KANNUR UNIVERSITY

(Abstract)

B.Sc Mathematics-Scheme & syllabus of Core,Complementary (Mathematics& Astronomy) and Open Courses under Choice Based Credit Semester System for Under Graduate Programmes-implemented with effect from 2009 admission-Orders Issued.

ACADEMIC BRANCH

No.Acad/C2/2390/2007 Dated, K.U.Campus. P.O,10- 07-2009.

Read: 1.Minutes of the meeting of the Board of Studies in Mathematics (UG) held on 23-05-2009.
2. Minutes of the meeting of the Faculty of Science held on 16-06-2009.
3. U.O No.Acad/C2/3838/2008 (i) dated 07-07-2009.
4. Letter dated 29-06-2009 from the Chairman, BOS in Mathematics (UG).

ORDER

1.The Board of Studies in Mathematics (UG) vide paper read (1) above has prepared, finalised and recommended the Scheme and Syllabus of Mathematics Core,Complementary (Mathematics&Astronomy) and Open Courses under Choice Based Credit Semester System for implementation from 2009 admission.

2. The recommendations of the Board in restructuring the syllabus is considered by the Faculty of Science vide paper read (2) and recommended for the approval of the Academic Council.

3. The Regulations for Choice based Credit Semester System is implemented in this University vide paper read (3).

4. The Chairman, BOS in Mathematics (UG) vide paper read (4),forwarded the restructured scheme and syllabus of Core,Complementary (Mathematics&Astronomy) and Open Courses under Mathematics Programme prepared in line with Choice Based Credit Semester System, by the Board of Studies in Mathematics (UG) for implementation with effect from 2009 admission.

5. The Vice Chancellor, after examining the matter in detail, and in exercise of the powers of the Academic Council as per section 11(1) of Kannur University Act 1996 and all other enabling provisions read together with, has accorded sanction to implement the scheme and syllabus of Core, Complementary (Mathematics & Astronomy) and Open

Courses under Mathematics Programme restructured in line with Choice Based Credit Semester System, with effect from 2009 admission, subject to ratification by the Academic Council.

6. The restructured scheme and syllabus of Core,Complementary (Mathematics& Astronomy) and Open Courses under Mathematics Programme in line with Choice Based Credit Semester System, implemented with effect from 2009 admission is appended.

7. The Scheme and Syllabus of Complementary Courses offered for this Programme will be available along with the syllabus of Core Courses of the Complementary subject.

8. The affiliated Colleges are not permitted to offer Complementary Courses in violation to the provisional/permanent affiliation granted by the University. Changes in Complementary Courses are permitted with prior sanction /revision in the affiliation order already issued in this regard.

9. If there is any inconsistency between the Regulations for CCSS and its application to the Scheme & Syllabus prepared, the former shall prevail.

10. Orders are issued accordingly.

Sd/-
To: REGISTRAR

1. The Principals of Colleges offering B.Sc Mathematics Programme.
2. The Examination Branch (through PA to CE)

Copy To:
1. The Chairman, BOS Mathematics (UG)
2. PS to VC/PA to PVC/PA to Registrar
3. DR/AR I Academic
4. The Central Library
5. SF/DF/FC.

Forwarded/By Order

SECTION OFFICER

K A N NUR UNIVERSITY

SYLLABUS

FOR

UNDERGRADUATE PROGRAMME

IN

M A T H E M A T I C S

CORE, COMPLEMENTARY
&
OPEN COURSES

CHOICE BASED CREDIT SEMESTER SYSTEM

w.e.f 2009 ADMISSION

COURSE STRUCTURE FOR UG PROGRAMME
MATHEMATICS

SEMESTER 1

No	Title of the Course	Contact hours /week	Credits	Exam hrs
1	Common Course (English)	5	4	3
2	Common Course (English)	4	3	3
3	Common Course (Additional Language)	4	4	3
4	Core Course 1	4	4	3
5	Complementary 1 (Course I)	4	3	3
6	Complementary 2 (Course I)	4	3	3

SEMESTER 2

No	Title of the Course	Contact hours/week	Credits	Exam hrs
1	Common Course (English)	5	4	3
2	Common Course (English)	4	3	3
3	Common Course (Additional Language)	4	4	3
4	Core Course 2	4	4	3
5	Complementary 1 (Course II)	4	3	3
6	Complementary 2 (Course II)	4	3	3

SEMESTER 3

No	Title of the Course	Contact hours/week	Credits	Exam hrs
1	Common Course (English)	5	4	3
2	Common Course (Additional Language)	5	4	3
3	Core Course 3	5	4	3
4	Complementary 1 (Course III)	5	3	3
5	Complementary 2 (Course III)	5	3	3

SEMESTER 4

No	Title of the Course	Contact hours/week	Credits	Exam hrs
1	Common Course (English)	5	4	3
2	Common Course (Additional Language)	5	4	3
3	Core Course 3	5	4	3
4	Complementary 1 (Course IV)	5	3	3
5	Complementary 2 (Course IV)	5	3	3

SEMESTER 5

No	Title of the Course	Contact Hours / week	Credit	Exam hrs
1	Open Course 1	2	2	3
2	Core Course 5	4	4	3
3	Core Course 6	5	4	3
4	Core Course 7	5	4	3
5	Core Course 8	4	3	3
6	Core Course 9	5	4	3

SEMESTER 6

No	Title of the Course	Contact Hours / week	Credit	Exam hrs
1	Open Course 2	2	2	3
2	Core Course 10	5	4	3
3	Core Course 11	5	4	3
4	Core Course 12	5	3	3
5	Core Course 13	4	3	3
6	Core Course 14 (Elective)	4	3	3
7	Project		2	

UG PROGRAMME (MATHEMATICS – CORE)

SCHEME AND SYLLABUS

Course Code	Semester	Title of the Course	Contact Hours	No.of Credits	Ext. Exam Hours	Weightage	
						Agg	Max
1B 01 MAT	I	Methodology and Perspectives of Sciences	72	4	3	45	30
2B 02 MAT	II	Foundation of Higher Mathematics	72	4	3	45	30
3B 03 MAT	III	Informatics	90	4	3	45	30
4B 04 MAT	IV	Calculus	90	4	3	45	30
5D 01 MAT	V	Open Course	36	2	3	45	30
5B 05 MAT	V	Vector Analysis	72	4	3	45	30
5B 06 MAT	V	Real Analysis	90	4	3	45	30
5B 07 MAT	V	Abstract Algebra	90	4	3	45	30
5B 08 MAT	V	Graph Theory	72	3	3	45	30
5B 09 MAT	V	Differential equations and Numerical Analysis	90	4	3	45	30
6D 02 MAT	VI	Open course	36	2	3	45	30
6B 10 MAT	VI	Analysis and Topology	90	4	3	45	30
6B 11 MAT	VI	Complex Analysis	90	4	3	45	30
6B 12 MAT	VI	Linear Algebra	90	3	3	45	30
6B 13 MAT	VI	Integral Transforms	72	3	3	45	30
6B 14 MAT	VI	Elective 1. Programming With C Language 2. Mechanics 3. Operation Research 4. Mathematical Modelling 5. Number Theory and Cryptography 6. Coding Theory	 42 (Theory) 72 72 72 72 72	 2 3 3 3 3 3	 3 3 3 3 3 3	 45 45 45 45 45 45	 30 30 30 30 30 30

	VI	Project	---	2	--	--	--

For 'Programming with C Language' there will be Practical.

Details of Practical

Practical Hours	No. of Credits	External Examination Hours
30	1	1 hr

Note: - Those batches having computer science as a subsidiary shall not choose 'Programming with C Language' as elective.

Project will be evaluated internally.

Scheme- Complementary Course (Mathematics)

No	Semester	Course code	Title of the course	Contact Hours	Credits	Weightage	
						Agg	Max
1	I	1C 01 MAT	Algebra and Geometry	72	3	45	30
2	II	2C 02 MAT	Differential and Integral calculus	72	3	45	30
3	III	3C 03 MAT	Differential Equations, Laplace Transforms, Fourier series and Partial Differential equations	90	3	45	30
4	IV	4C 04 MAT	Numerical Analysis and Vector Calculus	90	3	45	30

Scheme -Complementary Course (Astronomy)

No	Semester	Course code	Title of the course	Contact Hours	Credits	Weightage	
						Agg	Max
1	I	1C 01 AST	Astronomy 1	72	3	45	30
2	II	2C 02 AST	Astronomy 2	72	3	45	30
3	III	3C 03 AST	Astronomy 3	90	3	45	30
4	IV	4C 04 AST	Astronomy 4	90	3	45	30

Scheme -Open Courses

No	Semester	Course code	Title of the course	Hours/ Week	Credits	Weightage	
						Agg	Max
1	V	5D 01 MAT	Business Mathematics	2	2	30	20

2	V	5D 02 MAT	Astronomy	2	2	45	30
3	VI	6D 01 MAT	Vedic Mathematics	2	2	45	30
4	VI	6D 02 MAT	Principles of Computer Science	2	2	45	30

1B 01 MAT : METHODOLOGY AND PERSPECTIVES OF SCIENCES

Number of Contact hours: 72

Number of Credits : 4

Aim of the Course

To introduce the methodology and perspective of science in general so as to enable the students to systematically pursue his particular discipline in science in relation to other disciplines that come under the rubric of sciences.

Objective of the Course

On completion of the course students

- will have learnt the fundamental characteristics of science as a human enterprise
- will be able to understand how science works
- will be able apply scientific methods independently

Course Outline

Module- I – Science and Science Studies

Types of knowledge: practical, theoretical and scientific knowledge. Information.
What is science; what is not science; laws of science. Basis of scientific laws and factual truths. Science as human activity, scientific temper, empiricism, vocabulary of science, science disciplines.
Revolution in Science and Technology

Module – II – Methods and Tools Of Science

Hypothesis; Theories and laws in science; observations, evidences and proofs.
Posing a question; formulation of hypothesis; hypothetico-deductive model, inductive model. Significance of verifications(proving), corroboration and falsification(disproving), auxiliary hypothesis, ad-hoc hypothesis
Revision of scientific theories and laws
Importance of models, simulations and virtual testing
Mathematical methods versus Scientific methods
Significance of Peer Review

Module – III – Ethics in Science

Scientific information, depositories of scientific information, primary, secondary and digital sources. Sharing of knowledge; transparency and honesty; danger of preconceived ideas.

Reporting of observations and experimental data, human bias, biased observation, influence of observer on observation, using and acknowledging observations by others. Publications and patents (details not required). Plagiarism

Reference Books

- Gieryn, T.F. Cultural Boundaries of Science, Univ. Chicago Press. 1999
- Collins H and T.Pinch. The Golem: What Everyone Should Know About Science, Cambridge Univ Press, 1993
- Hewitt, Paul G, Suzanne Lyons, John A. Suchocki & Jennifer Yeh, Conceptual Integrated Science, Addison-Wesley,2007
- Newton RG. The Truth Of Science. New Delhi, 2nd Edition
- Bass, Joel, E and et.al. Methods of Teaching Science as Inquiry, Allyn & Bacon, 2009

Module – IV – Logic And Propositional Calculus

Text 1: Seymour Lipschutz, *Set theory and related topics,* 2nd Edition, Schaum's Outline Series, Tata McGraw Hill Edition.
Text 2: Robert G. Bartle, Donald R. Sherbert, *Real Analysis* - 3rd Edition, John Wiley and Son's Inc.

Introduction, Propositions and Compound Propositions, Basic Logical Operations, Propositions and Truth Tables, Tautologies and Contradictions, Logical Equivalence, Algebra of Propositions, Conditional and Biconditional Statements, Arguments, Logical implication, Propositional Functions, Quantifiers, Negation of quantified statements. Chapter 10 of the Text 1

Logic and Proofs: Appendix of the Text 2

Module	Teaching hours	Aggregate weightage	Maximum weightage
I	10	6	4
II	14	9	6
III	12	6	4
IV	36	24	16
Total	72	45	30

2B 02 MAT : FOUNDATION OF HIGHER MATHEMATICS

Number of Contact hours: 72

Number of Credits : 4

Text 1: Seymour Lipschutz, *Set theory and related topics,* 2nd Edition, Schaum's Outline Series, Tata McGraw Hill Edition.

Text 2: Robert G. Bartle, Donald R. Sherbert, *Real Analysis* - 3rd Edition, John Wiley and Son's Inc.

Text 3: MD Raisinghnia and RS Aggarwal-Algebra.

Module - I

Summation of series – Binomial series and its application – exponential series and its application – logarithmic series and application

Module - II

Relations: Introduction, Product Sets, Relations, Pictorial Representations of Relations, Closure properties, Partitions, Equivalence Relations, Partial Ordering Relations, n-Ary Relations Chapter 2 of the Text.1

Functions: Introduction, Functions, Composition of Functions, One-to-one, Onto, and Invertible Functions, Mathematical Functions, Exponential and Logarithmic Functions, Recursively Defined Functions (Chapter 4 of the Text 1)

Module - III

Ordered Sets and Lattices: Introduction, Ordered sets, Set constructions and order, Partially Ordered sets and Hasse Diagrams, Minimal and Maximal elements, First and Last elements, consistent enumeration, supremum and infimum, Isomorphic (Similar) ordered sets, Order types of linearly ordered sets, Lattices, Bounded, distributive, complemented lattices Chapter 7 of the Text 1

Module-IV

Theory of Equations: Fundamental theorem of Algebra – roots of the equation – relation between the roots and coefficients – application to solving equation – Transform an equation to another equation – sum of powers of the roots an equation – Newton's theorem – symmetric functions of the roots – Cardan's method for the solution of cubic equation – Descartes method for the solution of biquadratic equation – Descartes rule of sign – sturms theorem

Module	Teaching Hours	Aggregate Weightage	Maximum Weightage
I	10	9	6
II	20	15	10
III	18	9	6
IV	24	12	8
Total	72	45	30

3B 03 MAT: INFORMATICS

No. of Contact hours: 90

No. of credits : 4

Aim of the Course

To update and expand basic informatics skills and attitudes relevant to the emerging knowledge society and also to equip the students to effectively utilize the digital knowledge resources for their chosen courses of study

Objectives of the Course

- To review the basic concepts & functional knowledge in the field of informatics.
- To review functional knowledge in a standard office package and popular utilities
- To create awareness about nature of the emerging digital knowledge society
- To create awareness about social issues and concerns in the use of digital technology
- To create awareness about major informatics initiatives in India and Kerala
- To impart skills to enable students to use digital knowledge resources in learning.

Course Outline

Module I - Overview of Information Technology

Features of the modern personal computer and peripherals, computer networks & Internet, wireless technology, cellular wireless networks, introduction to mobile phone technology, introduction to ATM purchase of technology, License, Guarantee, Warranty, overview of Operating Systems & major application software

Module II - Knowledge Skills for Higher E ducation

Data, information and knowledge, knowledge management- Internet access methods- Dial-up, DSL, Cable, ISDN, Wi-Fi - Internet, as a knowledge repository, academic search techniques, creating cyber presence, case study of academic websites, open access initiatives, open access publishing models. Basic concepts of IPR, copyrights and patents, plagiarism, introduction to use of IT in teaching and learning, case study of educational software, academic services-'NFLIBNET, NICNET, BRNET

Module III- Social Informatics

IT & Society- issues and concerns- digital divide, IT & development, the free software movement, IT industry: new opportunities and new threats, software piracy, cyber ethics, cyber crime, cyber threats, cyber security, privacy issues, cyber laws, cyber addictions, information overload, health issues- guide lines for proper usage of computers, internet and mobile phones, e-wastes and green computing, impact of IT on language & culture-localization issues- Unicode-!T and regional languages

Module IV - IT Applications

e-Governance applications at national and state level, IT for national integration, overview of IT application in medicine, healthcare, business, commerce, industry, defense, law, crime detection, publishing, communication, resource management, weather forecasting, education, film and media, IT in service of disabled, futuristic IT-Artificial Intelligence, Virtual Reality, Bio-Computing

Essential Reading

- Technology in Action, Peasson
- *V. Rajaraman,* Introduction to Information Technology, Prentice Hall
- *Alexis Leon & Mathews Leon, Computers Today,* Leon Vikas, Rs. 180
- *Peter Norton,* Introduction to Computers,6e,(lndian Adapted Edition),

Additional References

- Greg Perry, SAMS Teach Yourself Open Office.org, SAMS,
- Alexis & Mathews Leon, *Fundamentals of Information Technology,* Leon Vikas
- George Beekman, Eugene Rathswohl, Computer Confluence, Pearson Education,
- Barbara Wilson, Information Technology: The Basics, Thomson Learning
- John Ray, 10 Minute Guide to Linux, PHI, ISBN 81-203-1549-9
- Ramesh Bangia, *Learning Computer Fundamentals,* Khanna Book Publishers

Module V- Latex - Technical documentation tool (Including Practical)

Chapter 2 Getting started 2.1 to 2.5
Chapter 3 Carrying on 3.1 to 3.7
Chapter 4 Moving information around 4.1 to 4.7
Chapter 7 Pictures-and colours 7.1 to 7.3.
Text book: Latex by Leslamport, Peason Education Pub.

Module VI - SciLab - Algebraic / Numerical software (Including Practical)

Introduction: What is Scilab - Getting Started (Chapter 1 - Sections 1.1 and 1.2)

The Scilab Language: Constants (Real, Complex, String) - Special Constants - Matrices of numbers, polynomials and strings — Functions of rational matrices — Functions and Libraries — Scilab syntax - Variables - Assignments - Expressions - Functions and Graphs - Commands (Chapter 2 - Sections 2.1,2.2 Ind 2.3)

Graphics: The media - Global plot parameters - 2D Plotting - 3D Plotting - Examples - Printing and Exporting Graphics (Chapter 3 - Sections 3.1 to 3.6)

Advanced Programming: Functions and Primitives - Call function - Building Interface Programs (Chapter 5 - Sections 5.*1,* 5.2 and 5.3)

Text Book: Engineering and Scientific Computing with Scilab - by C Bunks, J P Chancelier

Module	Teaching Hours	Aggregate Weightage	Maximum Weightage
I	14	6	4
II	16	9	6
III	14	6	4
IV	16	9	6
V	16	9	6
VI	14	6	4
Total	90	45	30

Note: Instead of conducting an external practical examination for latex and scilab each student has to submit a record consisting of minimum four practical works which will be evaluated internally.

4B 04 MAT : CALCULUS

Number of contact Hours : 90Hrs

Number of credit : 4

Module-I

Foundation of calculus .Quick review of functions, graphs, limit, continuity, differentiability and successive differentiation

Transiendental function-inverse function and their derivative, natural logarithm, the exponential function, a^x, $\log_a x$, derivations of inverse trigonometric function, hyperbolic function and derivatives
nth derivatives – nth derivatives of standard functions –
Rational function – Leibnitz theorem

(section 1.1 to 1.6 ,2.1 to 2.6,6.1 to 6.10 of text I and 4.1 to 4.4 of text II)

Module-II

Application of differentiation – Extreme value of function, mean value theorem, Taylor series, Maclaurin, series, indeterminate forms, polar co-ordinates, graphing in polar co-ordinates

Curvature and evolute – curvature, radius of curvature (cartesian, parametric and polar form), centre and circle of curvature, evolutes and involute, concavity convexity and points of inflection, asymptote

(Section 3.1, 3.2, 3.4, 3.5, 9.6 of text I and 7.11, 7.12, 7.14, 7.21, 7.31 of text II)

Module - III

Integration Quick review of integration and definite integrals. Riemann sum and definite integrals, mean value theorem, Fundamental theorem of calculus, numerical integration – Tra pezoidul and simpson 1/3 rule, Reduction formula, improper integrals, Beta and Gamma function and properties

(Section 4.1, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, and 4.9 of text I, 7.1 to 7.6 of text I)

Module - IV - Application of integration

Area between curves, volume of solid of revolution length of curves, area of surface of revolution integration in polar co-ordinates

(Section - 5.1, 5.3, 5.5, 5.6, 9.9 of text I)

Text I Calculus Thomas / Finney 9th edition

Text II Differential calculus – Balachanda Rao and C.K Santha

Ref 1) Calculus – Apostol volume I and II

2) Calculus – Pisknov

Module	Teaching hours	Aggregate Weightage	MaximumWeightage
I	20	9	6
II	30	15	10
III	20	12	8
IV	20	9	6
Total	90	45	30

5B 05 MAT: VECTOR ANALYSIS

Number of conduct hours: 72

Number of credit : 4

Module -1 Vectors and analytic geometry in space. A quick review of vectors in plane, cartesian co-ordinates and vectors in space, dot product, cross product, triple product lines and planes in space.

Cylinders, sphere, cone and quadric surfaces (ellipsoid, elliptic, paraboloid, elliptic cone, hyperboloid of one sheet, hyperboloid of two sheets, hyperboloid paraboloid,) cylindrical and spherical co-ordinates

Vector valued function and motion in space. Vector valued function and space curve, length and unit tangent vector, curvature, torsion and T N B frame (section 10.1 to 10.7, 11.1, 11.3 and 11.4)

Module-II multivariable function and partial derivatives, functions of several variable – limits and continuity, partial derivatives, Euler theorem on homogeneous functions,

differentiability – chain rule – directional directives, gradient and tangent plane – extreme values and saddle points – Lagranges multipliers. (section 12.1 to 12.9)

Module -III multiple integrals
Double integrals, area of bounded region in the plane, double integral in polar form, triple integral in rectangular co ordinates, triple integral in cylindrical and spherical co ordinates, substitution in multiple integrals (section 13.1 to 13.4, 13.6, 13.7)

Module –IV integrals in vector fields
Line integrals, vector fields, work, circulation, path independence, potential function, conservative fields, exact differential form, Green's theorem, in plane (with out proof) surface area and surface integral, stokes theorem (with out proof), divergence theorem (with out proof),
(section 14.1 to 14.8)

Text : Calculus Thomas / Finny 9 edn

Ref : 1. vectors analysis – Schaum's outline series (Spiegel)
2. Engineering mathematics – S.S. Sastri 3rd Edn
3. Advanced Engg. Mathematics Kreyszig 8th Edn
4. Vector analysis - M.D. Resingunia

Module	Teaching hours	Aggregate Weightage	Maximum Weightage
I	15	9	6
II	19	12	8
III	19	12	8
IV	19	12	8
TOTAL	72	45	30

5B 06 MAT: REAL ANALYSIS

No. of contact hours. : 90

No. of credit : 4

Aim To introduce fundamental concepts and techniques of real analysis as a tool applicable to almost all other branches of Mathematics.

Text: Introduction to Real analysis – Robert G. Bartle, Donald.R. Sherbert John Wiley & Sons inc. (3rd Edition)

Course Outline:
Module – I The real Numbers (Section 2 1, 2.2, 2.3, 2.4, 2.5)

The Algebraic and order properties of R, Absolute Value and Real Line, the completeness property of R, Applications of the Supremum property, intervals

Module – II Sequences (sections 3.1, 3.2, 3.3, 3.4, 3.5)
Sequences and their limits, limit theorems, monotone sequences, subsequences and Balzano – weierstrass theorem, the Cauchy criterion
Module – III Infinite series (sections 3.7, 9.1, 9.2, 9.3)
Introduction to series, absolute convergence, test for absolute convergence, test for non-absolute convergence.

Module – IV Continuous functions, (Sections 5.3, 5.4, 5.5)
Continuous functions on intervals, uniform continuity monotone and inverse functions.

Reference:

1. Richard.R. Goldberg – Methods of Real Analysis
2. Principles of Mathematical Aanalysis – Rudin .W
3. Mathematical Analysis – Binmore K.G.
4. Mathematical Analyis – Apostol T.M
5. Fundamentals of Real Analysis – V.K. Krishnan
6. A first course in Mathematical Analysis – Somasundaram, Choudhari
7. Real Analysis H.L. Royden
8. A course of Mathematical Analysis – Shanti Narayan

Module	Teaching hours.	Aggregate Weightage	Maximum Weightage
I	25	13	9
II	20	9	6
III	20	9	6
IV	25	14	9
Total	90	45	30

5B 07 MAT : ABSTRACT ALGEBRA

Number of Contact hours: 90

Number of Credits : 4

Aim of the Course:

1. To form a solid foundation of the concepts and methodology of modern algebra.
2. To make the students comfortable with the seeming abstractness of the subject.
3. To enable the students to pursue further axiomatic study of mathematics.

Objectives of the Course:

On completion of the course students

1. Will have learnt basic facts, methods and ideas related to the algebraic structures of groups, rings, fields and integral domains.

2. Will be able to read and write mathematical proofs and do computations related to the above topics.
3. Will be able to do more specialized study in algebra
4. Will be able to understand the necessity of abstraction and how it widens the scope of application especially related to number theory.

Course Outline:

Module I - Groups and Subgroups

Introduction and examples, Binary operations. Groups, Subgroups, Cyclic Groups

Module II - Permutations and Cosets

Groups of permutations. Orbits. Cycles and the alternating Groups

Module III - Homomorphisms and Factor groups

Homomorphisms, Factor Groups, Factor group Computations and Simple groups

Module IV - Rings and Fields

Rings and fields, Integral Domains, Fermat's and Eulers Theorems

Text book for the course:

A First Course in Abstract Algebra - John B Fraleigh, Seventh Edition Published by Pearson Education. Inc. 2003.

Topics: Chapter I: Sections 2,4,5 and 6 ; Chapter II: Sections 8,9 and 10 ; Chapter III: Sections 13,14 and 15; Chapter IV: Sections 18,19 and 20.

Reference Books:

1) Contempemporary Abstract Algebra- Joseph A. Gallian, Narosa Publishing House
2) Basic Abstract Algebra - P. B. Bhatacharya, S. K. Jain, S. R. Nagapaul. Cambridge University Press
3) Topics in Algebra- IN Herstein, Wiley Second Edition
4) Abstract Algebra - David S Dummit, Wiley; 3 edition
5) A Course in the Theory of Groups- Derek J.S. Robinson. Springer; Second Edition
6) Permutation Groups - John D. Dixon, Springer; First Edition
7)

Module	Teaching hours	Aggregate Weightage	Maximum Weightage
I	25	11	8
II	20	13	8
III	25	11	6
IV	20	10	8
Total	90	45	30

5B 08 MAT : GRAPH THEORY

Number of contact hours: 72

Number of credits : 3

Aim of the course: To introduce graph theory which is one of the branch of discrete Mathematics which has a surprising number of applications.

Objectives of the Course

- To introduce the basic concepts in Graph theory .
- To create the ability to understand and appreciate mathematical arguments or proof logically.
- Helps to strengthen the ideas.

Course Outline

Module – I An introduction to graphs – Definition of a graph, graphs as models, vertex, degree, sub-graph, paths and cycles matrix representation of graphs fusion. (Sections 1.1 to 1.8)

Module – II Trees and connectivity
Definitions and simple properties, bridges, spanning trees connector problems cut vertices and connectivity (section 2.1 to 2.4, 2.6) (Algorithms deleted)

Module-III Euler Tours, Hamiltonian Graphs and matching. Euler tours, Chinese postman problem, Hamiltonian graphs, traveling salesman problem, matching's and augmenting paths, the marriage problem, the personnel assignment problem, the optimal assignment problem
(section 3.1 to 3.4, 4.1 to 4.4) algorithm deleted)

Module - IV Directed graphs – definition – in degree and out degree, tournaments, traffic flow
(Section 7.1 to 7.4) (Algorithms deleted)

Text: John Clark and Derek Allen Halton – A first look at graph theory.

Ref: 1) A text book of graph theory
R. Balakrishnan and K. Ranganathan
2) Graph theory – Harary
3) Basic Graph theory – Prof. K.R. Parthasarathy

Module	Teaching hours	Aggregate Weightage	Maximum Weightage
I	16	9	6
II	14	7	5
III	24	16	11
IV	18	13	8
Total	72	45	30

5B 09 MAT: DIFFERENTIAL EQUATIONS AND NUMERICAL ANALYSIS

Number of Contact hours : 90

Number of credits : 4

Text 1: Boyce, W.E. and Diprima, R.C. Elementary Differential Equations and Boundary value problems, John Wiley & sons Inc., New York (2003)
Text 2: Kreyzig, Advanced Engineering Mathematics, 5th Edition .

Module – I Introduction:
Some basic mathematical models, direction fields, solutions of some differential equations, classification of differential equations, historical remarks (section 1.1 to 1.4 of Text 1)

First order differential equations
Linear equations with variable coefficients, separable equations, modeling with first order equations, differences between linear and nonlinear equations, exact equations and integrating factors, the existence and uniqueness theorem (without proof)
(Sections 2.1 to 2.4, 2.6, 2.8 of Text 1)

Module – II Second order linear equations
Homogeneous equations with constant coefficients, fundamental solution of linear homogeneous equations, linear independence and the wronskian, complex roots of the characteristic equation, repeated roots, reduction of order, non-homogeneous equations, method of undetermined coefficients, variation of parameters, (sections 3.1 to 3.7 of Text 1)
Basic theory of systems of first order linear equations (section 7.4 of Text 1)

Module – III Partial differential equations
Two-point boundary value problems, separation of variables, heat conduction in a rod, other heat conduction problems, the wave equation, vibrations of an elastic string, Laplace's equations (sections 10.1 10.5, to 10.8 of Text 1)

Module –IV Numerical Analysis
1. Numerical Analysis - Solution equations by interaction. Finite differences interpolation Numerical integration differentiation.
2. Numerical methods in linear algebra: Systems of linear equation. Gauss eliminations. Matrix inversion. (Relevant Chapters in Text 2).

Numerical methods for differential equations. Numerical methods for first order equation Taylor series method - Picard's method Euler's method- Runge-Kutta methods of fourth order. (Relevant Chapters in Text 2)

References

1. Yankosky, Differential equations and the calculus of variations, mio publications, Moscow (1997)
2. Collins, P.J Differential and integral equations, oxford university press (2006)
3. Ahsan,Z, Differential equations and their applications (2nd edn.) prentice Hall of India Pvt. Ltd., New Delhi (2004)

4. Mcowan, R.C., partial differential equations – methods and applications (2nd edn) Pearson Educaiton Inc., Delhi (204)

5. Wylie, C.R. and Burrett, L.C., Advanced Engineering mathematics (6th edn) Tata Mc Graw –Hill Publishing Company LTd., Delhi (2003)
6. Sastri S.S., Advanced Engineering Mathematics (2nd edn.) (2002)

Module	Teaching hours	Aggregate Weightage	Maximum Weightage
I	24	12	8
II	20	12	8
III	16	6	4
IV	30	15	10
Total	90	45	30

6B 10 MAT: ANALYSIS AND TOPOLOGY

Number of contact hrs. : 90

Number of credit : 4

Text : 1. Introduction to Real Analysis – Robert G.Bartle, Donald.R Sherbert (3rd Edition)
John Wiley & Sons inc.

2. Introduction to Topology and modern Analysis – George F. Simmons Meqrad – Hill international Editions

Course outline:

Module – I : Riemann integral (section 7.1, 7.2, and 7.3 of text I)
Riemann integral, Riemann integrable functions, the fundamental Theorem

Module – II: sequences of functions (section 8.1, 8.2, 9.4)
Pointwise and uniform convergence, interchange of limits, series of functions

Module – III: Metric Spaces (Chapter 2, sections 9, 10, 11, 12 from Text 2)
The definition and some examples, open sets, closed sets

Module – IV: Topological spaces (Chapter 3, sections 16, 17 of Text 2)
The definition and examples, Elementary concepts

References

1) Principles of Real Analysis Rudin.W
2) Topology - J. Monkres
3) Topology - Kelly
4) Topology - Jamich
5) Introduction to General Topology - K.D. Joshi

Module	Teaching hrs	Aggregate Weightage	Maximum Weightage
I	25	11	7
II	20	10	7
III	30	15	10
IV	15	9	6
Total	90	45	30

6B 11 MAT: COMPLEX ANALYSIS

No. of Contact hrs.: 90

No. of Credit : 4

Module – I Complex Numbers, Analytic function, Elementary function – sums and products – Basic Algebra properties – further properties – module – complex conjugates – exponential form – products and quotient in exponential form – roots of complex numbers – examples – Regions in the complex plane functions of a complex variable-mapping – mappings by the exponential functions – limits – Theorems on limits – limit involving the point at infinity – continuity -derivatives cauchy Riemann equation – sufficient condition for differentiability – polar co-ordiantes – Analytic function – Harmonic function - exponential functions –Trigonometric function – hyperbolic functions – inverse trigonometric and hyperbolic functions.
(Section 1.1 to 1.10, 2.11 to 2.25, 3.28 to 3.35 except logarithmic function, some identities involving logarithm and complex exponents)

Module – II Integrals, sequence and series
Derivative of function w(t) – Definite integrals of function w(t) – contours - contour integrals – examples upper bound for module of contour integrals – examples – cauchy Goursat theorem (without proof) – simply and multiply connected domains – cauchy integral formula – derivatives of Analytic function – Liouville's theorem – fundamental theorem of Algebra – convergence sequences – convergence of series – Taylor series – example – Laurent series (without proof) Absolute and uniform convergence of power series.
(Section 4.36 to 4.41, 4.43, 4.44, 4.46 to 4.49 5.51 to 5.57)

Module - III Residues, Residue theorem and application, conformal mapping
Residues – cauchy residue theorem – using a single residue the three types of isolated singular points – residues at poles – examples – zeros of analytic functions – zeros and poles – evaluation of improper integrals – examples – Definite – integrals – involving sines and cosines – argument principle and Rouches theorem (proof omitted) Liner transformation – w = 1/z – mapping by 1/z – linear fractional transformation – w = sinz – mapping by Z^2 and branches of $Z^{1/2}$, Argument – Riemann surfaces – conformal mapping – preservation at angles.
(Section 6.62 to 6.69, 7.71 to 7.73, 7.78 to 7.8, 8.83 to 8.87, 8.89, 8.90, 8.92, 9.94)

Text: Complex variable and application (7^{th} Edn.) James ward Brown, V.Churchill

Reference :

1) Advanced Engineering Mathematics – Kreyzig 8^{th} edn
2) Complex variable – schaum's series – murry R. Spiegel
3) Complex variable – Theory and application Kasana H.S.
4) Complex analysis (3^{rd} edn.) Ahlfors

Module	Teaching hours	Aggregate Weightage	MaximumWeightage
I	30	15	10
II	30	15	10
III	30	15	10
Total	90	45	30

6B 12 MAT: LINEAR ALGEBRA

No. of teaching hours: 90

No. of credits : 3

Aim: To emphasize the need and use of matrices taught in lower classes with a broader perspective.

Objective: To clarify geometrically the Euclidean and affine geometries.

Module I -Vector Spaces

Text: Elementary Linear Algebra - Devi Prasad (Narosa Pub. House, 2006)

Chapter 2 - Section 2.1 - Vector spaces.
Section 2.2 - Subspaces.
Section 2.3 - Linear dependence and independence.
Section 2.4 - Basis and dimension.

Module II- Matrices

Text: 1 . Elementary Linear Algebra - Devi Prasad (Narosa Pub. House, 2006)
2. Theory and Problems of Linear Algebra - Seymour Lipschutz (Schaum's Outline Series, 1987)

Text 1 - Chapter 1
Section 1.1 - Solution of graphs and elementary row operations.
Section 1.2- Row reduced echelon form.
Section 1.3 - Consistency of a linear system.
Section 1.4 - Inverse of a matrix (using elementary row operations).
Chapter 4
Section 4.1 - Eigen values and eigen vectors.
Section 4.2 - Diagonalization of a matrix.
Section 4.3 - Diagonalization of a symmetric matrix.

Text 2 - Chapter 9
Characteristic polynomial.
Cayley - Hamilton theorem.

Module III -Linear Transformations

Text: Elementary Linear Algebra - Devi Prasad (Narosa Pub. House, 2006)

Chapter 3 - Section 3.1 - Linear transformations.
Section 3.2 - Null and range spaces.
Section 3.3 - Inverse linear transformations.
Section 3.4 - More about linear transformations.
Section 3.5 - Matrices related to linear transformations.
Section 3.6 - Rank of a matrix.

Reference:

1) Linear Algebra - A Geometric Approach - S. Kumaresan (Prentice Hall India)
2) First Course in Linear Algebra - P.B. Bhattacharya, S.K. Jain, S.R. Nagpaul (Wiley Eastern).
3) Matrices - Shanti Narayan.
4) Matrices - Frank lyres Jr. (Schaum's series).

Module	Teaching hours	Aggregate Weightage	Maximum Weightage
I	25	14	10
II	40	17	11
III	25	14	9

Total	90	45	30

6B 13 MAT: INTEGRAL TRANSFORMS

No. of Contact hours : 72

No. of credit : 3

Module – I (Laplace Transforms)

Sections 5.1, to 5.9 of "Advanced Engg Mathematics" by Erwin Kreyszig, 8th Edition

Module – II (Fourier Series)

Sections 10.1 to 10.7 except 10.6 of "Advanced Engg, Mathematics" by Erwin Kreyszig, 8th Edition

Module – III (Z Transforms)

Sections: 23.1 to 23.17.5, except 23.17.4(Residue Method)
Text Book: A Text Book of Engineering Mathematics(6th Edition): Bali And Iyengar Laxmi Publications (P) Ltd.

Module - IV (Fourier Integral)

Section 10.8 to 10.10 of "Advanced Engg, Mathematics" by Erwin Kreyszig, 8th Edition
References:

1. Advanced Engg. Mathematics : Grewal
2. Fourier and wavelet Analysis : G Bachiman and L Narici

Module-V (Discrete Fourier Transforms)

Chapter -1: (1.6) Inner Products, Orthonormal Bases, Unitary Matrices

Chapter- 2:(2.1) Basic Properties of DFT

(2.2) Translation invariant Linear Transformation

Text: An Introduction to Wavelets through Linear Algebra by Michael W Frazier.

Springer

Publishers first reprint 2004.

Module	Teaching Hours	Aggregate Weightage	Maximum Weightage
I	12	9	6
II	12	6	4
III	20	12	8
IV	12	6	4
V	16	12	8
Total	72	45	30

6B 14 MAT: (ELECTIVE 1) PROGRAMMING WITH C LANGUAGE

No. of Contact hours: 72

No. of Credit : 3

Objectives:
On completion *of* this paper, the student should have sound knowledge in the fundamental concepts of *C* programming, which is considered to be the fundamental of all modern programming languages. After acquiring the fundamental concepts well, any programming languages can be self learnt.

Module – I
Programming concepts: algorithm, flowcharts, Variables, constants, basic data types- int, float double and char, qualifiers -long short and unsigned; declarations - Arithmetic expressions-operator: arithmetic, logical, bitwise, increment , decrement, assignment-precedence and order of evaluation - conditional expressions – scan *f*, print *f* operations

Module - II
Control flow if statement, if else and else if constructs - nested if, statements- switch statements, go *to'* - looping- for loops-nested loop while and do while statements, break and continue statements.

Module - III
Array: -initializing array elements, multidimensional arrays, sorting. Functions-arguments and local variables declaration-return values -variables- auto, static, external arid register variables-recursive functions.

Module – IV
Structure and union, type def statements, data type conversions, type casting-character strings - string functions, escape characters. Pointers:-pointers and structure, pointers and functions, pointers and array-operations on pointers.

Text book
1. Programming in Ansi C, E.Balagurusamy (3rd edition Me Graw Hill)

Reference
1. 1. Programming in C -Stephen G. Kochen (CBS New Delhi)
2. Let us C Kanikar BPB Publications
3. Sprit of C -Mullish Cooper.

PRACTICALS (30 hours)

1. Solving Quadratic Equations with all possibilities.
2. Matrix multiplication.
3. Sort list of numbers in ascending; and descending order

4. Primes up to a given number
5. Find value of a sine series.
6. Factorial of a number of a using recursive function
7. Solution of an equation using bisection method
8. Solution of an equation using Newton- Rap risen method
9. Program illustrating Langranges interpolation

10. Solution of DE using Euler's Modified Method
11. Solution of DE using Runge Kutta Method
12. Numerical Integration by Trapezoidal rule
13. Factorial of a number using Pointer.
14. Display student details using a. structure.

Module	Teaching hours	Aggregate Weightage	Maximum Weightage
I	11	12	8
II	10	11	7
III	11	12	8
IV	10	10	7
Total	42	45	30

6B 14 MAT: (ELECTIVE 2) MECHANICS

No. of contact hours : 72

No. of credit : 3

Module – I (Statics)

Composition and resolution of forces – parallel forces – moments – couples – Equilibrium of a particle under coplanar forces – Equilibrium of rigid bodies acted upon by 3 forces – General condition of equilibrium – friction – Laws of friction – Equilibrium of a rough inclined plane.

Module – II (Dynamics)

Motion of a particle on a line under constant forces – vertical motion under gravity – S.H.M – forces – momentum – impulse of a force and impulsive forces Law of conservation of momentum – impact of elastic bodies. Tangential and normal acceleration of a particle describing a plane curve – constant motion in a circle – simple pendulum – conical pendulum – Radial and Transverse components of velocity and acceleration – central orbits – Differential equations of central orbit - (p.r) equation of a central orbit – Law of forces – keplers laws.

Text: The elements of statics and Dynamics – Loney S.L. AITBS pub. And distribution – New Delhi.

Module	Teaching hrs	Aggregate Weightage	Maximum Weightage
I	26	18	12
II	46	27	18
Total	72	45	30

6B 14 MAT: (ELECTIVE 3) OPERATION RESEARCH

No. of Contact hours : 72

No. of credit : 3

Text: Swarup. K, Gupta, P.K, and Mohan.M, Operations Research (12^{th} edn.) Sulthan Chand

& Sons, New Delhi (2004)

Module – I

Operations Research – An overview (Chapter – 1)

Convex sets and their properties (section 0.13, proof of theorem 0.4 omitted)

Convex function, local and global extreme, quadratic forms (Section 0.15 to 0.17)

Linear programming problem – mathematical formulation

Chapter – 2

General linear programming problem – canonical and standard forms of L.P.P (sections 3.4. 3.5) solutions and fundamental properties of solutions of LPP (sections 4.1. 4.2 theorems without proof)

Graphical solution method (section 3.2)

Simplex method (section 4.3)

Duality in linear programming – General primal – dual pair, formulating a dual problem. (Sections 5.1 to 5.3)

Module – II

Transportation problem

General transportation problem, the transportation tables, loops in transportation table solution of a transportation problem, finding an initial basic feasible solution, test for optimality, degeneracy in transportation problem, transportation algorithm (MODI method) (sections 10.1, 10.2, 10.3, 10.5, 10.8, 10.9, 10.10, 10.11, 10.12)

Assignment Problem

Mathematical formulation, the assignment method (sections 11.1 to 11.3)

Integer programming

Gomory's, All I.P.P method, construction of Gomary' constraints, fractional cut method – All integer, fractional cut method – mixed integer (section 7.1 to 7.4)

Module – III

Sequencing problem

Problem of sequencing, basic terms used in sequencing, processing n job through two machine, processing n jobs through u machines, processing 2 jobs through u machines, maintenance even scheduling (sections 12.1 to 12.7)

Games and strategies

Introduction, two- person zero-sum games, some basic terms, the maximin – minimax principle, games without saddle points – mixed strategies, graphic solution of 2xn and nx2 games, dominance property arithmetic method for nxn games (section 17.1 to 17.8)

Module	Teaching Hours	Aggregate Weightage	Maximum Weightage
I	30	19	12
II	21	13	9
III	21	13	9
Total	72	45	30

6B 14 MAT : (ELECTIVE 4) MATHEMATICAL MODELLING

No. of Contact hours : 72

No. of credits : 3

Aim of the course

To develop thinking skills in students

Objective of the course

To get an idea of what mathematical modeling is about

Course outline

Module – I

Mathematical modeling – what and why, types of modeling its limitations. Identifying the essentials of a problem. Mathematical formulation and solution of formulated problems (motion of a pendulum, motion of a raindrop) interpretation of the solution

Module – II

Basic concepts like free fall of a body, upward motion under gravity, simple harmonic motion, projectile motion, Newton's law of gravitation, escape velocity, central forces. Modeling planetary motion, Kepler's laws

Limitation of the model

Modeling Blood Flow problem and oxygen transfer in Red cells. Formulation solution, interpretation and limitation.

Module – III

Understang problem of investments, Markowrte model, Return variations, risk valuations, diversification, portfolio selection, feasible set, efficient and optimal portfolio, limitations of the model.

Text

Reference

1. Bender, E.A,. introduction to Mathematical modeling wiley (1978)
2. Gibtons, MM, A concrete approach to mathematical modeling Addison Wesely (1989
3. Vera press, Introduction to the theory of error – correcting codes.

Module	Teaching hours	Aggregate Weightage	Maximum Weightage
I	24	15	10
II	24	15	10
III	24	15	10

Total	72	45	30

6B 14 MAT: (ELECTIVE 5) NUMBER THEORY AND CRYPTOGRAPHY)

Number of contact hours : 72

Number of credit : 3

Module – I

Divisibility theory in integers, g.c.d, prime, fundamental theorem of Arithmetic, the theory of congruence.

Module – II

Fermat's theorem – Pierre de Fermat – Fermat's factorization method – the little theorem – Wilson theorem Euler's generalization of Fermat's theorem – Euler's phi function – Euler's theorem – some properties of phi function

Module – III

Primitive roots and indices – the order of an integer – modulo n – primitive for primes composite numbers having primitive roots – the theory of indices. The Fermat conjecture – phythagorean Triples – The famous Last theorem.

Module – IV

Cryptography – classical cryptography – some simple crypto system
Shannon's theory

Text: Module I, II and III – Elementary number theory 6th edn. David M Burton.

Module IV – cryptography – The theory and practice Douglas R. Stinson. Chapman and
Hall (2002)

Reference : A course in Number theory and Cryptography (2nd edn.) Springer Verlay (1994) Neal Koblitz.

Module	Teaching hrs	Aggregate Weightage	Maximum Weightage
I	10	9	6
II	20	12	8
III	22	12	8
IV	20	12	8
Total	72	45	30

6B 14 MAT: (ELECTIVE 6) CODING THEORY

Number of contact hours: 72

Number of credit : 3

Aim of the course : To develop thinking skills in students

Objective of the Course : To get an idea of coding theory

Course Outline

Module – I

Polynomials of over a field – kronecker's construction of simple field extension. A four – element field and a sixteen element field. Finite characteristic. Theorems on fields of finite characteristic. Uniqueness of a field with a given number of elements.

Module – II

Error – correcting codes. Coding for redundancy. Parity check bit. The hamming distance – Linear codes. Generating matrix – A hamming code. Parity – check matrics – cyclic codes check polynomial – Result like the dual code of a cyclic code is cyclic

Module – III

BCH Codes A two error – correcting codes – Designer codes. A maximum – distance – separable codes. Reed – Solomon code – CDS – Coding theory applied to CDS. Latin Squares – Projective planes and block designs.

Text: B.L Johnson and E. Richman- Numbers and symmetry (An introduction to Algebra)

K.H. Kim and F.W Roush – Applied Abstract Algebra (John willy and Ellis Horwood 1983)

Reference

1. Lidl and Niederretur : Finite Fields and their application
2. COMAP : Principles and practice of Mathematics (Springer)
3. Vera Pless : Introduction to the theory of Error correcting codes
4.

Module	Teaching hours	Aggregate Weightage	Maximum Weightage
I	24	15	10
II	24	15	10
III	24	15	10
Total	72	45	30

Sd/-

K. Somasundaram,
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KANNUR UNIVERSITY

SCHEME & SYLLABUS

MATHEMATICS (COMPLEMENTARY)

With effect from 2009 Admission

UNDER

CHOICE BASED CREDIT SEMESTER SYSTEM

SCHEME & SYLLABUS
MATHEMATICS COMPLEMENTARY

No	Semester	Course code	Title of the course	Credits	Weightage	
					Agg	Max
1	I	1C 01 MAT	Algebra and Geometry	3	45	30
2	II	2C 02 MAT	Differential and Integral calculus	3	45	30
3	III	3C 03 MAT	Differential Equations, Laplace Transforms, Fourier series and Partial Differential equations	3	45	30
4	IV	4C 04 MAT	Numerical Analysis and Vector Calculus	3	45	30

1C 01 MAT: ALGEBRA AND GEOMETRY

No. of contact hours: 72
No. of Credit : 3

Text 1: Fraleigh J. B., *A first course in abstract algebra,* 5th Edition
Text 2: V. Krishnamurthy, V. P. Mainra, J. L. Arora, *An introduction to Linear Algebra* - Affiliated East West Press Pvt. Ltd., New Delhi.
Text 3: Thomas and Finney, *Calculus,* 9th Edition, Pearson Education.
Text 4: Grewal – Higher Engineering Mathematics

Module - I

Groups: Definition and Examples of Group and Field (finite and infinite). Text 1
Vector space: Definition and examples of vector spaces and subspaces, span of a set, linear dependence, independence, dimension and basis (proofs of theorems omitted) Chapter 3 of Text 2

Module - II

Linear Transformations: Definition and examples Section 1 Chapter 4 of Text 2
Matrix associated with a linear map Section 1 Chapter 5 of Text 2

Module - III

Rank of a matrix, Determination of rank using normal and row echelon method, System of linear equations (both homogenous and non homogenous) and their solutions, using row echelon and method of cross multiplication, Matrix polynomials, eigen values and eigen vectors, Cayley Hamilton Theorem. - from Text 3

Module - IV

Two Dimensional Geometry-Polar coordinates -Section 6 of Chapter 9 of Text 4
Three Dimensional Geometry - Cylindrical and Spherical Coordinates- Section 7 of Chapter 10 of Text 4.

Module	Teaching hours	Aggregate Weightage	Maximum Weightage
I	15	9	6
II	10	6	4
III	32	21	14
IV	15	9	6
Total	72	45	30

2C 02 MAT: DIFFERENTIAL AND INTEGRAL CALCULUS

No. of contact hours: 72
No. of credits : 3

Text 1: Shanti Narayanan and P. K. Mittal, *Differential Calculus,* (2005), S. Chand Publishers, Shyamlal Charitable Trust, New Delhi.

Text 2: Narayanan, S and Pillay, T. K. M., *Differential and Integral Calculus* - S. Viswanathan Printers and Publishers, Chennai.

Module – I (Differential Calculus – I)

1. Successive differentiation-Leibnitz's theorem on n^{th} derivative of a product of two functions (without proof)
2. Exponential and logarithmic functions-hyperbolic functions and their derivatives.
3. Rolle's theorem and Cauchy's mean value theorem (without proof) illustration.
4. Indeterminate forms 0/0, 0°, α/α, $\alpha - \alpha$
5. Taylor and Maclaurin's Series (Theorems without proof)-expansions in series

Module – II (Differential Calculus – II)

1. Functions of two or more variables-partial differentiation. Euler's theorem on homogeneous functions with proof. Differentials examples.
2. Curvature-Formula for radius of curvature of a curve in Cartesian, parametric and polar forms. Evolutes and involutes.

Module – III (Integral Calculus – I)

Integration by Successive Reduction – Quadrature (curves in catesian, parametric and polar form)- finding lengths of arc of curves. Area bounded by a known curve between specified limits –polar co-ordinates also. Evaluation of surface and volume integrals. Area of surface of revolution, Volume of solid of revolution-examples (formula without proof).

Module – IV (Integral Calculus – II)

Integration of Functions of two or more variables – Region of Integration – Double integral, Triple Integral with their applications.

References

[1]: Kreyzig, *Advanced Engineering Mathematics,* 5th Edition
[2]: Thomas and Finney, *Calculus,* 9th Edition, Pearson Education.

Module	Teaching Hours.	Aggregate Weightage	Maximum Weightage
I	15	9	6
II	15	9	6
III	27	18	12
IV	15	9	6
Total	72	45	30

3C 03 MAT: DIFFERENTIAL EQUATIONS, LAPLACE TRANSFORMS, FOURIER SERIES AND PARTIAL DIFFERENTIAL EQUATIONS

No. of contact hours: 90
No. of credits : 3

Text: Kreyzig, *Advanced Engineering Mathematics,* 5th Edition

Module – I

1. Ordinary differential equations of the first order - Separable equations - Equations reducible to separable form - Exact equations - Linear equations - Method of Variation of Parameters - Bernoulli's equation- Orthogonal families of curves- Cauchy equation orthogonal trajectory (Sections 1.3, 1.4, 1.5, 1.6, 1.7, 1.8 and 1.10 of Chapter 1)
2. Second order linear differential equation - Homogeneous and non-homogeneous equation - Method of undetermined coefficients Sections 2.1 to 2.5, 2.7, 2.11 and 2.12.
3. System of Equations (Relevant sections from the Text) Method of variation of parameter of second order eqn.

Module - II

Laplace and Inverse Laplace Transforms, Linearity Theorems, Method of partial fractions - Laplace transforms of derivatives and integrals - Laplace transform of the integral of a function - Shifting on the s-axis, shifting on the t-axis, unit step function - Differentiation and integration of transforms – Convolution theorem (with proof) – Periodic function Applications to differential equations Sections 5.1 to 5.4, 5.6, 5.7 of Chapter 5.

Module - III

Fourier series: Periodic functions - functions with period 2π - Euler's formulae (Derivation Omitted) Even and odd functions - Half range expansion. Sections 5.1 to 5.4 of Chapter 5 Fourier series of Functions having arbitrary period - Even and odd functions -Half range expansion.

Module - IV

Partial Differential equations: Basic concepts - One dimensional wave and heat equations (Derivation of the equations is omitted), Laplace equations, Poisson equation, Solution by relating to ordinary differential equation, separation of variables (product method) - Solution to the wave equation by separation of variables - D'Alemberts Solution of the Wave equation - one dimensional heat flow. Sections 11.1 to 11.5.

Module	Teaching hours	Aggregate Weightage	Maximum Weightage
I	25	15	10
II	25	12	8
III	20	9	6

IV	20	9	6
Total	90	45	30

4C 04 MAT: NUMERICAL ANALYSIS AND VECTOR CALCULUS

No. of contact hours: 90

No. of credits : 3

Text 1: Kreyzig, *Advanced Engineering Mathematics,* 5th Edition

Text 2: Harry F. Davis, *Introduction to Vector Analysis,* 6th Edition, Arthur David Snider, Universal Book Stall, New Delhi.

Module - I (Numerical Analysis - I)

1. Numerical Analysis - Solution equations by interaction. Finite differences interpolation Numerical integration differentiation.
2. Numerical methods in linear algebra: Systems of linear equation. Gauss eliminations. Matrix inversion. (Relevant Chapters in Text 1).

Module - II (Numerical Analysis -1I)

Numerical methods for differential equations. Numerical methods for first order equation Taylor series method - Picard's method Euler's method- Runge-Kutta methods of fourth order. (Relevant Chapters in Text 1).

Module - III (Vector Calculus - I)

1. Vector function of a single scalar variable - Differentiation - space curve - velocity -tangent -acceleration and curvature - Sections 2.1, 2.2 and 2.3 of Chapter 2 of Text 2
2. Scalar and vector fields : Scalar fields, isotomic surfaces, gradients, vector fiels, divergence and curl, del operator and its properties. Vector identities. - Sections 3.1, 3.3, 3.4, 3.5, 3.6 and 3.9 of Chapter 3 of Text 2.

Module IV (Vector Calculus - II)

Vector integration- line integrals- Irrotatioanl Fields, surface integral- volume integrals – Green's theorem- Gauss' divergence theorem-Stoke's theorem (without proof)- Illustrations and examples. Sections 4.1, 4.4, 4.9, 4.10, 4.11, 4.12 and 4.16 of Chapter 4 of Text 2.

Module	Teaching hours	Aggregate Weightage	Maximum Weightage

I	25	12	8
II	20	9	6
III	25	15	10
IV	20	9	6
Total	90	45	30

Sd/-
K.Somasundaram,
Chairman,BOS Mathematics(UG)

KANNUR UNIVERSITY

SYLLABUS

FOR

ASTRONOMY (COMPLEMENTARY)

With effect from 2009 Admission

UNDER

CHOICE BASED CREDIT SEMESTER SYSTEM

SCHEME & SYLLABUS
ASTRONOMY COMPLEMENTARY

No	Semester	Course code	Title of the course	Credits	Weightage	
					Agg	Max
1	I	1C 01 AST	Astronomy 1	3	45	30
2	II	2C 02 AST	Astronomy 2	3	45	30
3	III	3C 03 AST	Astronomy 3	3	45	30
4	IV	4C 04 AST	Astronomy 4	3	45	30

1C 01 AST: ASTRONOMY 1

No. of Contact Hours: 72

No. of Credit : 3

Module – I

Spherical Trigonometry

Sphere, Spherical Triangle, Polar Triangle Relation between them, cosine formula, sine formula, cotangent formula, five parts formula, Half angels, Napirer's analogies, Spherical Co-ordinates.

Module – II

Celestial spheres – Celestial sphere – Diurnal motion, cardinal points, Hemispheres, Annual motion, Ecliptic, Obliquity, celestial co-ordinate, change in the co-ordinates of the sun in the course of the year, sidereal time, latitude of a place, Relation between them, Hour angle of a body at rising and setting. Morning and evening star, circumpolar star, condition of circumpolar star, diagram of the celestial sphere.

Module – III

Earth – The zones of earth, variation in the duration of day and night, condition of perpetual day. Terrestrial latitude and longitude. Radius of earth – Foucault's Pendulum experiment.

Module – IV

History of Astronomy: Ancient History, modern history, famous astronomers, artificial satellites, probes, landing on moon, new planets, comet, meteors.

Text: S. Kumaravelu – Astronomy for degree classes
J.V. Narlikar – Introduction to cosmology

Reference: 1) Bidyanath Basu – An introduction to Astrophysics
2) Stefan Hofkings – A brief history of time

Module	Teaching hours	Aggregate Weightage	Maximum Weightage
I	18	12	8
II	18	10	7
III	18	12	8
IV	18	11	7

2C 02 AST: ASTRONOMY 2

No. of Contact Hours: 72

No. of Credit : 3

Module – I

Dip of horizon, effects of Dip, Twilight, duration of twilight

Module – II

Refraction, Laws of refraction, effect on RA and declination, shape of the disc, tangent formula, cassini's formula, effect on rising and setting

Module –III

Geocentric parallax – effect on RA and declination, rising and setting, angular radius relation between them

Module – IV

Helliocentric Parallax – effect of parallax on the longitude and latitude, parallatic ellipse, parsec

Aberration – effect of aberration on the longitude and latitude, annual, diurnal and planetary aberrations

Text: S. Kumaravelu – Astronomy for degree classes
J.V. Narliker – Introduction to cosmology

Reference :
1) Bidynath Basu – An introduction to Astrophysics
2) Stefan Hofkings – A brief history of time

Module	Teaching Hours	Aggregate Weightage	Maximum Weightage
I	18	12	8
II	15	9	6
III	15	9	6
IV	24	15	10
Total	72	45	30

3C 03 AST: ASTRONOMY 3

No. of Contact Hours: 90

No. of Credit : 3

Module – I

Kepeler's law – Kepeler's laws of planetary motion, verification of laws in the case of earth, eccentric anomaly, mean anomaly, and true anomaly relation between them.

Module – II

Time - Equation of time, mean sun, true sun, effect of equation of time, seasons, coures seasons, calendar – different kinds of year, Julien and Gregorion calendars – conversion of time, relation between them

Module – III

Moon – sidereal month, synodic month phases of moon, age of the moon, summer and winter, full moon, golden number, epact saros of chaldiens.

Module – IV

Precession and Nutations – Physical explanations, effect on R.A and declination, effect of length of seasons, cosmology – the large scale structure of the universe – general relativity, Eisten's universe, red shiff, Big bang theory – age of the universe Role of dark matter fate of the universe, singularity.

Text: S. Kumaravelu – Astronomy for degree classes
J.V. Narlikar – Introduction to cosmology

Reference : 1) Bidynath Basu – An introduction to Astrophysics
2) Stegan Hofkings – A brief History of time

Module	Teaching hours	Aggregate Weightage	Maximum Weightage
I	20	10	7
II	20	11	7
III	20	10	7
IV	30	14	9
Total	90	45	30

4C 04 AST: ASTRONOMY 4

No. of Contact Hours: 90

No. of Credit : 3

Module – I

Astronomical observations – fixing the ecliptic fixing the equnutical points, determination of latitude of place method 1 to 4, fixing the meridian line methods 5 determination of local time method 1 to 3, determination of longitude of a place method 1 to 3

Module – II

Eclipses – umbra, penembra, condition of totality of lunar and solar eclipses. Maximum and minimum number of eclipses (section 256 to 284)

Module – III

Planetary phenomena – Bodes law, Elognation conjenction, opposition, direct and retrograde motion, phase of the plant (section 285 to 302)

Module – IV

Solar system – The sum, the planets, astroids, comets, meteors

The stellar universe – stellar motion, distance of star, magnitude of star, colour and size of star, main sequence star, Galaxy, Milky way

Text : S. Kumaravelu: Astronomy for degree classes
J.V. Nartikar : introduction to cosmology

Reference: Bidynath Basu – Un Introduction to Astrophysics
Stefan Hofking – A brief history of time

Module	Teaching hours	Aggregate Weightage	Maximum Weightage
I	20	10	7
II	20	11	7
III	20	10	7
IV	30	14	9
Total	90	45	30

Sd/-
K. Somasundaram,
Chairman, BOS in Mathematics (UG)

KANNUR UNIVERSITY

COURSE STRUCTURE

&

SYLLABUS

FOR

OPEN COURSES

(MATHEMATICS)

With effect from 2009 Admission

under

Choice Based Credit Semester System

SCHEME & SYLLABUS
OPEN COURSES

No	Semester	Course code	Title of the course	Credits	Weightage	
					Agg	Max
1	V	5D 01 MAT	Business Mathematics	2	30	20
2	V	5D 02 MAT	Astronomy	2	45	30
3	VI	6D 01 MAT	Vedic Mathematics	2	45	30
4	VI	6D 02 MAT	Principles of Computer Science	2	45	30

5D 01 MAT: BUSINESS MATHEMATICS

No. of contact hours: 36

No. of credits :2

Aim of the Course: To update and expend basic knowledge of Mathematics.

Objective of the course – To review the basic concepts and knowledge in differentiation and integration

To impart skills to enable students to use mathematics in business studies.

Course details:

Module – I

Function, limit and continuity – definition – Differentiation – rules of differentiation – parametric function logarithmic differentiation – successive differentiation – application to Business – local maximum and local minimum Integration – rules of integration – some standard results – application to Business – consumer's surplus – producers surplus – investment and capital formation.

Module – II

Basic mathematics of Finance – nominal rate of interest, effective rate of interest – continuous compounding – compound interest – present valve – interest and discount – rate of discount – equation of value – depreciation

Text: B.M Aggarwal: Business mathematics and statistics Ane Books Pvt. Ltd.

Reference :

Shanthi Narayan	:	Differential Calculus
Shanthi Narayan	:	Integral Calculus

Module	Teaching hours	Aggregate Weightage	Maximum Weightage
I	18	15	10
II	18	15	10
Total	36	30	20

5D 02 MAT: ASTRONOMY

No. of contact hours: 36

No. of credits :2

Aim of the Course: To update and expend basic knowledge of Astronomy.

Course details:

Module – I

Spherical Trigonometry

Sphere, Spherical Triangle, Polar Triangle Relation between them, cosine formula, sine formula, cotangent formula, five parts formula, Half angels, Napirer's analogies, Spherical Co-ordinates.

Module – II

Celestial spheres – Celestial sphere – Diurnal motion, cardinal points, Hemispheres, Annual motion, Ecliptic, Obliquity, celestial co-ordinate, change in the co-ordinates of the sun in the course of the year, sidereal time, latitude of a place, Relation between them, Hour angle of a body at rising and setting. Morning and evening star, circumpolar star, condition of circumpolar star, diagram of the celestial sphere.

Module – III

Earth – The zones of earth, variation in the duration of day and night, condition of perpetual day. Terrestrial latitude and longitude. Radius of earth – Foucault's Pendulum experiment.

Text: S. Kumaravelu – Astronomy for degree classes
J.V. Narlikar – Introduction to cosmology

Reference: 1) Bidyanath Basu – An introduction to Astrophysics
2) Stefan Hofkings – A brief history of time

Module	Teaching hours	Aggregate Weightage	Maximum Weightage
I	13	15	10
II	13	15	10
III	10	15	10
TOTAL	36	45	30

6D 01 MAT: VEDIC MATHEMATICS

No. of contact hours: 36

No. of credits :2

Module – I

Arithmetical Computations, Multiplication, Division By *Nikhilam* Method, Division By *Paravartya* Method, Argumental Division, Factorization (of Simple Quadratics), HCF, Simple Equations(First Principle), Merger Type of Easy Simple Equations

Module–II

The Vedic Numerical Code, Recurring Decimals, Straight Division , Auxiliary Fractions, Divisibility and Simple Osculators, Divisibility and Complex Multliplex Osculators, Sum and Difference of Squares, Elementary Squaring and Cubing, Straight Squaring

Text: VEDIC MATHEMATICS
- JAGADGURU SWAMI SHRI, BHARATI KRSNA TIRTHAJI, MAHARAJA

Module	Teaching hours	Aggregate Weightage	Maximum Weightage
I	18	22	15
II	18	23	15
TOTAL	36	45	30

6D 02 MAT: PRINCIPLES OF COMPUTER SCIENCE

No. of Contact hours: 36

No. of Credit : 2

Module – I

Data, its organization, fields, records, file, introduction to data structures, data structures operations – algorithms, examples, time-space trade-off, algorithmic notation – control structures – sequential logic, selection logic, iteration logic, complexity of algorithms – worst case & average case, Big O Notation, sub algorithms, algorithms for solving various simple mathematical problems (such as average of 'n' numbers, prime number etc.)

Module – II

Linked list – its representation, traversing, searching, memory allocation, garbage collection, insertion into linked list, insertion and deletion algorithms – two way list

Text: Theory and problems of data structure, schaum series, Mc Graw Hill Publications

Reference:

1. Horowitz and Sahni, Fundamentals of data structures, Galgotia Pub.
2. Data structure using C++, Prentice Hall of India, International edn 1986)

Module	Teaching hours	Aggregate Weightage	Maximum Weightage
I	18	22	15
II	18	23	15
Total	36	45	30

Sd/-

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