Units	Core/ Elective
MATH201	Algebra II	4	4	Core
MATH202	Real Analysis II	4	4	Core
MATH203	Ordinary Differential Equations	4	4	Core
MATH204	Topology I	4	4	Core

Total Credit for Second Semester : 16 (All are core courses)

Semester III

Sl. No	Title of the Course	No. of Credits	No. of Units	Core/ Elective
MATH301	Complex Analysis	4	4	Core
MATH302	Functional Analysis	4	4	Core
MATH303	Partial Differential Equations	4	4	Core
MATH304	Elective I	4	4	Elective
MATH305	Elective II	3	3	Elective

Total Credit for Third Semester : 19 (3 core courses + 2 Electives)

Semester IV

Sl. No	Title of the Course	No. of Credits	No. of Units	Core/ Elective
MATH401	Elective III	3	3	Elective
MATH402	Elective IV	3	3	Elective
MATH403	Elective V	3	3	Elective
MATH404	Dissertation	8	------	----------

Total Credit for First Semester : 17 (3 Electives + Dissertation)

List of Electives

1. Advanced Complex Analysis
2. Advanced Functional Analysis
3. Topology II
4. Algebraic Topology
5. Differential Geometry
6. Measure and Integration
7. Operations Research
8. Computer Oriented Numerical Analysis

QUESTION PAPER PATTERN (FOR CORE PAPERS)

Question paper of **core courses** is of **80 marks** and of **3 hours** duration. Each paper has two parts, Part - A and Part - B

Part-A is of **48 marks** consisting of **12** short answer questions, **3** questions from each unit and each question carries **4** marks (Out of 12 questions at least 4 of them must be problems, one from each unit). Part-A is Compulsory.

Part-B is of **32 marks** with four units. Each unit has **2** questions of **8 marks each**, out of which one has to be answered. It is desirable to have atleast two sub-questions for each of these questions.

The questions are to be evenly distributed over the entire syllabus

DETAILED SYLLABI

SEMESTER I

PAPER I : ALGEBRA - I (2008 ADMISSIONS ONWARDS)

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

No. of Credits : 4

UNIT I

Direct products & finitely generated Abelian Groups (**omit** Periodic Functions & Plane Isometries), Factor Groups, Factor-Group Computations and Simple Groups, Series of groups.
[§§ 2.4, 3.3, 3.4, 3.5]

UNIT II

Group action on a set, Applications of G-set to counting, Isomorphism theorems (**omit** Butterfly Lemma and proof of the Schreier Theorem), Free Groups (**omit** Another look at free abelian groups).

[§§ 3.6, 3.7, 4.1, 4.5]

Unit III

Sylow theorems, Applications of the Sylow theory, Field of quotients of an Integral Domain
[§§ 4.2, 4.3, 5.4]

Unit IV

Rings of Polinomials (**omit** proofs of 5.15 & 5.16), Factorization of polynomials over a field, Homomorphism and factor rings, Prime and Maximal Ideals.
[§§ 5.5, 5.6, 6.1, 6.2]

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. C. Musili : Introduction to Rings and Modules
   Narosa Publishing House, New Delhi (1992)
8. N. Jacobson : Basic Algebra, Vol. I.
   Hindustan Publishing Corporation (India),
   Delhi 110 007 Reprint (1991)
9. P.B. Bhattacharya & S.K. Jain : First course in rings, fields and vector spaces
   Wiley Eastern Ltd.,New Delhi (1976)
10. T.W. Hungerford : Algebra
    Springer Verlag GTM 73 (1987) 4th Printing.

APER II : LINEARALGEBRA (2008 ADMISSIONS ONWARDS)

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

No. of Credits : 4

UNIT I

Vector Spaces; Linear Transformations
[Chapter 2: Sections 2.1 – 2.4; Chapter 3: Section 3.1]

UNIT II

Linear Transformations (continued)
[Chapter 3: Sections 3.2 – 3.7]

UNIT III

Elementary Canonical Forms
[Chapter 6: Sections 6.1 to 6.4]

UNIT IV

Elementary Canonical Forms (continued); Rational and Jordan Forms
[Chapter 6: Sections 6.6 to 6.8; Chapter 7: Sections 7.1 & 7.2]

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. Maclane 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)

APER III : REAL ANALYSIS –I (2008 ADMISSIONS ONWARDS)

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

No.of Credits : 4

UNIT I

Basic Topology – Finite, Countable and Uncountable sets, Metric Spaces, Compact Sets, Perfect Sets, Connected sets.
[Chapter 2]

UNIT II

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

Differentiation – (**Quick review of** : 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.
[Chapter 4 & Chapter 5: (Quick review of 5.1 - 5.13), 5.14 to 5.19]

UNIT III

The Riemann – Stieltjes Integral, - Definition and Existence of the integral, properties of the integral, Integration and Differentiation, Integration of Vector valued- Functions, Rectifiable curves.

Sequences and Series of Functions - Discussion of Main problem, Uniform convergence, Uniform convergence and continuity.
[Chapter 6: 6.1 to 6.27; Chapter 7: 7.1 to 7.10]

UNIT IV

Sequences and Series of Functions - Uniform convergence and Integration, Uniform convergence and differentiation. Equicontinuous Families of Functions.
[Chapter 7: 7.11 to 7.33]

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

APER IV : DISCRETE MATHEMATICS (2008 ADMISSIONS ONWARDS)

TEXTS :1. **R. BALAKRISHNAN and K. RANGANADHAN.,**
A TEXT BOOK OF GRAPH THEORY
Springer-Verlag New York,Inc., 2000.
2. **K. D JOSHI.,** FOUNDATIONS OF DISCRETE MATHEMATICS
New Age International (P) Limited,New Delhi1989
3. **PETER LINZ.,** AN INTRODUCTION TO FORMAL
LANGUAGES AND AUTOMATA
(2nd Edn.) Narosa Publishing House, New Delhi,1997

Number of Credits : 4

UNIT I

Graphs – Basic concepts, sub graphs, Paths, Connectedness, Automorphisms, Operations on Graphs; Directed Graphs; Connectivity
[Chapter 1: Sections 1.0 to 1.4 (up to and including 1.4.10), 1.5 (up to and including 1.5.3), 1.7 (up to and including 1.7.5); Chapter 2: Section 2.1; Chapter 3: Sections 3.1 (up to and including 3.1.10), 3.2 (up to and including 3.2.4) from Text 1]

UNIT II

Trees , Eulerian graphs, Hamiltonian graphs, Planarity
[Chapter 4: Section 4.1 (up to and including 4.1.7); Chapter 6: Sections 6.1 (up to and including 6.1.2), 6.2 (up to and including 6.2.4); Chapter 8 sections 8.1 (up to and including 8.1.7), 8.2 (up to and including 8.2.5), 8.3 from text 1]

UNIT III

Lattices and Boolean Algebras – Order Relations; Boolean Algebras: Definition and Properties, Boolean functions
[Chapter 3: Section 3.3; Chapter 4: Sections 4.1 to 4.2 from text 2]

UNIT IV

Automata and Formal languages – Languages, Grammars, Automata, Applications, DFA, NDFA, Equivalence of DFA & NDFA
[Chapters 1 sections 1.2 and 1.3; chapter 2 sections 2.1, 2.2 and 2.3 from Text 3]

REFERENCES

1. F. Hararay : Graph Theory
Narosa Pub. House, New Delhi (1992)
2. C. Berge : Graphs and Hypergraphs
North Holland,Amsterdam(1973)
3. N. Biggs : Algebraic Graph Theory
Cambridge University Press (1974)
4 C. L. Liu : Elements of Discrete Mathematics
(2nd Edn.) Mc Graw – Hill International Edns. Singapore 1985
5. Narasing Deo : Graph Theory with applications to Engineering and
Computer Science
Prentice Hall of India New Delhi (1987)
6. O.Ore : Graphs and their uses
Random House NY (1963)
7. C.J. Dale : An Introduction to Data base systems
Addison Wesley Pub Co., Reading Mass. (1981) 3rd Edn.

8. Robin J. Wilson : Introduction to Graph Theory
Longman Scientific and Technical Essex (1985)
(co-published with John Wiley and sons NY)

9. D.E. Knuth : The art of Computer programming ,Vols I to III
Addison Wesley Pub Co., Reading Mass. (1973

10. Abbot J.C. : Sets, lattices and Boolean Algebras
Allyn and Bacon, Boston (1969)

11. J.G. Michaels & K.H. Rosen : Applications of Discrete Mathematics
McGraw-Hill International Edn.
(Mathematics & Statistics Series) 1992.

12. Colman and Busby : Discrete Mathematical Structures
Prentice Hall of India (1985)

PAPER V : NUMBER THEORY (2008 ADMISSIONS ONWARDS)

TEXTS : 1. **APOSTOL, T.M.,**: INTRODUCTION TO ANALYTIC NUMBER THEORY
Narosa Publishing House, New Delhi, 1990
2. **KOBLITZ , NEAL**:A COURSE IN NUMBER THEROY AND
CRYPTOGRAPHY, Springer–Verlag (NewYork)1987.

No. of Credits : 4

UNIT I

Arithmetical functions and Dirichlet multiplication; Averages of arithmetical functions
[Chapter 2 sections 2.1 to 2.14, 2.18, 2.19; Chapter 3 sections 3.1 to 3.4, 3.9 to 3.12 of Text 1]

UNIT II

Some elementary theorems on the distribution of prime numbers
[Chapter 4 Sections 4.1 to 4.10 of Text 1]

UNIT III

Quadric residues and quadratic reciprocity law
[Chapter 9 sections 9.1 to 9.8 of Text 1]

UNIT IV

Cryptography, Public key
[Chapters 3 ; Chapter 4 sections 1and 2 of Text 2.]

REFERENCES

1. W. W Adams & L. J. Goldstein : Introduction to Number Theory
Printice Hall Inc.,Engelwoods, (1976)

2. Tom M. Apostol : Introduction to Analytic Number Theory
Springer International Edn.(4th Reprint)
Narosa Pub House,Delhi, (1993)

3. A.N. Stewart & D.O. Tall : Algebraic Number Theory
(2nd Edn.),Chapman & Hall, London,(1985)

4. P. Samuel : Theory of Algebraic Numbers
Hermann Paris Houghton Mifflin (1975)

5. W.J. Le Veque : Topics in Number Theory ,vols I& II
Addison Wesley Pub. Co. Readings Mass (1961)

6. A Hurwitz & N.Kritiko : Lectures on Number Theory
Springer Verlag ,Universitext (1986)

7. H. Davenport : The higher arithmetic
Cambridge Univ.Press, Sixth Edn. (1992)

8. Kenneth H Rosen : Elementary Number Theory and its applications
Addison Wesley Pub Co., 3rd Edn., (1993)

9. G.H. Hardy & E M Wright: Introduction to the theory of numbers
Oxford International Edn (1985)

10. D.P. Parent : Exercises in Number Theroy
Springer Vertlag, (Problem Books in Math) 1984

11. Don Redmond : Number Theory
Monographs & Texts in Mathematics No: 220
Marcel Dekker Inc (1994).

12. Thomas Koshy : Elementary Number Theory with Applications
Harcourt / Academic Press 2002

13. Douglas R Stinson : Cryptography- Theory and Practice (2nd edn.)
Chapman & Hall / CRC (2002)

14. Simon Sing : The Code Book
The Fourth Estate London (1999)

15. Song Y. Yan : Number Theroy for Computing (2nd Edition)
Springer – Verlag 2002

16. Oystein Ore : Number Theory and its History –
Mc Graw – Hill Book Company 1948

17. Paulo Ribenboim : The little book of Big Primes
Springer-Verlag (New York 1991)

18. Albrecht Beautelspacher : Cryptology
Mathematical Association of America (Incorporated),1994

SEMESTER II

PAPER VI : ALGEBRA – II (2008 ADMISSIONS ONWARDS)

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

No. of Credits : 4

UNIT I

Introduction to extension fields, Algebraic extensions (**omit** proof of the Existence of an Algebraic Closure), Geometric constructions.
[§§ 8.1, 8.3, 8.4]

UNIT II

Finite fields, Automorphisms of fields, The Isomorphism Extension Theorem.
[§§ 8.5, 9.1, 9.2]

UNIT III

Splitting fields, Separable extensions, Galois Theory.
[§§ 9.3, 9.4, 9.6]

UNIT IV

Illustration of Galois theory. Cyclotomic extensions, Insolvability of the Quintic.
[§§ 9.7, 9.8, 9.9]

REFERENCES

1. N.H. McCoy and R.Thomas : Algebra. Allyn & Bacon Inc. (1977).
2. J. Rotman : The theory of groups Allyn & Bacon Inc. (1973)
3. Hall, Marshall : The theory of groups. Chelsea Pub. Co. NY. (1976)
4. Clark, Allan : Elements of Abstract Algebra Dover Publications (1984)
5. L.W. Shapiro : Introduction to Abstract Algebra McGraw Hill Book Co. NY (1975)
6. C. Musili : Introduction to Rings and Modules Narosa Publishing House, New Delhi (1992)
7. N. Jacobson : Basic Algebra , Vol. I. Hindustan Publishing Corporation (India), Delhi 110 007 Reprint (1991)
8. P.B. Bhattacharya & S.K. Jain : First course in rings, fields and vector spaces Wiley Eastern Ltd.,New Delhi (1976)
9. T.W. Hungerford : Algebra Springer Verlag GTM 73 (1987) 4th Printing
10. I.N. Herstein : Topics in Algebra. New York, Blaisdell. 1964

PAPER VII : REAL ANALYSIS - II (2008 ADMISSIONS ONWARDS)

TEXTS: 1 **RUDIN, W.**, PRINCIPLES OF MATHEMATICAL ANALYSIS
(3rd Edn.) Mc. Graw-Hill, 1986.
2. **ROYDEN,H.L**, REAL ANAYLSIS
(3rd Edn.) Macmillan Publishing company.

No. of Credits : 4

UNIT I

Functions of Several Variables
[Chapter 9: up to 9.29 from Text 1]

UNIT II

Algebra of Sets; Lebesgue Measure
[Chapter 1: Section 4; Chapter 3: Sections 1,2,3,4,5 from Text 2]

UNIT III

Lebesgue Measure (contd.); The Lebesque Integral
[Chapter 3: Section 6; Chapter 4: Sections 1,2,3,4 from text 2]

UNIT IV

Differentiation and Integration
[Chapter 5: Sections 1,2,3,4 from Text 2]

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

PAPER VIII :ORDINARY DIFFERENTIAL EQUATIONS
(2008 ADMISSIONS ONWARDS)

TEXTS : 1. **SIMMONS, G.F.** : DIFFERENTIAL EQUATIONS WITH APPLICATIONS AND HISTORICAL NOTES, TMH Edition, New Delhi, 1974.

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

No. of credits : 4

UNIT I

Inner Product Spaces; The Existence and Uniqueness of Solutions
[Chapter 8 : Seections 1,2 from Text 2; Chapter 11: Sections 55,56 from Text 1]

UNIT II

Power Series Solutions and Special functions (continued); Some special functions of Mathematical Physics
[Chapter 5: Sections 30, 31 Chapter 6 : Sections 32, 33, 34, 35 from Text 1]

UNIT III

Systems of First Order Equations; Non linear Equations
[Chapter 7 : Sections 37, 38, Chapter 8 : Sections 40, 41, 42, 43, 44 from Text 1]

UNIT IV

Second Order Linear Equations; Power Series Solutions and Special functions
[Chapter3: Sections 14 to 19; Chapter 5: Sections 26, 27, 28, 29 from Text 1]

REFERENCES

1. G. Birkhoff & G.C. Rota : Ordinary Differential Equations Edn. Wiley & Sons 3rd Edn (1978)
2. E.A. Coddington : An Introduction toOrdinary 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. John F : Partial Differential Equations Narosa Pub House New Delhi (1986)
6. Phoolan Prasad & Renuka Ravindran : Partial Differential Equations Wiley Eastern Ltd New Delhi (1985)
7. Courant R and Hilbert D : Methods of Mathematical Physics , vol I Wiley Eastern Reprint (1975)
8. W.E. Boyce & R.C. Deprima : Elementary Differential Equations and boundary value problems John Wiley & Sons NY 2nd Edn (1969)
9. A. Chakrabarti : Elements of ordinary Differential Equations and special functions Wiley Eastern Ltd New Delhi (1990)
10. Ian Sneddon : Elements of Partial Differential Equations McGraw-Hill International Edn., (1957)

PAPER IX : TOPOLOGY – I (2008 ADMISSIONS ONWARDS)

TEXT: **JOSHI, K.D.** : INTRODUCTION TO GENERAL TOPOLOGY
(Revised Edition) New Age International (P) Ltd., New Delhi, 1983

No. of Credits : 4

UNIT I

Definition of a Topological Space, Examples of Topological Spaces; Bases and Subbases, Subspaces
[Chapter 4 from the text]

UNIT II

Closed Sets and Closure, Neighbourhoods, Interior and Accumulation Points, Continuity and Related Concepts
[Chapter 5 : Sections 1,2,3 from the text]

UNIT III

Making Functions Continuous, Quotient Spaces, Smallness Conditions on a Space, Connectedness
[Chapter 5 : Section 4; Chapter 6 : Section 1, 2 from the text]

UNIT IV

Hierarchy of Separation Axioms, Cartesian Products of families of sets, The Product Topology
[Chapter 7: Section 1; Chapter 8: Sections 1, 2 from the text]

REFERENCES

1. Dugundji, J. : Topology
   Prentice Hall of India (1975)
2. Willard. S. : General Topology
   Addison Wesley Pub Co., Reading Mass (1976)
3. Simmons G.F. : Introduction to Topology and Modern Analysis
   McGraw-Hill International Student Edn. (1963)
4. M. Gemignani : Elementary Topology
   Addison Wesley Pub Co Reading Mass (1971)
5. K.D. Joshi : Introduction to General Topology
   Wiley Eastern Ltd (1983)
6. M.G. Murdeshwar : General Topology (Second Edition)
   Wiley Eastern Ltd (1990)
7. M.A. Armstrong : Basic Topology, Springer Verlag
   New York 1983, ISBN 0-387-90839-0