பகுதி – I, தமிழ்

தமிழ் முதல் தாள்

முதல் பருவம்

மழ முதல தாள

(இளநிலை அறிவியல் பட்ட வகுப்புகளுக்குரியது)

பாடத்திட்டப் பொதுநோக்கம்

- கற்றல் வழி சிந்தனைத் திறனையும், கருத்து வெளிப்பாட்டுத் திறனையும், மேம்படுத்துதல்.
- ஆய்வுநோக்கை மேம்படுத்துதல்.
- இலக்கியங்கள் உணர்த்தும் வாழ்வின் நுட்பமான பகுதிகளை உணர்த்துதல்.
- மனித மனத்தினைப் பக்குவப்படுத்துதலில் இலக்கியம் தரும் பங்கினை உணர்த்துதல்.
- வளர்ந்து வரும் சமூகத்தில் அறஉணர்வு, பண்பாடு போன்றவை குறித்து அறிவூட்டல்.
- அரசுத் தேர்வுகளுக்கு மாணவர்களை ஆயத்தமாக்குதல்.

பாடத்திட்டப் பயன் விளைவு

- இந்திய குடியுரிமைப் பணி முதலான போட்டித் தேர்வுகளில், விருப்பப் பாடமாக இடம்பெறுகின்ற, 'தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.
- கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.
- தமிழின் வளர்ச்சித் துறையாகிய, 'அறிவியல் தமிழ்'; 'இணைய தமிழ்' குறித்த பன்நோக்கு அணுகுமுறையிலான ஆய்வுச் சிந்தனை மேம்பாடு.
- 4. வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல் .
- சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.
- 6. மொழிபெயப்புத் துறைசார்ந்த வேலைவாய்புத் திறன் பெற்றிருத்தல்

அலகு – I : இக்கால இலக்கியம்: (10 மணிநேரம்)

கல்வி : மகாகவி பாரதியார் – சுயசரிதை - ஆங்கிலக் கல்வி. இன்றைய நிலை : கவிமணி தேசிக விநாயகம்பிள்ளை–ஒற்றுமையே உயிர்நிலை. மனிதநேயம் : கவிஞர் சிற்பி பாலசுப்பிரமணியன் –மலையாளக் காற்று. சூழலியல் : கவிஞர் வைதீஸ்வரன் - விரல் மீட்டிய மழை.

பெண்ணியம் : கவிஞர் சுகந்தி சுப்பிரமணியம் – புதையண்ட வாழ்க்கை.

அலகு – II : அற இலக்கியம்:

கொன்றை வேந்தன்: 1-50 பாடல்கள்

திருக்குறள்: பண்புடைமை, வினைத்திட்பம் – 20 குறள்கள் பழமொழி நானூறு: 5 பாடல்கள்

(8 மணிநேரம்)

18LSU101 :

4-H.4-C

அலகு - III : சிற்றிலக்கியம்:

மூவருலா: 1-26 கண்ணிகள்

திருச்செந்தூர் முருகன் பிள்ளைத்தமிழ்: 2 பாடல்கள்

அலகு – IV : கட்டுரை:

- 1. உயர்தனிச் செம்மொழி பரிதிமாற்கலைஞர்
- 2. கட்டிடக்கலை அ. இராசமாணிக்கனார்
- 3. வாழ்க்கை இளவழகனார்
- 4. ஆளுமைத்திறன் அறிவோம் ஸ்ரீகண்ணன்
- 5. மணற்கேணி நெ.து.சுந்தரவடிவேலு

அலகு- V : மொழிப்பயிற்சி:

- 1. பொருத்தமான தமிழ்ச் சொற்களைப் பயன்படுத்துதல்
- 2. செய்யுள் பொருளுணர் திறன்
- 3. மொழிபெயர்ப்புப் பயிற்சிகள்
- 4. கடிதங்கள் மற்றும் விண்ணப்பங்கள் எழுதுதல்

பாட நூல்: கற்பகச்சோலை – தமிழ் ஏடு.

கற்பகம் உயர்கல்வி கலைக்கழகத் தமிழ்த்துறை வெளியீடு.

கலிங்கத்துப் பரணி: போர்பாடியது - 9 பாடல்கள்

(8 மணிநேரம்)

(8 மணிநேரம்)

(6 மணிநேரம்)

B. Sc. Mathematics		2	2018-2019	
		Semester – I		
18ENU101	ENGLISH	4H-4C		
Instruction Hours / week: L: 4 T: 0 P: 0	Marks: Internal: 40	External: 60 Total: 100 End Semester Exam: 3 Hours		

Course Objectives:

- To train students to acquire proficiency in English.
- To explore different genres of literature and learning grammar.
- To provide aesthetic pleasure through literature.
- To inculcate moral values through literature.
- To develop ethical values.
- To give basic grammar knowledge.

Course Outcomes:

- 1. Develop the knowledge of interpersonal skills.
- 2. Establish and maintain social relationships.
- 3. Genres of literature will give moral values of life.
- 4. Develop communication skills in business environment
- 5. Communication skills will get developed.
- 6. Develop to have language competence.

UNIT - I : PROSE

- 1. Morals in the Indian Context Francis Nicholas Chelliah
- 2. How Comic Books help us to relive our Childhood Benoit Peeters
- 3. Let's Do What India Needs From Us -Dr.A.P.J. Abdul Kalam

UNIT - II : POEM

- 1. The Stolen Boat William Wordsworth
- 2. Telephone Conversation- Wole Soyinka
- 3. A River A.K. Ramanujan

UNIT - III : SHORT STORIES

- 1. Rapunzel Brothers Grimm
- 2. The Ant and The Grasshopper- W. Somerset Maugham
- 3. The Nightingale and the Rose Oscar Wilde.

UNIT – IV : DRAMA

- 1. The Merchant of Venice- Act 4-Scence 1
- 2. The Death Trap- Saki

UNIT – V : GRAMMAR AND COMPOSITION

- GRAMMAR: 1. Tenses
 - 2. Articles
 - 3. Auxiliaries (Primary and Modal)
 - 4. Tag Questions

Composition:

- 1. Reading to Comprehend
- 2. Letter Writing
- 3. Resume Writing
- 4. General Essay

Prescribed Text: Reminisce, Published by the Department of English,KarpagamAcademy of Higher Education.

Suggested Reading: Hewings Martin,1999 Advanced English Grammar, Cambridge University Press.

B. Sc. Mathematics		2018-201
18MMU101	CALCULUS	Semester – I 4H – 4C
Instruction Hours / week: L: 4 T: 0 P: 0	Marks: Internal: 40	External: 60 Total: 100 End Semester Exam: 3 Hours

Course Objectives

This course enables the students to learn

- The concepts of essentials of concavity, inflection points and its geometrical applications.
- The Higher order derivatives and its applications in business, economics and life sciences.
- The Leibniz rule and its applications in exponential and trigonometric.
- The concepts of volumes by slicing, disks and washers' methods, volumes by cylindrical shells, parametric equations and parameterizing a curve.
- The concepts of vector functions, operations with vector-valued functions, limits and continuity of vector functions.
- Recognize the appropriate tools of calculus to solve applied problems.

Course Outcomes (COs)

On successful completion of this course, the students will be able to

- 1. Understand the concepts of hyperbolic functions.
- 2. Explore the concept of reduction formula and calculate limits in indeterminate forms by a repeated use of L'Hospital rule.
- 3. Use single and multiple integration to calculate the arc length, area and volume.
- 4. Understand the techniques of sketching conics and properties of conics.
- 5. Know about the knowledge on application of vector functions.
- 6. Acquire the knowledge on application of Kepler's second law.

UNIT – I DIFFENTIAL CALCULUS

Hyperbolic functions, higher order derivatives-Leibniz rule and its applications to problems of type $e^{ax+b}sinx$, $e^{ax+b}cosx$, $(ax+b)^nsinx$, $(ax+b)^ncosx$.

UNIT II

INTEGRAL CALCULUS

Reduction formulae-derivations and illustrations of reduction formulae of the type $\int \sin nx \, dx$, $\int \cosh x \, dx$, $\int \sin nx \, dx$

UNIT III

APPLICATIONS OF INTEGRATION

Volumes by slicing-disks and washers methods-volumes by cylindrical shells-parametric equations-Parameterizing a curve-arc length-arc length of parametric curves-area of surface of revolution.

UNIT IV CURVE SKETCHING

Concavity and Inflection points-asymptotes-Techniques of sketching conics-reflection properties of conics, rotation of axes and second degree equations, classification into conics using the discriminant, polar equations of conics.

UNIT V VECTOR FUNCTIONS

Introduction to vector functions-operations with vector-valued functions- limits and continuity of vector functions-differentiation and integration of vector functions-tangent and normal components of acceleration-modeling ballistics and planetary motion-Kepler's second law.

- 1. Thomas G.B., and Finney R.L., (2008).Calculus, Ninth Edition, Pearson Education, Delhi.
- 2. Anton H., Bivens I., and Davis S.,(2017). Calculus, Tenth Edition, John Wiley and Sons (Asia) P. Ltd., Singapore.
- 3. Strauss M.J., Bradley G.L., and Smith K. J., (2007). Calculus, Third Edition, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), Delhi.
- 4. Courant R., and John F., (2000). Introduction to Calculus and Analysis (Volumes I & II), Springer- Verlag, New York.

Sc. Mathematics		2018-2019
18MMU102	ALGEBRA	Semester – I 7H – 6C
Instruction Hours / week: L: 6 T: 1 P: 0	Marks: Internal: 40	External: 60 Total: 100 End Semester Exam: 3 Hours

Course Objectives

This course enables the students to learn

- The functions, relations, systems of linear equations and linear transformations.
- How to identify, evaluate and simplify algebraic expressions using the correct operations.
- The basic concepts of linear algebra.
- The concepts of principles of mathematical induction.
- The solution and application of linear systems.
- The application of matrix, inverse of matrix and system of linear equations.

Course Outcomes (COs)

On successful completion of this course, the students will be able to

- 1. Know about the basic concepts of set theory.
- 2. Describe the categories of functions.
- 3. Understand the algorithms on operation.
- 4. Use matrix operations to solve system of linear equations.
- 5. Learn how to find characteristic equation, eigen value and eigen vector for matrix.
- 6. Know about the applications of linear systems and linear independence.

UNIT I

BASICS OF SETS

Polar representation of complex numbers-nth roots of unity-De Moivre's theorem for rational Indices and its applications-Sets-Finite and infinite sets-Equality sets-Subsets-Comparability -Proper subsets-Axiomatic development of set theory-Set operations.

UNIT II FUNCTIONS

Equivalence relations-Functions-Composition of functions-Invertible functions-One to one Correspondence and cardinality of a set-Well-ordering property of positive integers.

UNIT III

DIVISIBILITY AND CONGRUENCE RELATIONS

Division algorithm-Divisibility and Euclidean algorithm-Congruence relation between integers-Principles of Mathematical Induction-Statement of Fundamental Theorem of Arithmetic.

UNIT IV

SYSTEM OF LINEAR EQUATIONS

Systems of linear equations-row reduction and echelon forms-vector equations, the matrix equation Ax=b-Solution sets of linear systems-Applications of linear systems-Linear independence.

UNIT V

LINEAR TRANSFORMATIONS

Introduction to linear transformations-Matrix of a linear transformation-Inverse of a matrix-Characterizations of invertible matrices. Subspaces of R^n -Dimension of subspaces of R^n and rank of a matrix-Eigen values-Eigen Vectors and Characteristic-Equation of a matrix.

- 1. TituAndreescu., and DorinAndrica,(2006). Complex Numbers from A to Z, Birkhauser. Library of Congress Cataloging-in-Publication Data Andreescu, Titu .
- 2. Edgar G. Goodaire and Michael M. Parmenter, (2015).Discrete Mathematics with Graph Theory, 3rd Edition, Pearson Education (Singapore) P. Ltd., Indian Reprint.
- 3. David C. Lay., (2008). Linear Algebra and its Applications, Third Edition, Pearson Education Asia, Indian Reprint.
- 4. Kenneth Hoffman., Ray Kunze., (2015).Linear Algebra, Second edition, Prentice Hall of India Pvt Ltd, New Delhi.

B. Sc. Mathematics	2018-2	201	
18MMU103 LOGIC AND SETS		Semester – I 8H – 6C	
Instruction Hours / week: L: 6 T: 2 P: 0	Marks: Internal: 40	External: 60 Total: 100 End Semester Exam: 3 Hours	

Course Objectives

This course enables the students to learn

- First-order formula of predicate logic is a tautology using a natural-deduction style formal system.
- The formal definitions of predicates, operations on sets and pertaining to relations.
- The concepts of Set operations and the laws of set theory and Venn diagrams.
- Composition of relations, Types of relations, Partial ordering relations and n-ary relations.
- The enhancement of logical thinking and its application to computer science.
- The methods of mathematical logic.

Course Outcomes (COs)

On successful completion of this course, the student will be able to

- 1. Acquire the knowledge about propositions, conjunction, disjunction, logical equivalences and counting principle.
- 2. Identify between binding variables and negations.
- 3. Use the language of set theory, interpreting issues in different areas of mathematics.
- 4. Know the concepts Difference and Symmetric difference of two sets.
- 5. Mastery in the concepts of relations.
- 6. Study Composition of relations, Types of relations, Partial ordering relations and nary relations.

UNIT I

LOGIC AND CONNECTIONS

Introduction-Propositions-Truth table-Negation-Conjunction and disjunction-Implications-Biconditional propositions-Converse-Contra positive and inverse propositions and precedence of logical operators.

UNIT II

PROPOSITIONAL EQUIVALENCE

Logical equivalences-Predicates and quantifiers: Introduction-Quantifiers-Binding variables and Negations.

UNIT III

SETS

Subsets-Set operations and the laws of set theory and Venn diagrams-Examples of finite and infinite sets.

UNIT IV FINITE SETS AND COUNTING PRINCIPLE

Empty set-Properties of empty set-Standard set operations-Classes of sets-Power set of a set-Difference and Symmetric difference of two sets-Set identities-Generalized union and intersections.

UNIT V RELATIONS

Product set-Composition of relations, Types of relations-Partitions-Equivalence Relations with example of congruence modulo relation-Partial ordering relations-n-ary relations.

- 1. Grimaldi R.P.,(2004). Discrete Mathematics and Combinatorial Mathematics, Pearson Education, Pvt.Ltd, Singapore.
- 2. Bourbaki .N(2004),Theory of sets, Springer Pvt Ltd, Paris.
- 3. Halmos P.R., (2011). Naive Set Theory, Springer Pvt Ltd, New Delhi.
- 4. Kamke E., (2010). Theory of Sets, Dover Publishers, New York.

B. Sc. Mathematics		2018-2019
		Semester – I
18MMU111	CALCULUS (PRACTICAL)	3H – 2C

Instruction Hours / week: L: 0 T: 0 P: 3

Marks: Internal: 40

External: 60 Total: 100 End Semester Exam: 3 Hours

Course Objectives

This course enables the students to learn

- To demonstrate comprehension in relevant area of calculus
- Problem solving through (computer language) programming.
- The basic structure of the programme, declaration and usage of variables.
- The basic MATLAB (matrix laboratory) programme.
- The usage of MATLAB in order to facilitate understanding and visualization of mathematical problems
- The practical preparation knowledge to apply the acquired knowledge and skills.

Course Outcomes (COs)

On successful completion of this course, the student will be able to

- 1. Familiarize with the programming environment.
- 2. Acquire the problem solving skills through computer programming.
- 3. Understand to write diversified solutions using programming language.
- 4. Plot of graphs of functions (exponential, logarithmic, trigonometric).
- 5. Sketching parametric curves (Eg. Trochoid, cycloid, epicycloids, hypocycloid).
- 6. Deal with different input/output methods.

List of Practical (Any 8 programs)

- 1. Plotting of graphs of function e^{ax+b} , log(ax + b), 1/(ax + b), sin(ax + b), cos(ax + b), |ax + b| and to illustrate the effect of a and b on the graph.
- 2. Plotting the graphs of polynomial of degree 4 and 5, the derivative graph, the second derivative graph and comparing them.
- 3. Sketching parametric curves (Eg. Trochoid, cycloid, epicycloids, hypocycloid).
- 4. Obtaining surface of revolution of curves.
- 5. Tracing of conics in cartesian coordinates/ polar coordinates.
- 6. Sketching ellipsoid, hyperboloid of one and two sheets, elliptic cone, elliptic, paraboloid, hyperbolicparaboloid using cartesian coordinates.
- 7. Matrix addition.
- 8. Matrix multiplication.

9. Inverse of a matrix.

10. Transpose of a matrix

பகுதி – I, தமிழ் _____ப் 18LSU201 தமிழ் 🗆 🗆 🗠 🗠 தாள் 4-H.4-C

_____ **பொதுநோக்கம்**

- கற்றல் வழி சிந்தனைத் திறனையும், கருத்து வெளிப்பாட்டுத் திறனையும், மேம்படுத்<u>து</u>த___.
- ாா கோர் குத்துதாக
- இலக்கியங்கள் உணர்த்தும் வாழ்வின் நுட்பமான பகுதிகளை உணர்த்துதல்.
- மனித மனத்தினைப் பக்குவப்படுத்துதலில் இலக்கியம் தரும் பங்கினை உணர்த்துதல்.
- வளர்ந்து வரும் சமூகத்தில் அறஉணர்வு, பண்பாடு போன்றவை குறித்து அறிவூட்டல்.
- அரசுத் தேர்வுகளுக்கு மாணவர்களை ஆயத்தமாக்குதல்.

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(7 மணிநேரம்)

1. சைவம் - பட்டப்பட்டு - பட்டப்பட்டப்பட்ட பட்டப்பட்ட

அலகு – II : சங்க இலக்கியம்

(14 மணிநேரம்)

அஎட்டுத்தொகை

Karpagam Academy of Higher Education (Deemed to be University), Coimbatore - 641 021

Црљара : полос полосование – полосование

ஆ). பத்துப்பாட்டு

அலகு - III : காப்பியம்

(6 மணிநேரம்)

அலகு – IV : சிறுகதை

(8 மணிநேரம்)

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அலகு- v : மொழிப்பயிற்சி

(5 மணிநேரம்)

படைப்பிலக்கியப் பயிற்சிகள் (கதை, கவிதை, கட்டுரை, உரைநடை

மொழிபெயர்ப்பு

பாட நூல்: கற்பகச்சோலை – தமிழ் ஏடு. கற்பகம் பல்கலைக்கழகத் தமிழ்த்துறை 🗆 ளியீடு.

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18MMU201	DIFFERE	NTIAL EQUATIONS	Semester – II 4H - 4C
Instruction Hours / week:	L: 4 T: 0 P: 0	Marks: Internal: 40	External: 60 Total: 100 End Semester Exam: 3 Hours

Course Objectives

This course enables the students to learn

- First order exact differential equations, linear homogeneous and non homogeneous equations of higher order with constant coefficients.
- The complete solution of a non-homogeneous differential equation with constant coefficients by the method of undetermined coefficients.
- The transform of a periodic function.
- The applications of the inverse Laplace transform.
- The Euler's equations, method of variation of parameters.
- The predatory-prey model and its analysis, epidemic model of influenza and its analysis.

Course Outcomes (COs)

On successful completion of this course, the student will be able to

- 1. Understand the concepts of explicit, implicit and singular solutions of a differential equation.
- 2. Acquire knowledge on linear and bernoulli's equaitons.
- 3. Know the concepts of population model.
- 4. Understand the method of solving differential equation using variation of parameters. Identify the applications of differential equations.
- 5. Know about the concepts of Laplace Transform.
- 6. Understand the concept of inverse Laplace transform.

UNIT I

DIFFERENTIAL EQUATIONS

Differential equations and mathematical models-General-Particular-Explicit-Implicit and singular solutions of a differential equation.

UNIT II

TYPES OF DIFFERENTIAL EQUATIONS

Exact differential equations and integrating factors-Separable equations and equations reducible to this form, linear equation and Bernoulli equations, special integrating factors and transformations.

UNIT III

SECOND ORDER LINEAR EQUATIONS

General solution of homogeneous equation of second order-Principle of super position for homogeneous equation, Wronskian: its properties and applications-Linear homogeneous and non-Homogeneous equations of higher order with constant coefficients-Euler's equation-Method of undetermined coefficients-Method of variation of parameters.

<mark>UNIT IV</mark>

LAPLACE TRANSFORMS

Definition-Sufficient conditions for the existence of the Laplace Transform-Laplace Transform of periodic functions- Some general theorems-Evaluation of integrals using Laplace Transform.

<mark>UNIT V</mark>

INVERSE LAPLACE TRANSFORMS

Solving ordinary differential equations with constant coefficients using Laplace Transforms-Solving a system of differential equations using Laplace Transforms.

- 1. Ross S.L., (2016). Differential Equations, Third Edition, John Wiley and Sons, India.
- 2. Martha L Abell., and James P Braselton., (2004). Differential Equations with MATHEMATICA, Third Edition, Elsevier Academic Press.
- 3. Sneddon I.,(2006). Elements of Partial Differential Equations, McGraw-Hill, International Edition, New Delhi.

Somostor II

18MMU202	THEORY OF EQUATIONS		7H – 6C
Instruction Hours / week: L	: 6 T: 1 P: 0	Marks: Internal: 40	External: 60 Total: 100 End Semester Exam: 3 Hours

Course Objectives

This course enables the students to learn

- The solution of Reciprocal and Binomial Equations and properties of the derived functions.
- About the properties of polynomials.
- The concepts of Relations between the roots and coefficients and applications of theorems.
- About algebraic Solution of the Cubic and Biquadratic and Properties of the Derived Functions.
- The algebraic solutions of cubic and biquadratic equations.
- The relation between coefficients of the equation and its roots.

Course Outcomes (COs)

On successful completion of this course, the student will be able to

- 1. Learn about the properties of polynomials.
- 2. Find positive, negative and imaginary roots using Descartes rule.
- 3. Identify the relation between coefficients of the equation and its roots.
- 4. Familiarize about the transformations of equations.
- 5. Know about the algebraic solutions of cubic and biquadratic equations.
- 6. Understand Algebraic Solution of the Cubic and Biquadratic.

UNIT I

GENERAL PROPERTIES OF POLYNOMIALS

Theorem relating to polynomials when the variable receives large values, similar theorem when the variable receives small values-Continuity of a rational integral function - Form of the quotient and remainder when a polynomial is divided by a Binomial - Tabulation of functions - Graphic representation of a polynomial - Maximum and minimum values of polynomials

UNIT II

GENERAL PROPERTIES OF EQUATIONS

Theorems relating to the real roots of equations - Existence of a root in the general equation. Imaginary roots - Theorem determining the number of roots of an equation.

Descartes' rule of signs for positive roots - Descartes' rule of signs for negative roots - Use of Descartes' rule in proving the existence of imaginary roots - Theorem relating to the substitution of two given numbers for the variable.

UNIT III

RELATIONS BETWEEN THE ROOTS AND COEFFICIENTS

Theorem - Applications of the theorem - Depression of an equation when a relation exists between two of its roots - The cube roots of unity - Symmetric functions of the roots – Examples - Theorems relating to symmetric functions - Examples.

UNIT IV

TRANSFORMATION OF EQUATIONS

Roots with signs changed - Roots multiplied by a given quantity - Reciprocal roots and reciprocal equations - To increase or diminish the roots by a given quantity - Removal of terms - Binomial coefficients.

Solution of reciprocal and binomial equations: Reciprocal equations - Binomial equations. Propositions embracing their leading general Properties - The special roots of the equation - Solution of binomial equations by circular functions - Examples.

UNIT V

ALGEBRAIC SOLUTION OF THE CUBIC AND BIQUADRATIC

The algebraic solution of the cubic equation - Application to numerical equations - Expression of the cubic as the difference of two cubes - Solution of the cubic by symmetric functions of the roots – Examples.

Properties of the Derived Functions: Graphic representation of the derived function - Theorem relating to the maxima and minima of a polynomial -Rolle's Theorem. Corollary - Constitution of the derived functions

- 1. Burnside W.S. and Panton A.W.,(1954). The Theory of Equations, Eighth Edition, Dublin University Press.
- 2. Leonard Eugene Dickson (2012). First Course in the theory of Equations., J. Wiley & sons, London: Chapman & Hall, Limited, New York.
- 3. Turnbull,H.W (2013)., Theory Of Equations, Fourth Edition, Published In Great Britain Bt, Oliver And Boyd Ltd., Edinburgh.
- 4. James VíctorUspensky., (2005). Theory of Equations, McGraw-Hill Book Co, New York.
- 5. Mac Duffee C.C., (1962). Theory of Equations, John Wiley & Sons Inc., New York.

18MMU203	REAL ANALYSIS	Semester – II 8H – 6C	
Instruction Hours / week: L: 6 T: 2 P:	0 Marks: Internal: 40	External: 60 Total: 100 End Semester Exam: 3 Hours	

Course Objectives

This course enables the students to learn

- The fundamental properties of the real numbers that underpin the formal development of real analysis
- About the extreme points, Root test, Ratio test.
- The alternating series, and series of functions.
- The concepts of real Sequence, Bounded sequence, Cauchy convergence criterion for sequences.
- The basic theorems on monotone sequences and their convergence.
- About the Power series and radius of convergence.

Course Outcomes (COs)

On successful completion of this course, the student will be able to

- 1. Understand about the categories of sets.
- 2. Acquire the knowledge on limits and convergence of sequences.
- 3. Know the types of test of convergence for series.
- 4. Familiarize about the basic theorems on monotone sequences.
- 5. Know about the radius of convergence.
- 6. Understand the Power series and radius of convergence.

UNIT I

REAL NUMBERS SYSTEM

Finite and infinite sets-Examples of countable and uncountable sets-Real line-Bounded sets-Suprema and infima-completeness property of \mathbb{R} , Archimedean property of \mathbb{R} , intervals.

UNIT II

SEQUENCES

Real Sequence- Bounded sequence- Cauchy convergence criterion for sequences. Limit of a sequence. Limit Theorems. Cauchy's theorem on limits- Order preservation and squeeze theorem Monotone sequences and their convergence (monotone convergence theorem without proof).

UNIT III SERIES

Infinite series. Cauchy convergence criterion for series- Positive term series- Geometric seriescomparison test- Convergence of p-series- Root test- Ratio test- Alternating series- Leibnitz's test(Tests of Convergence without proof). Definition and examples of absolute and conditional convergence.

UNIT IV

MONOTONE SEQUENCES

Monotone Sequences- Monotone Convergence Theorem. Subsequences- Divergence Criteria-Monotone Subsequence Theorem (statement only)- Bolzano Weierstrass Theorem for Sequences. Cauchy sequence- Cauchy's Convergence Criterion. Concept of cluster points and statement of Bolzano - Weierstrass theorem.

UNIT V

SEQUENCE AND SERIES OF FUNCTIONS

Sequence of functions- Series of functions- Point wise and uniform convergence. M-test- Statements of the results about uniform convergence and integrability and differentiability of functions- Power series and radius of convergence.

- 1. Bartle R.G. and Sherbert D. R., (2013). Introduction to Real Analysis, John Wiley and Sons (Asia) Pvt. Ltd.
- 2. Fischer E., (2012). Intermediate Real Analysis, Springer Verlag.
- 3. Ross K.A., (2003).Elementary Analysis- The Theory of Calculus Series Undergraduate Texts in Mathematics, Springer Verlag.
- 4. Apostol T. M., (2010). Calculus (Vol.II), John Wiley and Sons (Asia) P. Ltd.
- 5. Goldberg R.,(2012). Methods of Real Analysis, Oxford and IBH publishing Co. Pvt. Ltd. New Delhi.

18MMU211 DIFFERENTIAL EQUATIONS (PRACTICAL)

Instruction Hours / week: L: 0 T: 0 P: 3

Marks: Internal: 40

External: 60 Total: 100 End Semester Exam: 3 Hours

Semester – II 3H – 2C

Course Objectives

This course enables the students to learn

- Problem-solving through programming.
- Hands-on training using lab components.
- Plotting of second order solution of differential equations and recursive sequences.
- Cauchy's root test and Ratio test by plotting the ratio.
- The exponential growth and decay, the population growth of species or the change in investment return over time.
- The usage of program to solve the differential equations.

Course Outcomes (COs)

On successful completion of this course, the student will be able to

- 1. Demonstrate comprehension in fundamental topics of computing, algorithms, computer organization and software systems.
- 2. Have applied knowledge of areas of computing to create solutions to challenging problems, including specify, design, implement and validate solutions for new problems.
- 3. Be aware of current research activity in computing through activities including reading papers, hearing research presentations.
- 4. Know about successfully planning and completing an individual research project in computing or its application.
- 5. Understand Cauchy's root test and Ratio test by plotting the ratio.
- 6. Acquire the knowledge on Growth model and Decay model.

List of Practical (Any 8 programs)

- 1. Plotting of second order solution family of differential equation.
- 2. Growth model (exponential case only).
- 3. Decay model (exponential case only).
- 4. Lake pollution model (with constant/seasonal flow and pollution concentration).
- 5. Case of single cold pill and a course of cold pills.
- 6. Limited growth of population (with and without harvesting).
- 7. Predatory-prey model (basic volterra model, with density dependence, effect of DDT, two prey one predator).
- 8. Plotting of recursive sequences.
- 9. Verify Bolzano-Weierstrass theorem through plotting of sequences and hence identify convergent subsequences from the plot.

- 10. Study the convergence/divergence of infinite series by plotting their sequences of partial sum.
- 11. Cauchy's root test by plotting nth roots.
- 12. Ratio test by plotting the ratio of n^{th} and $(n+1)^{th}$ term.

B. Sc. Mathematics		2018-20
184 E C 201		Semester – II
10ALU201	ENVIRONMENTAL STUDIES	411-40

Instruction Hours / week: L: 4 T: 0 P: 0

Marks: Internal: 40

External: 60 Total: 100 End Semester Exam: 3 Hours

Course Objectives

This course enables the students to learn

- The awareness about environmental problems among people.
- About various renewable and nonrenewable resources of the region.
- The appropriate judgments and decisions for the protection and improvement of the earth.
- The concept of Environmental Pollution, effects and control measures of urban and industrial wastes.
- About the concepts of Social Issues and the Environment.
- The causes and effects of Environmental pollution.

Course Outcomes (COs)

On successful completion of this course, the student will be able to

- 1. Create the awareness about environmental problems among people.
- 2. Motivate the public to participate in environment protection and improvement.
- 3. Know about the Role of Information Technology in environment and human health.
- 4. Develop an attitude of concern for the environment and biodiversity at global.
- 5. Investigate the Environmental Pollution, effects and control measures of urban and industrial wastes.
- 6. Solve Environment Protection Act, Wildlife Protection Act. Forest Conservation Act.

UNIT I

ENVIRONMENT

Definition- Scope and importance- components- Ecosystem Definition- Concept- Scope- importance-Structure and functions of ecosystem. Energy flow- Ecological succession Food chains and food webs. Classification of ecosystem.

UNIT II

NATURAL RESOURCES

Renewable and non-renewable resources: Natural resources and associated problems. Forest resources-Water resources- Mineral resources- Food resources- Energy resources- Land resources : Use and overutilization- Exploitation. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable life styles. Ill-effects of fireworks.

UNIT III

BIODIVERSITY AND ITS CONSERVATION

Introduction- definition: genetic- Species and ecosystem diversity. Biogeographical classification of India. Value of biodiversity: Consumptive use- productive use- social- ethical- Aesthetic and option values. Biodiversity at global- National and local levels. India as a mega-Diversity nation. Hot-spots of biodiversity. Threats to biodiversity: habitat loss- Poaching of wildlife- Man-wildlife conflicts.

Endangered and endemic species of India. Conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

UNIT IV

ENVIRONMENTAL POLLUTION

Definition- Causes- effects and control measures of Air pollution- Water pollution- Soil pollution-Marine pollution- Noise pollution- Thermal pollution- Nuclear hazards- Solid waste management: Causes- effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. Disaster management: Foods- earthquake- cyclone and landslides.

UNIT V

SOCIAL ISSUES AND THE ENVIRONMENT

From unsustainable to sustainable development. Urban problems related to energy. Water conservationrain water harvesting- watershed management. Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions. Climate change- global warmingacid rain- ozone layer depletion- nuclear accidents and holocaust. Case studies. Wasteland reclamation. Consumerism and waste products. Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and Control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act. Issues involved in enforcement of environmental legislation. Public awareness. Population growth- variation among nations. Population explosion—Family Welfare Programme. Environment and human health. Human rights. Value education.HIV/AIDS. Women and Child Welfare.Role of Information Technology in environment and human health.

- 1. Tripathy.S.N., and Sunakar Panda., (2010). Fundamentals of Environmental Studies, Third Edition, Vrianda Publications Private Ltd, New Delhi.
- 2. Arvind Kumar., (2004). A Textbook of Environmental Science, APH Publishing Corporation, New Delhi.
- 3. VermaP.S., and Agarwal V.K., (2015). Environmental Biology (Principles of Ecology); S.Chandand Company Ltd., New Delhi.
- 4. AnubhaKaushik, C.P.Kaushik, (2005). Perspectives in Environmental Studies, New Age International Pvt. Ltd. Publications, New Delhi.
- 5. Singh, M.P., B.S. Singh and Soma S. Dey, (2004). Conservation of Biodiversity and Natural Resources. Daya Publishing House, Delhi.
- 6. Daniel B.Botkin and Edward A. Keller., (2014). Environmental Science, John Wiley and Sons, Inc., New York.
- 7. Uberoi, N.K., (2005). Environmental Studies, Excel Books Publications, New Delhi, India

18MMU301PDE AND SYSTEMS OF ODE

 $\begin{array}{c} Semester-III \\ 4H-4C \end{array}$

Instruction Hours / week: L: 4 T: 0 P: 0	Marks: Internal: 40	External: 60 Total: 100
		End Semester Exam: 3 Hours

Course Objectives

This course enables the students to learn

- The various methods of solving Differential equations which is very much used in the field of Engineering.
- The Method of Separation of Variables for solving first order partial differential equations.
- The basic concepts of Reduction of second order Linear Equations to canonical forms
- The Systems of linear differential equations and its applications.
- The concept of second order linear homogeneous, non-homogeneous differential equations with constant coefficients.
- The application of The Euler method-The modified Euler method -The Runge-Kutta method.

Course Outcomes (COs)

On successful completion of the course, students will be able to

- 1. Understand the basic concepts partial differential equations.
- 2. Gain knowledge about forming the differential equations method of separation of Variables, Initial Boundary Value Problems and method of successive approximations.
- 3. Know about the Reduction of second order Linear Equations to canonical forms.
- 4. Study the Method of separation of variables and Solving the Vibrating String.
- 5. Understand the Basic Theory of linear systems in normal form.
- 6. Use the Numerical methods to solve the real world problems.

UNIT I

PARTIAL DIFFERENTIAL EQUATIONS

Basic concepts and Definitions -Mathematical Problems. First Order Equations: Classification - Construction and Geometrical Interpretation- Method of characteristics for obtaining General Solution of Quasi Linear Equations- Canonical Forms of First-order Linear Equations.

UNIT II

CLASSIFICATION OF SECOND ORDER LINEAR EQUATIONS

Method of Separation of Variables for solving first order partial differential equations. Derivation of Heat equation -Wave equation and Laplace equation. Classification of second order partial differential equations - linear equations as hyperbolic-Parabolic or Elliptic.

UNIT III

CAUCHY PROBLEM AND WAVE EQUATIONS

Reduction of second order Linear Equations to canonical forms- The Cauchy problem- The Cauchy-Kowalewskaya theorem -Cauchy problem of an infinite string - Initial Boundary Value Problems -

Semi-Infinite String with a fixed end - Semi-Infinite String with a Free end- Equations with non-homogeneous boundary conditions -Non- Homogeneous Wave Equation.

UNIT IV

METHOD OF SEPARATION OF VARIABLES

Solving the Vibrating String problems- Solving the Heat Conduction problem - Systems of linear differential equations - Types of linear systems differential operators - An operator method for linear systems with constant coefficients.

UNIT V

BASIC THEORY OF LINEAR SYSTEMS IN NORMAL FORM

Homogeneous linear systems with constant coefficients -Two Equations in two unknown functions-The method of successive approximations-The Euler method-The modified – Euler method -The Runge-Kutta method.

- 1. TynMyint-U and LokenathDebnath., (2006).Linear Partial Differential Equations for Scientists and Engineers, 4th edition, Springer, Indian reprint.
- 2. Ross S.L., (2004). Differential equations, Third Edition, John Wiley and Sons, India.
- 3. Martha L Abell., James P Braselton, (2004). Differential equations with MATHEMATICA, Third Edition Elsevier Academic Press.

B. Sc. Mathematics			2018-	2019
18MMU302	GRO	OUP THEORY I	Semester – III 8H – 6C	
Instruction Hours / week: 1	L: 6 T: 2 P: 0	Marks: Internal: 40	External: 60 Total: 100 End Semester Exam: 3 Hours	

Course Objectives

This course enables the students to learn

- Group homomorphism, isomorphism, automorphism and its related properties.
- The concept of internal and external direct product.
- The properties of cyclic groups, permutations and cosets.
- The concepts Abelian groups, divisible and reduced groups and Torsion group.
- The extension of group structure to finite permutation groups.
- The basic concepts of group actions and their applications.

Course Outcomes (COs)

On successful completion of the course, students will be able to:

- 1. Expertise on fundamental of groups.
- 2. Know about Subgroups and its properties.
- 3. Understand the concept of cyclic groups and its properties.
- 4. Acquire the knowledge on basic concepts of Permutation group.
- 5. Apply Cauchy's theorem for finite abelian groups.
- 6. Understand the concepts of Isomorphism.

UNIT I

GROUPS

Definition and Examples of Groups - Elementary Properties of Groups.

UNIT II

FINITE GROUPS AND SUBGROUPS

Terminology and Notation - Subgroup Tests -Examples of Subgroups.

UNIT III CYCLIC GROUPS

Properties of Cyclic Groups - Classification of Subgroups of Cyclic Groups.

UNIT IV PERMUTATION GROUPS

Definition and Notation - Cycle Notation - Properties of Permutations.

UNIT V ISOMORPHISM

Karpagam Academy of Higher Education (Deemed to be University), Coimbatore - 641 021

Definition and Examples- Cayley's theorem - Properties of isomorphism - Automorphism.

- 1. Joseph A. Gallian., (2001). Contemporary Abstract Algebra, Fourth Edition., Narosa Publishing House, New Delhi.
- 2. Fraleigh.J.B., (2004). A First Course in Abstract Algebra , Seventh edition , Pearson Education Ltd, Singapore.
- 3. David S. Dummit and Richard M. Foote, (2004)., Abstract Algebra,. Third Edition., John Wiley and Sons (Asia) Pvt. Ltd., Singapore.
- 4. Herstein.I.N., (2010). Topics in Algebra ,Second Edition, Willey and sons Pvt Ltd, Singapore.
- 5. Artin.M., (2008).Algebra, Prentice Hall of India, New Delhi.

ANALYTICAL GEOMETRY

6H – 4C

Instruction Hours / week: L: 4 T: 2 P: 0

Marks: Internal: 40

External: 60 Total: 100 End Semester Exam: 3 Hours

Course Objectives

18MMU303A

This course enables the students to learn

- Geometry and its applications in the real world
- Geometric ideas in the language of the mathematician.
- Parabola, Ellipse and Hyperbola.
- The relation between areas of a triangle and its projection, relation between areas of a polygon.
- The General Equations Tracing of Curves.
- The fundamental theorems of isomorphism.

Course Outcomes (COs)

On successful completion of the course, students will be able to:

- 1. Acquiring knowledge of straight lines and area of triangle..
- 2. Know about Reflection properties of parabola.
- 3. Acquire the knowledge on basic concepts of Hyperbola and their applications.
- 4. Study the angles between two directed lines, the projection of a segment.
- 5. Understand the General Equations Tracing of Curves.
- 6. Know about particular cases of Conic sections.

UNIT I

COORDINATES

Lengths of straight lines and areas of triangle- Polar coordinates. Locus- Equation to a locus.Straight line: Equation of a straight line- angle between two straight line. Length of a perpendicular techniques for sketching parabola- ellipse and hyperbola. Reflection properties of parabola.

UNIT II

PARABOLA AND ELLIPSE

Classification of quadratic equations representing lines.Parabola : Loci Connected with the parabola -Three normals passing through a given points - Parabola referred to two tangent as axes. Ellipse: Auxiliary circle and eccentric angle - Equation to a tangent - Some properties of Ellipse - Poles and polar - Conjugate diameters - Four normals through any points.

UNIT III HYPERBOLA

Asymptotes – equations referred to the asymptotes axes-One variables examples. Spheres: The Equation of a sphere - Tangents and tangent plane to a sphere - The radical plane of two spheres cylindrical surfaces. Illustrations of graphing standard quadric surfaces like cone, Ellipsoid.

UNIT IV

THE ANGLES BETWEEN TWO DIRECTED LINES

The projection of a segment - Relation between a segment and its projection - The projection of a broken line - the angle between two planes - Relation between areas of a triangle and its projection - Relation between areas of a polygon.

UNIT V

POLAR EQUATION TO A CONIC

General Equations Tracing of Curves- Particular cases of Conic sections- Transformation of equations to center as origin- Equations to asymptotes - Tracing a parabola - Tracing a central conic - Eccentricity and foci of general conic.

- Loney S.L.,(2005). The Elements of Coordinate Geometry, McMillan and Company, London. (For Unit I, II, III & V)
- 2. Bill R.J.T., (1994). Elementary Treatise on Coordinate Geometry of Three Dimensions, McMillan India Ltd. New Delhi. (For Unit IV)
- 3. Anton H., Bivens I. and Davis S., (2002). Calculus, John Wiley and Sons (Asia) Pvt. Ltd.
- 4. Thomas G.B., and Finney R.L., (2005). Calculus, Ninth Edition, Pearson Education, Delhi.
- 5. Fuller, Gordon.,(2000). Analytic Geometry, Addison Wesley Publishing Company Inc. Cambridge.

Semester – III

18MMU303B	COMPUT	TER GRAPHICS	6H – 4C
Instruction Hours / week	x: L: 4 T: 2 P: 0	Marks: Internal: 40	External: 60 Total: 100
			End Semester Exam: 3 Hours

Course Objectives

This course enables the students to learn

- The scope of this course is to provide students with distinguished knowledge in the field of twoand three-dimensional computer graphics for Animation.
- Different hardware used for graphical requirement.
- How to display 3D objects in a 2D display devices using projection techniques.
- How to create realistic images using color and shading techniques.
- Computer Animation and Design of Animation Sequences.
- Designing and implementing practical graphic solutions to challenging problems in different application domains.

Course Outcomes (COs)

On successful completion of this course, the student will be able to

- 1. Transfer to the students the skills required for designing and implementing practical graphic solutions to challenging problems in different application domains and make them a competent product.
- 2. Understand different hardware used for graphical requirement.
- 3. Perform visual computations for geometrical drawings.
- 4. Display 3D objects in a 2D display devices using projection techniques.
- 5. Create realistic images using color and shading techniques.
- 6. Developed Computer Animation and Design of Animation Sequences.

UNIT I

A SURVEY OF COMPUTER GRAPHICS

Video Display Devices - Refresh Cathode Ray Tubes -Raster Scan Displays - Random Scan Displays - Color CRT Monitors - Direct –View Storage Tubes - Flat Panel Displays - Three Dimensional Viewing Devices – Raster Scan and Random Scan graphic storages Displays processors and Character generators, color display techniques.

UNIT II

INPUT DEVICES

Keyboards - Mouse – Track Ball and Space ball – Joysticks - Data Glove – Digitizers - Image Scanners - Touch Panels - Light Pens - Voice Systems. Hard Copy Devices: Printers and Plotters, Interactive input/output devices

Point, lines and Curves : Scan conversion, Line Drawing Algorithms: DDA Algorithm - Bresenhams Line Algorithm. Circle Generating Algorithms: Mid Point Circle Algorithm, Ellipse Generating Algorithm, Conic-section generation, polygon filling anti aliasing.

UNIT III

TWO DIMENSIONAL GEOMETRIC TRANSFORMATIONS

Basic Transformations: Translation – Rotation – Scaling - Composite Transformations: Translations – Rotations - Scalings. General Pivot Point Rotation - General Fixed Point Scaling. Two – Dimensional Viewing: The Viewing Pipeline - Window to viewport Transformation - Clipping Operations: Point Clipping - Line Clipping Algorithms- Cohen Sutherland Line Clipping - Polygon Clipping: Sutherland – Hodgeman Polygon Clipping Algorithm - Text Clipping.

UNIT IV

THREE DIMENSIONAL TRANSFORMATIONS

Three – Dimensional Display methods, Three – Dimensional Transformations : Translation – Rotation – Scaling, Three Dimensional viewing : Viewing pipeline - Viewing coordinates - Parallel Projection – . Perspective Projections.

UNIT V

VISIBLE SURFACE DETECTION METHODS

Classification of Visible Surface Detection Algorithms - Back Face Detection - Depth Buffer Method - Area Sub division Method.

Computer Animation: Design of Animation Sequences-General Computer Animation functions – Raster Animations – Computer animation Languages – Key Frame Systems – Motion Specifications.

SUGGESTED READINGS

- 1. Donald Hearn and M. Pauline Baker, (2010).Computer Graphics C Version, Second Edition, Pearson Education, New Delhi.
- 2. Amarendra N. Sinha, (2008). Computer Graphics, First Edition, Tata McGraw Hill, New Delhi.
- 3. Foley, Vandam, Feiner and Hughes, (1999). Computer Graphics Principles and Practices, Second Edition, Addison Wesley, Singapore.
- 4. Zhigang Xiang and Roy A. Plastock, (2002). Theory and Problems of Computer Graphics, Second Edition, Tata McGraw-Hill publishers, New Delhi.
- 5. William M. NewMan and Robert F. Sproull, (2007).Principles of Interactive Computer Graphics, Second Edition, Tata McGraw-Hill Publishers, New Delhi.
- 6. Rogers D.F., (2001). Procedural Elements in Computer Graphics, Second Edition, McGraw Hill Book Company, New Delhi.
- 7. Rogers D.F., Adams A.J., (1990). .Mathematical Elements in Computer Graphics, Second Edition, McGraw Hill Book Company, New Delhi.

WEBSITES

- 1. <u>http://www.fileformat.info/mirror/egff/ch02_01.html</u>
- 2. <u>http://www.rw-designer.com/how-to</u>
- 3. http://en.wikipedia.org/wiki/3D_computer_graphics

B. Sc. Mathematics		2018-2019
		Semester – III
18MMU304	PHYSICS I	4H – 4C

Instruction Hours / week: L: 4 T: 0 P: 0

Marks: Internal: 40

External: 60 Total: 100 **End Semester Exam: 3 Hours**

Course Objectives

This course enables the students to learn

- The basic theories and experiments in Physics.
- The fundamentals of physics.
- About the electronic component like Diode, transistor etc.
- The analytical methods required to interpret and analyze results and draw conclusions as supported by their data.
- The graphical relationship of resistance, capacitor and inductor.
- About the circuit connection.

Course Outcomes (COs)

On successful completion of this course, the students will be able to

- 1. Demonstrate proficiency in mathematics and the mathematical concepts to understand physics.
- 2. Design and conduct an experiment (or series of experiments) demonstrating their understanding of the scientific method and processes.
- 3. Demonstrate an understanding of the analytical methods required to interpret and analyze results and draw conclusions as supported by their data.
- 4. Know about the Laws of thermodynamics.
- 5. Know about the Intrinsic and extrinsic semiconductor.
- 6. Understand the graphical relationship of resistance, capacitor and inductor.

UNIT-I

PROPERTIES OF MATTER

Elastic constants of an isotropic solid -Stress - Strain - Relations connecting them - Poisson's ratio -Bending of beams - Uniform and non-uniform bending - Bending moment of a bent beam - cantilever -Static and dynamic methods - Torsion in a wire - Rigidity modulus determination by Static and dynamic methods.Surface tension and Surface energy- Pressure difference across a spherical surface- Pressure difference across a curved surface.

UNIT-II

MECHANICS

Motion of bodies in 2–D - Newton's laws - projectile motion – range- maximum height – projectile from space flight- Rotational motion - Rotation with constant angular acceleration - angular momentum of particles - rigid body - spinning top - conservation of angular momentum - Planetary motion -Kepler's laws – universal law of gravitation.

UNIT-III THERMAL PHYSICS

Laws of thermodynamics - Reversible and irreversible process - Heat engine - Carnot's theorem.Black Stefan's Newton's Newton's body law law of cooling cooling from Stefan's Experimental determination Stefan's law of law of constant – Wien's displacement law – Rayleigh – Jean's law – Planck's law.

UNIT-IV OPTICS AND LASER PHYSICS

Reflection – Refraction – Snell's law – Total internal reflection – Interference – Diffraction – Polarization – Coherence. Stimulated emission and absorption – Einstein's theory of radiation - population inversion – optical pumping – meta stable state – conditions for laser actions – Ruby laser – Helium – neon laser – applications of lasers – Raman effect – Raman shift – stokes and anti-stokes lines.

UNIT-V BASIC ELECTRONICS

Intrinsic and extrinsic semiconductor – PN Junction diode – Biasing of PN junction – V-I characteristics of junction diode – Rectifiers – Half wave – Full wave and bridge rectifiers – Zener diode – Characteristics of Zener diode – Voltage regulator – Transistor – Characteristics of transistor – CB, CE mode – Transistors as an amplifier.

- 1. Murugesan. R., Modern Physics, S.Chand& Co, New Delhi.
- 2. Brijlal and N. Subramanyam, (2004). Properties of matter, S. Chand & Company, New Delhi.
- 3. Aruldhas and P.Rajagopal, Modern Physics, Prentice Hall of India, New Delhi.
- 4. Mathur. D.S., (2003). Elements of properties of matter Shyamlal Charitable Trust, New Delhi.
- 5. V K Mehta and Rohit Mehta,(2008). Principles of Electronics, S.Chand& Company Ltd. Revised Eleventh Edition
- 6. F. W. Sears and G. L. Salinger,(1998).Thermodynamics, Kinetic theory, and Statistical Thermodynamics, IIIrd ed., Narosa Publishing House
- 7. Ghatak and Thygarajan,(1984).Lasers, Theory and applications, Macmillan IndiaLtd., New Delhi.

18MMU311 PDE AND SYSTEMS OF ODE - PRACTICAL Semester - III 4H - 2C

Instruction Hours / week: L: 0 T: 0 P: 4	Marks: Internal: 40	External: 60 Total: 100
		End Semester Exam: 3 Hours

Course Objectives

This course enables the students to learn

- The various methods of solving Differential equations which is very much used in the field of Engineering.
- The Method of Separation of Variables for solving first order partial differential equations.
- The basic concepts of Reduction of second order Linear Equations to canonical forms
- The Systems of linear differential equations and its applications.
- The Equations with non-homogeneous boundary conditions.
- The Canonical Forms of First-order Linear Equations.

Course Outcomes (COs)

On successful completion of this course, the student will be able to

- 1. Gain knowledge about forming the differential equations method of separation of Variables, Initial Boundary Value Problems and method of successive approximations.
- 2. Understand the elementary theory of partial differential equations, and solve it using various techniques.
- 3. Determine solutions to second order linear homogeneous, non-homogeneous differential equations with constant coefficients.
- 4. Solve the Canonical Forms of First-order Linear Equations.
- 5. Understand the Equations with non-homogeneous boundary conditions.
- 6. The application of The Euler method-The modified Euler method The Runge-Kutta method.

List of Practical:

- 1. Solution of second order ordinary differential equations with initial conditions.
- 2. Solving Non Homogeneous Wave Equation.
- 3. Solving the Heat Conduction Problem.
- 4. Solving two dimensional Laplace equations.
- 5. Solving system of linear differential Equations.
- 6. Solution of differential equation using Euler method.
- 7. Solution of differential equation using Modified Euler method.
- 8. Solution of differential equation using 4th order Runge-Kutta method.
| B. Sc. Mathematics | | | 2018-201 | Ľ |
|---------------------------|--------------------|---------------------|---|---|
| 18MMU312 | PHYSICS | S-I-PRACTICAL | Semester – III
4H – 2C | |
| Instruction Hours / we | ek: L: 0 T: 0 P: 4 | Marks: Internal: 40 | External: 60 Total: 100
End Semester Exam: 3 Hours | |

Course Objective

This course enables the students to learn

- The basic understanding of laboratory technique and to educate and motivate the students in the field of Physics.
- A deep knowledge of fundamentals of optics.
- The practical knowledge by applying the experimental methods to correlate with the Physics theory.
- The usage of electrical and optical systems for various measurements.
- The intellectual communication skills and discuss the basic principles of scientific concepts in a group.
- The physical Principles and applications of Electronics.

Course Outcomes (COs)

On successful completion of this course, the students will be able to

- 1. Perform basic experiments in mechanics and electricity and analyze the data.
- 2. Acquire engineering skills and Practical knowledge, which help the student in their everyday life.
- 3. Know the physical Principles and applications of Electronics.
- 4. Apply the analytical techniques and graphical analysis to the experimental data.
- 5. Apply the various procedures and techniques for the experiments.
- 6. Use the different measuring devices and meters to record the data with precision.
- 7. Apply the mathematical concepts/equations to obtain quantitative results

ANY EIGHT EXPERIMENTS

- 1. Young's Modulus-Non Uniform bending-Pin and Microscope
- 2. Young's Modulus-Static cantilever
- 3. Acceleration due to gravity-Compound pendulum
- 4. Determination of spring constant of the given spring.
- 5. Determine the radius of capillary tube using microscope.
- 6. Refractive Index of a solid prism (I-d) curve-Spectrometer
- 7. Co-efficient of thermal conductivity-Lee's disc method
- 8. Wavelength of spectral lines -Grating-minimum deviation method-Spectrometer.
- 9. Characteristics of a Zener and Junction diode
- 10. μ of a lens-Newton's ring method

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- 11. Thickness of a thin wire-Air wedge method
- 12. Determine the surface tension Drop weight method
- 13. Determine the wavelength of He-Ne laser.
- 14. Determination of the Coefficient of Viscosity of a given liquid using Burette method
- 15. Construct a single stage amplifier using transistor

- 1. Ouseph C.C., U.J. Rao and V. Vijayendran 2007, Practical Physics and Electronics, S.Viswanathan (Printers & Publishers) Pvt. Ltd., Chennai
- 2. Singh S.P., 2003, Advanced Practical Physics 1, 13th Edition, Pragathi Prakashan, Meerut
- 3. Singh S.P., 2000, Advanced Practical Physics 2, 12th Edition, Pragathi Prakashan, Meerut

Semester – IV

18MMU401 NUMERICAL METHODS 4H – 4C	18MMU401	NUMERICAL METHODS	4H-4C
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Instruction Hours / week: L: 4 T: 0 P: 0Marks: Internal: 40External: 60 Total: 100End Semester Exam: 3 Hours

Course Objectives

This course enables the students to learn

- The basic concepts of numerical methods.
- The Numerical integration and differentiation, numerical solution of ordinary differential equations.
- The Engineering problems which are impossible to solve by analytical means.
- Numerical methods to solve linear system of equations.
- The numerical solution of initial value problems and boundary value problems.
- The appropriate numerical methods to solve algebraic and transcendental equations.

Course Outcomes (COs)

On successful completion of the course, students will be able to:

- 1. Study the concept of Newton's Method.
- 2. Realize the system of linear algebraic equtions along with specified methods.
- 3. Know about the basic concepts of Interpolation.
- 4. Understand the Gregory forward and backward difference interpolation.
- 5. Familiar with numerical integration and differentiation, numerical solution of ordinary differential equations.
- 6. Use the solutions of differential equations by Runge-Kutta methods.

UNIT I

CONVERGENCE-ERRORS

Relative- Absolute- Round off-Truncation. Transcendental and Polynomial equations: Bisection method - Newton's method - False Position method - Secant method - Rate of convergence of these methods.

UNIT II

SYSTEM OF LINEAR ALGEBRAIC EQUATIONS

Gaussian Elimination - Gauss Jordan methods – Gauss Jacobi method - Gauss Seidel method and their convergence analysis – LU decomposition - Power method.

UNIT III INTERPOLATION

Lagrange and Newton's methods. Error bounds - Finite difference operators. Gregory forward and backward difference interpolation – Newton's divided difference – Central difference – Lagrange and inverse Lagrange interpolation formula.

UNIT IV NUMERICAL DIFFERENTIATION AND INTEGRATION

Gregory's Newton's forward and backward differentiation- Trapezoidal rule-Simpson's rule- Simpsons 3/8th rule- Boole's Rule.Midpoint rule-Composite Trapezoidal rule- Composite Simpson's rule.

UNIT V

ORDINARY DIFFERENTIAL EQUATIONS

Taylor's series - Euler's method - modified Euler's method - Runge-Kutta methods of orders two and four.

- 1. Jain. M.K., Iyengar. S.R.K., and Jain R.K., (2012). Numerical Methods for Scientific and Engineering Computation, New Age International Publishers, New Delhi.
- 2. Bradie B., (2007). A Friendly Introduction to Numerical Analysis, Pearson Education, India,
- 3. Gerald C.F., and Wheatley P.O., (2006). Applied Numerical Analysis, SixthEdition, Dorling Kindersley (India) Pvt. Ltd., New Delhi.

End Semester Exam: 3 Hours

18MMU402 GR0	OUP THEORY II	Semester – IV 8H – 6C
Instruction Hours / week: L: 6 T: 2 P: 0	Marks: Internal: 40	External: 60 Total: 100

Course Objectives

This course enables the students to learn

- Group homomorphism, isomorphism, automorphism and its related properties.
- Different types of groups such as normal subgroups, factor groups
- Familiar with various direct product of groups.
- Sylow's theorems, Cauchy's theorem and Index theorem.
- The concept of internal and external direct product.
- The applications of group actions and Generalized Cayley's theorem.

Course Outcomes (COs)

On successful completion of the course, students will be able to:

- 1. Expertise on fundamental theorems of cosets and Lagrange's.
- 2. Know about external direct products and its developments.
- 3. Understand the concept of normal subgroups and factor groups.
- 4. Acquire the knowledge on basic concepts of group homomorphism.
- 5. Study about fundamental theorems of Abelian groups.
- 6. Understand the Isomorphism Classes of Abelian Groups

UNIT I

COSETS AND LAGRANGE'S THEOREM

Properties of Cosets - Lagrange's Theorem and Consequences - An Application of Cosets to Permutation Groups.

UNIT II

EXTERNAL DIRECT PRODUCTS

Definition and Examples - Properties of External Direct Products - The Group of Units Modulo n as an External Direct Product - Applications.

UNIT III

NORMAL SUBGROUPS AND FACTOR GROUPS

Normal Subgroups - Factor Groups - Applications of Factor Groups - Internal Direct Products.

UNIT IV

GROUP HOMOMORPHISMS

Definition and Examples - Properties of Homomorphisms - The First Isomorphism Theorem.

UNIT V FUNDAMENTAL THEOREM OF FINITE ABELIAN GROUPS

The Fundamental Theorem - The Isomorphism Classes of Abelian Groups - Proof of the Fundamental Theorem.

- 1. Joseph A. Gallian., (2001). Contemporary Abstract Algebra, Fourth Edition., Narosa Publishing House, New Delhi.
- 2. Fraleigh.J.B., (2004). A First Course in Abstract Algebra, Seventh edition, Pearson Education Ltd, Singapore.
- 3. David S. Dummit and Richard M. Foote, (2004)., Abstract Algebra,. Third Edition., John Wiley and Sons (Asia) Pvt. Ltd., Singapore.
- 4. Herstein.I.N.,(2010). Topics in Algebra ,Second Edition, Willey and sons Pvt Ltd, Singapore. Artin.M., (2008).Algebra, Prentice Hall of India, New Delhi.
- 5. Artin.M., (2008).Algebra, Prentice Hall of India, New Delhi.

18MMU403A	GRAPH THEORY	Semester – IV 6H – 4C
Instruction Hours / week: L: 4 T: 2 P: 0	Marks: Internal: 40	External: 60 Total: 100 End Semester Exam: 3 Hours

Course Objectives

This course enables the students to learn

- Definitions and Basic properties of graphs.
- The fundamental concepts in graph theory.
- A blended method to prove theorems.
- The concept of Trees, spanning trees and its properties.
- Basic concepts in graph theory and a variety of different problems in Graph Theory.
- Gain the knowledge of various graphs algorithms will also be taught along with its analysis.

Course Outcomes (COs)

On successful completion of the course, students will be able to

- 1. Understand and Apply the fundamental concepts in graph theory.
- 2. Understand basic results related with Eulerian and Hamiltonian graphs.
- 3. Study about Chromatic polynomial, Matching and Covering.
- 4. Know about the fundamental concepts of trees.
- 5. Understand the Spanning trees, rank and nullity.
- 6. Mastery in Dijkstra's algorithm-Floyd- Warshall algorithm

UNIT I

GRAPHS

Definition-Examples and basic properties of graphs-Directed Graphs-Types of Directed Graphs-Pseudo graphs-Complete graphs-Bi- partite graphs- Isomorphism of graphs.

UNIT II

PATHS AND CIRCUITS

Paths and circuits-Strongly Connected Components -Eulerian circuits-Hamiltonian cycles Random graphs-Planargraphs-Networks.

UNIT III GRAPH COLORING

The adjacency matrix-weighted graph-Incidence matrix-Submatrices-Circuit Matrix-Path Matrix - Chromatic Number -Chromatic polynomial, Matching –Covering-Four Color Problem.

UNIT IV

TREES

Trees and its properties- minimally connected graph -Pendant vertices in a tree -Distance and centers in a tree-rooted and binary tree-Levels in binary tree-height of a tree-Spanning trees -rank and nullity.

UNIT V

APPLICATIONS OF GRAPHS

Travelling salesman's problem-shortest path-Dijkstra's algorithm-Floyd- Warshall algorithm.

- 1. Edgar G.Goodaire., and Michael M. Parmenter., (2003) .Discrete Mathematics with Graph Theory, Second Edition, Pearson Education (Singapore) P. Ltd.
- 2. Sundaresan V., Ganapathy Subramanian K.S., and Ganesan K., (2002) .Discrete Mathematics, A.R. Publications, Nagapatinam.
- 3. Jean Gallier, January 4, (2016), Discrete Mathematics., Second Edition, Springer.
- 4. Grimaldi R.P., (2004) .Discrete Mathematics and Combinatorial Mathe Davey B.A., and Priestley H.A., (2002) . Introduction to Lattices and Order, Cambridge University Press, Cambridge.
- 5. Davey B. A. and Priestley H.A., (2002) .Introduction to Lattices and Order, Cambridge University Press, Cambridge.

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B. Sc. Mathematics

18MMU403B

OPERATING SYSTEM: LINUX

2018-2019

Instruction Hours / week: L: 4 T: 2 P: 0

Marks: Internal: 40

External: 60 Total: 100 End Semester Exam: 3 Hours

Course Objectives

This course enables the students to learn

- The main components of OS and their working.
- The memory allocation methods, page replacement algorithms, file allocation methods, multi-• threading, process synchronization, and CPU scheduling.
- The basic components of a computer operating system, and the interactions among the various • components.
- The capabilities and limitations of computer operating systems, process management, processor scheduling, deadlocks, memory management, secondary memory management, file management and I/O systems.
- Introduce the concepts of process and thread and their scheduling policies.
- Design the components of operating system.

Course Outcomes (COs)

On successful completion of this course, the student will be able to

- 1. Familiar with the memory allocation methods, page replacement algorithms, file allocation methods, multi-threading, process synchronization, and CPU scheduling.
- 2. Describe the main components of OS and their working.
- 3. Explain the concepts of process and thread and their scheduling policies.
- 4. Solve synchronization and deadlock issues.
- 5. Compare the different techniques for managing memory, I/O, disk and files.
- 6. Design components of operating system.

UNIT I

INTRODUCTION

Mainframe systems Desktop Systems - Multiprocessor systems - distributed systems - real time systems. Process: - Process concepts - Operation on process - cooperation process - Inter process Communication - Mutual Exclusion - Critical sections- primitives - Semaphores - Deadlock: System Model, Deadlock characterization, Deadlock prevention, avoidance, detection, recovery from deadlock.

UNIT II

STORAGE MANAGEMENT

Memory Management - swapping- Contiguous memory allocation - paging, segmentation segmentation with paging - Virtual memory :Virtual storage organization - Demand Paging, Process Creation - Page replacement - Thrashing.

UNIT III PROCESSOR SCHEDULING

6H - 4C

Preemptive scheduling : - Scheduling Criteria – Scheduling Algorithms – FCFS- SJF- Priority – RoundRobin –Multilevel Queue – Multilevel Feedback Queue . Multiprocess schedule: Real time schedule, Algorithm evaluation: Deterministic Modeling, Queue Model, Simulation.

UNIT IV FILE SYSTEMS

Introduction – File System Concepts – Access Methods – Directory structure – File Sharing – Allocation Methods – Free space management –Efficiency and performance – Recovery Disk Performance Optimization: Introduction – Disk structure – Disk scheduling – Disk management.

UNIT V

LINUX-THE OPERATING SYSTEM

Linux History- Linux features- Linux distributions- Linux's relationship to Unix- Overview of Linux Architecture- Installation- Start up scripts- System process (an overview)- Linux Security- The Ext2 and Ext3 File Systems: General characteristics of the Ext3 File System- File permissions- User Management: Types of users- The powers of Root- Managing users (adding and deleting) : using the command line and GUI Tools.

Resource Management in Linux: File and Directory management- System calls for files process management- Signals- IPC: Pipes- FIFOs- System VIPC- Message Queues- System calls for processes-Memory Management- Library and System calls for Memory.

SUGGESTED READINGS

- 1. Silberschatz Galvin Gagne. (2012). Operating system concepts, Ninth Edition, Wiley India (pvt), Ltd, New Delhi.
- 2. Deitel H.M. (2005). Operating systems, Third Edition, Addision Wesley Publication, New Delhi.
- 3. Pramod Chandra P. Bhatt. (2007). An Introduction to Operating Systems, Second Edition, Prentice Hall India, New Delhi.
- 4. Tanenbaum Woodhull. (2005) . Operating Systems., Second Edition, Pearson Education (LPE) , New Delhi.
- 5. William Stallings. (2010). Operating Systems internals and Design Principles, Sixth Edition, Prentice Hall India, New Delhi.
- 6. Arnold Robbins., (2008) ., Linux Programming by Examples The Fundamentals, Second Edition., Pearson Education,.
- 7. Cox K, (2009).Red Hat Linux Administrator's Guide,PHI.
- 8. Stevens R., (2009). UNIX Network Programming, Third Edition., PHI.
- 9. Sumitabha Das, (2009). Unix Concepts and Applications, Fourth Edition., TMH.
- 10. Ellen Siever, Stephen Figgins, Robert Love, Arnold Robbins, (2009) . Linux in a Nutshell, Sixth Edition,O'Reilly Media.
- 11. Neil Matthew, Richard Stones, Alan Cox,(2004) Beginning Linux Programming, Third Edition.

WEBSITES

- 1. www.cs.columbia.edu/~nieh/teaching/e6118_s00/
- 2. www.clarkson.edu/~jnm/cs644
- 3. pages.cs.wisc.edu/~remzi/Classes/736/Fall2002/

B. Sc. Mathematics		2018-2019
		Semester – IV
18MMU404	PHYSICS-II	4H-4C

Instruction Hours / week: L: 4 T: 0 P: 0

Marks: Internal: 40

External: 60 Total: 100 End Semester Exam: 3 Hours

Course Objectives

This course enables the students to learn

- Basic knowledge on material properties.
- Magnetism and digital electronics.
- To educate and motivate the students in the field of science.
- The unit cell for some crystal structure, be able to draw the atomic packing arrangement for a specific crystallographic plane.
- The use of X-ray diffraction measurements in determining crystalline structures.
- The relation in between Electromagnetic theory.

Course Outcomes (COs)

On successful completion of this course, the student will be able to

- 1. Explain how physics applies to phenomena in the world around them.
- 2. Recognize how and when physics methods and principles can help address problems in their major and then apply those methods and principles to solve problems.
- 3. Study the theory of Photoelectric effect.
- 4. List different types of atomic spectra.
- 5. Understand the importance of Mosley's law and Bragg's law.
- 6. Understand the concept of digital electronics.

UNIT – I ELECTROSTATICS

Coulombs law – electric field – Gauss's law and its applications – potential – potential due to various charge distribution. Parallel plate capacitors – dielectrics- current – galvanometer – voltmeter – ammeter- potentiometric measurements.

UNIT - II

MAGNETISM

Magnetic field – Biot Savart's law – B due to a solenoid – Amperes law – Faradays law of induction – Lenz's law. Magnetic properties of matter –Dia, para and ferro - Cycle of magnetization – Hysteresis – B-H curve – Applications of B-H curve.

UNIT - III MODERN PHYSICS

Einstein's Photoelectric effect-characteristics of photoelectron –laws of photoelectric emission-Einstein's photo electric equations- Compton effect-matter waves-De-Broglie Hypothesis. Heisenberg's uncertainty principle-Schrödinger's equation- particle in a box.

UNIT-IV

ATOMIC AND NUCLEAR PHYSICS

Atom Models : Sommerfield's and Vector atom Models – Pauli's exclusion Principle – Various quantum numbers and quantization of orbits. X-rays : Continuous and Characteristic X-rays – Mosley's Law and importance – Bragg's Law.

Nuclear forces –characteristics - nuclear structure by liquid drop model – Binding energy – mass defect – particle accelerators – cyclotron and betatron – nuclear Fission and nuclear Fusion.

UNIT - V DIGITAL ELECTRONICS

Decimal – binary – octal and hexadecimal numbers– their representation, inter-conversion, addition and subtraction, negative numbers. Sum of products – product of sums – their conversion – Simplification of Boolean expressions - K-Map – min terms – max terms - (2, 3 and 4 variables). Basic logic gates – AND, OR, NOT, NAND, NOR and EXOR gates – NAND and NOR as universal building gates – Boolean Algebra – Laws of Boolean Algebra – De Morgan's Theorems – Their verifications using truth tables.

- 1. Narayanamurthi,(1988). Electricity and Magnetism, The National Publishing Co, First edition.
- 2. J. B. Rajam, Atomic Physics., (1990).S. Chand & Company Limited, New Delhi, First edition.
- 3. B. N. Srivastava,(2005) Basic Nuclear Physic, Pragati Prakashan, Meerut.
- 4. Albert Paul Malvino, (2002). Digital principles and Applications, McGraw-Hill International Editions, New York.
- 5. Floyd, Digital fundamentals (2006). Pearson education, 8th edition.
- 6. R. S. Sedha, (2004). A text book of Digital Electronics, S. Chand & Co, New Delhi, First edition.

18MMU411 NUMERICAL METHODS - PRACTICAL

Semester – IV 4H – 2C

Instruction Hours / week: L: 0 T: 0 P: 4 Marks: Internal: 40 External: 60 Total: 100 End Semester Exam: 3 Hours

Course Objectives

This course enables the students to learn

- Exercise user defined functions to solve real time problems.
- Illustrate flowchart and algorithm to the given problem.
- The basic structure of the programme, declaration and usage of variables.
- The basic MATLAB (matrix laboratory) programme.
- The usage of Matlab in order to facilitate understanding and visualization of mathematical problems
- Practical approach to apply the acquired knowledge and skills in professional and specialist courses.

Course outcomes (COs)

On successful completion of this course, the student will be able to

- 1. Acquire the basic knowledge of MATLAB and explore the structure of the numerical methods.
- 2. Use different memory allocation methods.
- 3. Deal with different input/output methods.
- 4. Use different data structures.
- 5. Express their ideas in terms of the syntax of the computer package MATLAB.
- 6. Apply the MATLAB prog
- 7.
- 8. ramme in the real world situation involving numerical problems.

List of Practical (using MATLAB/Mathematica/ SCILAB) (Any 10 Programs)

- 1. Calculate the sum $1/1 + 1/2 + 1/3 + 1/4 + \dots + 1/N$.
- 2. To find the absolute value of an integer.
- 3. Enter 100 integers into an array and sort them in an ascending order.
- 4. Bisection Method.
- 5. Newton Raphson Method.
- 6. Secant Method.
- 7. Regula Falsi Method.
- 8. LU decomposition Method.
- 9. Gauss-Jacobi Method.

10. Gauss-Seidel Method.

- 11. Lagrange Interpolation or Newton Interpolation.
- 12. Simpson's rule.

18MMU412	PHYSIC	S-II-PRACTICAL	Semester – IV 4H – 2C
Instruction Hours / week:	L:0T:0P:4	Marks: Internal: 40	External: 60 Total: 100 End Semester Exam: 3 Hours

Course Objective

This course enables the students to learn

- The concepts in integrated chips.
- The optical and electronic properties of solids through experimentations.
- The usage of electrical and optical systems for various measurements.
- The intellectual communication skills and discuss the basic principles of scientific concepts in a group.
- The physical Principles and applications of Electronics.
- The various procedures and techniques for the experiments.

Course Outcomes (COs)

On successful completion of this course, the student will be able to

- 1. Perform basic experiments in mechanics, heat and electricity and analyze the data.
- 2. Acquire engineering skills and Practical knowledge, which help the student in their everyday life.
- **3.** Know the physical Principles and applications of Electronics.
- 4. Apply the various procedures and techniques for the experiments.
- 5. Apply the mathematical concepts/equations to obtain quantitative results.
- **6.** Develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results.

Any 8 Experiments

- 1. Determine the magnetic dipole moment (m) of a bar magnet Tan A
- 2. Determine the magnetic dipole moment (*m*) of a bar magnet Tan B
- 3. Field Intensity-Circular coil- Vibration magnetometer
- 4. Moment of a magnet-Circular coil-Deflection Magnetometer
- 5. Study of logic gates using IC's.

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- 6. Study of NOR gate as Universal building block.
- 7. Study of NAND gate as Universal building block.
- 8. Verification of Basic logic gates using discrete components.
- 9. To study the variation in current and voltage in a series LCR circuit
- 10. To study the variation in current and voltage in a parallel LCR circuit
- 11. Transistor characteristics CE & CB

- Ouseph C.C., U.J. Rao and V. Vijayendran 2007, Practical Physics and Electronics, S.Viswanathan (Printers & Publishers) Pvt. Ltd., Chennai
- 2. Singh S.P., 2003, Advanced Practical Physics 1, 13th Edition, Pragathi Prakashan, Meerut
- 3. Singh S.P., 2000, Advanced Practical Physics 2, 12th Edition, Pragathi Prakashan, Meerut

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18MMU501A	MULTIVARIATE CALCULUS	8H-6C
		Semester – V

Instruction Hours / week: L: 6 T: 2 P: 0	Marks: Internal: 40	External: 60 Total: 100
		End Semester Exam: 3 Hours

Course Objectives

This course enables the students to learn

- The basics concept of functions of several variables.
- Mastery in the skills of limit and continuity functions of two variables.
- Definition and compute partial derivatives, directional derivatives and differentials.
- Find local extreme values of functions of several variables, test for saddle points, examine the conditions for the existence of absolute extreme values.
- Differential, integral and double integral calculus for functions of more than one variable.
- The mathematical tools and methods are used extensively in the physical sciences, engineering and economics.

Course Outcomes (COs)

On successful completion of this course, the student will be able to

- 1. Understand the functions of several variables.
- 2. Know about the Extrema of functions of two variables.
- 3. Use double, triple and its applications.
- 4. Know about the change of variables in double integrals and triple integrals
- 5. Synthesize the key concepts of line integrals and its applications.
- 6. Ability to apply the knowledge of Green's theorem and Stoke's theorem

UNIT I

FUNCTIONS OF SEVERAL VARIABLES

Limit and continuity of functions of two variables, partial differentiation, total differentiability and differentiability, sufficient condition for differentiability. Chain rule for one and two independent parameters-Directional derivatives, the gradient-Maximal and normal property of the gradient-Tangent planes.

UNIT II

EXTREMA OF FUNCTIONS OF TWO VARIABLES

Method of Lagrange multipliers, constrained optimization problems, Definition of vector field, divergence and curl.

UNIT III

DOUBLE INTEGRATION OVER RECTANGULAR REGION

Double integration over non-rectangular region, double integrals in polar co-ordinates-Triple integrals, Triple integral over a parallelepiped and solid regions. Volume by triple integrals-Cylindrical and spherical co-ordinates. Change of variables in double integrals and triple integrals.

UNIT IV LINE INTEGRALS

Applications of line integrals-Mass and Work. Fundamental theorem for line integrals- Conservative vector fields-Independence of path.

UNITV GREEN'S THEOREM

Surface integrals-Integrals over parametrically defined surfaces. Stoke's Theorem-The Divergence theorem.

- 1. Strauss M.J., Bradley G.L. and Smith K. J., (2007). Calculus, Third Edition, Dorling Kindersley (India) Pvt.Ltd. (Pearson Education), Delhi.
- 2. Thomas G.B., and Finney R.L., (2005).Calculus, Ninth Edition, Pearson Education, Delhi.
- 3. Marsden E., Tromba A.J. and Weinstein A., (2005). Basic Multivariable Calculus, Springer (SIE), Indian reprint, New Delhi.
- 4. James Stewart., (2001). Multivariable Calculus, Concepts and Contexts, Second Edition, Brooks Cole, Thomson Learning, USA.

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B. Sc. Mathematics

18MMU501B

THEORY OF REAL FUNCTIONS

Semester – V 8H – 6C

2018-2019

Instruction Hours / week: L: 6 T: 2 P: 0Marks: Internal: 40External: 60 Total: 100End Semester Exam: 3 Hours

Course Objectives

This course enables the students to learn

- The solution of Reciprocal and Binomial Equations and properties of the derived functions.
- About the relations between the roots and coefficients.
- The concept of continuous functions and limits of functions.
- The Applications of mean value theorem to inequalities and approximation of polynomials.
- Taylor's series and Maclaurin's series expansions of exponential and trigonometric functions.
- The transformations of equations.

Course Outcomes (COs)

On successful completion of this course, the student will be able to

- 1. Learn about the Limits of functions.
- 2. Understand uniform continuity, non-uniform continuity criteria, uniform continuity theorem.
- 3. Know about the, algebra of differentiable functions.
- 4. Familiarize about the sequence of functions.
- 5. Know about the infinite series.
- 6. Understand the concept of series of functions.

UNIT I

LIMITS

Limits of Functions-Limit theorems-some Extensions of the Limit concept.

UNIT II

CONTINUOUS FUNCTIONS

Continuous Functions-Combinations of Continuous Functions-Continuous functions on Intervals-Uniform Continuity-Continuity and Gauges-Monotone and Inverse Functions.

UNIT III DIFFERENTIATION

The Derivative-The Mean Value theorem-L'Hospital rules-Taylor's theorem.

UNIT IV

SEQUENCES OF FUNCTIONS

Pointwise and Uniform Convergence-Interchange of Limits-The Exponential and logarithmic Functionsthe trigonometric functions.

UNIT V INFINITE SERIES

Absolute Convergence-Tests for Absolute Convergence-Tests for Non-absolute Convergence-Series of functions.

- 1. Bartle R., and Sherbert D.R., (2003). Introduction to Real Analysis, John Wiley and Sons.
- 2. Mattuck A., (2013). Introduction to Analysis, Prentice Hall. Ghorpade S. R. and Limaye B.V., (2006). A Course in Calculus and Real Analysis, Springer New York.
- 3. Ghorpade S. R. andLimaye B.V., (2006). A Course in Calculus and Real Analysis, Springer.New York.
- 4. Ross K.A., (2004). Elementary Analysis: The Theory of Calculus, Springer. New York.

B. Sc. Mathematics				2018-201
18MMU502A	RING THEORY	AND LINEAR ALGEBRA I	Semester – V 8H – 6C	
Instruction Hours / y	veek: L: 6 T: 2 P: 0	Marks: Internal: 40	External: 60 Total: 100	

End Semester Exam: 3 Hours

Course Objectives

This course enables the students to learn

- Linear transformations, homomorphism, isomorphism and its properties.
- The basic definitions of Rings, subrings, vector spaces, subspaces, algebra of subspaces, • isomorphism and its properties.
- The concept of ideals and maximal ideals •
- Fundamental characteristics of vector spaces.
- Concepts of linear transformations and their role in modern mathematics.
- The concept of ring homomorphisms, properties of ring homomorphisms.

Course Outcomes (COs)

On successful completion of this course, the student will be able to:

- 1. Understand the concept of rings, subrings, vector spaces, subspaces, algebra of subspaces, isomorphism and its properties.
- 2. Understand the concept of ring homomorphisms, properties of ring homomorphisms.
- 3. Know about the Vector spaces and dimension.
- 4. Analyze Linear transformations and matrix representation of a linear transformation.
- 5. Study change of coordinate matrix and its properties.
- 6. Understand Isomorphism theorems I, II and III, field of quotients.

UNIT I

RINGS

Definition and examples of rings- properties of rings-Subrings- Integral domains and fieldscharacteristic of a ring. Ideal- ideal generated by a subset of a ring- factor rings- operations on ideals- prime and maximal ideals.

UNIT II RING HOMOMORPHISMS

Ring homomorphisms-Properties of ring homomorphisms-Isomorphism theorems I, II and III, field of quotients.

UNIT III **VECTOR SPACES**

Vector spaces-Subspaces-Algebra of subspaces- quotient spaces- Linear combination of vectors-Linear span-Linear independence-Basis and dimension-Dimension of subspaces.

UNIT IV LINEAR TRANSFORMATIONS

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Linear transformations- Null space- Range- rank and nullity of a linear transformation- matrix representation of a linear transformation- Algebra of linear transformations.

UNIT V ISOMORPHISM

Isomorphism: Isomorphism theorems-Invertibility and isomorphisms-Change of coordinate matrix.

- 1. Fraleigh.J.B., (2004). A First Course in Abstract Algebra , Seventh Edition , Pearson Education Ltd, Singapore.
- 2. Joseph A. Gallian., (2013). Contemporary Abstract Algebra, Fourth Edition, Narosa Publishing House, New Delhi.
- 3. Kumaresan S., (2000). Linear Algebra- A Geometric Approach, Prentice Hall of India, New Delhi.

B. Sc. Mathematics			2018-20
18MMU502B	NUMBEI	R THEORY	Semester – V 8H – 6C
Instruction Hours / week	: L: 6 T: 2 P: 0	Marks: Internal: 40	External: 60 Total: 100

Course Objectives

This course enables the students to learn

- Numbers, functions and its properties.
- Beauty and clarity of number theoretic functions. •
- The challenging problems in number theory. •
- How number theory is related to and used in cryptography. •
- The concepts of divisibility, congruence, greatest common divisor, prime, and prime-٠ factorization.
- The Law of Quadratic Reciprocity and other methods to classify numbers as primitive roots, quadratic residues, and quadratic non-residues.

Course Outcomes (COs)

On successful completion of this course, the student will be able to

- 1. Understand the Linear Diophantine equation,
- 2. Know about the Fermat's Little theorem.
- 3. Mastery in the Mobius Inversion formula.
- 4. Familiar with the concepts of primitive roots
- 5. Acquire knowledge of the Legendre symbol and its properties.
- 6. Acquire concepts of Public key encryption, RSA encryption and decryption

UNIT I

DIVISIBILITY, PRIMES AND CONGRUENCES

Linear Diophantine equation- Prime counting function- statement of prime number theorem-Goldbach conjecture- linear congruences- Complete set of residues- Chinese Remainder theorem.

UNIT II

FERMAT'S LITTLE THEOREM

Fermat's Little theorem- Wilson's theorem. Number theoretic functions- Sum and number of divisors-Totally multiplicative functions - Definition and properties of the Dirichlet product.

UNIT III

NUMBER THEORETIC FUNCTIONS

The Mobius Inversion formula- The greatest integer function- Euler's phi- function- Euler's theorem reduced set of residues-Some properties of Euler's phi-function.

2018-2019

End Semester Exam: 3 Hours

UNIT IV

PRIMITIVE ROOTS AND INDICES

Order of an integer modulo n- primitive roots for primes- Composite numbers having primitive roots-Euler's criterion- The Legendre symbol and its properties.

UNIT V

THE QUADRATIC RECIPROCITY LAW

Quadratic reciprocity-Quadratic congruences with composite moduli. Public key encryption-RSA encryption and decryption- the equation $x^2 + y^2 = z^2$ - Fermat's Last theorem.

- 1. David M. Burton, (2007). Elementary Number Theory, Sixth Edition, Tata McGraw-Hill, Delhi.
- 2. Neville Robinns, (2007). Beginning Number Theory, 2nd Ed., Narosa Publishing House Pvt. Ltd., Delhi.
- 3. Neal Koblitz., (2006). A course in Number theory and cryptography, Second Edition, Hindustan Book Agency, New Delhi.

18MMU503A

PROBABILITY AND STATISTICS

Instruction Hours / week: L: 6 T: 2 P: 0

Marks: Internal: 40

External: 60 Total: 100 End Semester Exam: 3 Hours

Semester – V 8H – 6C

Course Objective:

This course enables the students to learn

- Basic concepts in probability theory and statistical measures.
- Commonly used probability distributions (both discrete and continuous).
- Central Limit theorem and their applications in various disciplines.
- The nature of uncertainty and randomness and set up data collection methods that are free of bias.
- Appropriate methods to draw conclusions based on sample data by constructing and/or evaluating tables, graphs, and numerical measures of characteristics of data.
- The foundations of probabilistic and statistical analysis mostly used in varied applications in engineering and science.

Course Outcomes (COs)

On successful completion of this course, the student will be able to

- 1. Understand the basic concepts of Measures of central tendency.
- 2. Know about the Probability Concepts and its properties.
- 3. Know about the Discrete distributions and its types.
- 4. Study the Continuous distributions and its types.
- 5. Understand the Basic Theory of Chebyshev's inequality.
- 6. Chapman-Kolmogorov equations, classification of states.

UNIT I

BASICS OF STATISTICS

Meaning and definition of statistics-Frequency Distribution Measures of central tendency: Arithmetic Mean-Median-Mode. Measures of dispersion – Range- Coefficient of range- Quartile deviation-Coefficient of Quartile deviation-Standard deviation and Coefficient of variation.

UNIT II PROBABILITY CONCEPTS

Trial- Event- Sample space- mutually exclusive event- Exclusive and exhaustive events- Dependent and independent events- simple and compound events- Mathematical properties- Permutation and combination- Probability axioms- Addition and multiplication theorem- Real random variables (discrete and continuous)- Cumulative distribution function- probability density functions- mathematical expectation- moments- Moment generating function- characteristic function.

UNIT III

DISCRETE DISTRIBUTIONS

Binomial distribution- Poisson distribution- And its properties- Joint probability density functions-Marginal and conditional distributions- Expectation of function of two random variables- Conditional expectations- Independent random variables.

UNIT IV

CONTINUOUS DISTRIBUTIONS

Uniform distribution- normal distribution- Standard normal distribution- exponential distribution. Joint cumulative distribution function and its properties- Joint probability density functions (No derivations) and simple problems. Bivariate distribution- Correlation coefficient- joint moment generating function (jmgf) and calculation of covariance (from jmgf)- Linear regression for two variables.

UNIT V

LIMIT THEOREMS AND MARKOV CHAINS

Chebyshev's inequality- Statement and interpretation of (weak) law of large numbers and strong law of large numbers- Central Limit theorem for independent and identically distributed random variables with finite variance- Markov Chains- Chapman-Kolmogorov equations- classification of states.

- 1. Gupta S.P., (2001). Statistical Methods, Sultan Chand & Sons, New Delhi.
- 2. Robert V. Hogg, Joseph W. McKean and Allen T. Craig., (2007). Introduction to Mathematical Statistics, Pearson Education, Asia.
- 3. Irwin Miller and Marylees Miller, John E. Freund, (2006). Mathematical Statistics with Application, Seventh Edition, Pearson Education, Asia.
- 4. Sheldon Ross., (2007). Introduction to Probability Model, Ninth Edition, Academic Press, Indian Reprint.
- 5. Pillai R.S.N., and Bagavathi V., (2002). Statistics , S. Chand & Company Ltd, New Delhi.
- 6. Srivastava T.N., and ShailajaRego., (2012). 2e, Statistics for Management, McGraw Hill Education, New Delhi.
- 7. Dr.P.N.Arora, (2002). A foundation course statistics, S.Chand& Company Ltd, New Delhi.

18MMU503B BOOLEAN ALGEBRA AND AUTOMATA THEORY

Semester – V 8H – 6C

Instruction Hours / week: L: 6 T: 2 P: 0	Marks: Internal: 40	External: 60 Total: 100
		End Semester Exam: 3 Hours

Course Objectives

This course enables the students to learn

- Lattice and algebraic system, Basic properties of algebraic systems
- Finite Automata and regular languages
- The foundations of computability theory
- A strong background in reasoning about finite state automata and formal languages.
- Mathematical arguments using logical connectives and quantifiers.
- The various categories of languages and grammars in the Chomsky hierarchy.

Course Outcomes (COs)

On successful completion of this course, the student will be able to

- 1. Understand how lattices and Boolean algebra are used as tools and mathematical models in the study of networks.
- 2. Define various categories of automata.
- 3. Context free grammars and pushdown automata.
- 4. Understand Turing machine as a model of computation.
- 5. Define the various categories of Undecidability.
- 6. Knowledge about Post Correspondence Problem.

UNIT I

LATTICES AND BOOLEAN ALGEBRAS

Definition of ordered set with examples and basic properties of ordered sets- Maps between ordered sets - Duality principle- lattices as ordered sets- Lattices as algebraic structures- Sublattices- Products and homomorphisms- Modular and distributive lattices.

Boolean algebras: Boolean polynomials- Minimal forms of Boolean polynomials- Quinn- McCluskey method- Karnaugh diagrams- Switching circuits and applications of switching circuits.

UNIT II

THE CENTRAL CONCEPT OF AUTOMATA

Alphabets- strings- and languages. Finite Automata and Regular Languages: Deterministic and non-Deterministic finite automata- Regular expressions-Regular languages and their relationship with finite automata- Pumping lemma and closure properties of regular languages.

UNIT III

CONTEXT FREE GRAMMARS AND PUSHDOWN AUTOMATA

Context free grammars (CFG)- Parse trees-ambiguities in grammars and languages- Pushdown automaton (PDA) and the language accepted by PDA- deterministic PDA- Non- deterministic PDA-

properties of context free languages-normal forms- pumping lemma- Closure properties- Decision properties.

UNIT IV TURING MACHINES

Turing machine as a model of computation- Programming with a Turing machine- Variants of Turing machine and their equivalence.

UNIT V UNDECIDABILITY

Recursively enumerable and recursive languages- Undecidable problems about Turing machines: halting problem- Post Correspondence Problem and undecidability problems About CFGs.

- 1. Davey B A., and Priestley H. A., (2002). Introduction to Lattices and Order, Cambridge University Press, Cambridge.
- 2. Hopcroft J. E., Motwani R., and Ullman J.D., (2001). Introduction to Automata Theory, Languages, and Computation, Second Edition, Addison-Wesley.
- 3. Edgar G. Goodaire and Michael M. Parmenter, (2003).Discrete Mathematics with Graph Theory, Second Edition, Pearson Education P.Ltd., Singapore.
- 4. Rudolf Lidl and Günter Pilz, (2004). Applied Abstract Algebra, Second Edition, Undergraduate Texts in Mathematics, Springer (SIE).
- 5. Lewis H.R., Papadimitriou C.H., and Papadimitriou C., (2005). Elements of the Theory of Computation, Second Edition ,Prentice-Hall. New Delhi.
- 6. Anderson J.A., (2006). Automata Theory with Modern Applications, Cambridge University Press, Cambridge.

18MMU504 INTRODUCTION TO ACCOUNTING

 $\frac{\text{Semester} - V}{6H - 4C}$

Instruction Hours / week: L: 4 T: 2 P: 0	Marks: Internal: 40	External: 60 Total: 100
		End Semester Exam: 3 Hours

Course Objectives

This course enables the students to learn

- The fundamental accounting concepts and principles.
- The capability to perform the basic accounting functions.
- The recognition, valuation, measurement and recording of the most common business transactions and the preparation of accounting statements.
- the "Fundamental Issues in Accounting" and comprises.
- How people analyze the corporate financial under different conditions and understand why people describe the financial statements in different manner.
- The Financial Statement Analysis associate with Financial Data in the organization.

Course Outcomes (COs)

On successful completion of this course, the student will be able to:

- 1. Use the fundamental accounting equation to analyze the effect of business transactions on an organization's accounting records and financial statements.
- 2. Enrich the ability to use a basic accounting system to create (record, classify, and summarize) the data needed to solve a variety of business problems.
- 3. Develop the ability to use accounting concepts, principles, and frameworks to analyze and effectively communicate information to a variety of audiences.
- 4. Promote the ability to use accounting information to solve a variety of business problems.
- 5. Demonstrate the applicability of the concept of Accounting to understand the managerial Decisions and financial statements.
- 6. Apply the Financial Statement Analysis associate with Financial Data in the organization.

UNIT I

INTRODUCTION TO ACCOUNTING

Meaning and Need for Accounting - Definition and Objectives of Accounting - Advantages and

Limitations of Accounting – Accounting Rules – Bases of Accounting - Basic accounting concepts and

conventions. Methods of Accounting – Double Entry system – Types of Accounts – Double Entry book

keeping – Journals and Ledger Accounts.

UNIT II

SUBSIDIARY BOOKS

Purchase Book – Sales Book – Purchase return Book and Sales return Book – Cash Book Simple Cash Book – Two Column Cash Book – Three Columnar Cash Book – Trial balance – Errors – Rectifications of Errors – Bank Reconciliation Statement.

UNIT III

MANUFACTURING ACCOUNT

Trading Account – Profit & Loss Account – Balance sheet – Problems with simple Adjustments.

UNIT IV

AVERAGE DUE DATE AND ACCOUNT CURRENT

Determination of due date - Average due date as basis for calculation of interest. Account Current – Meaning and Definition – Procedure for calculating days of interest - Preparation of Account – Product Method – Red-ink Interest – Interest table method.

UNIT V

DEPRECIATION ACCOUNTING

Meaning and Characteristics – Causes and Objectives – Methods of providing Depreciation – Straight line Method – Diminishing Balance Method – Distinction between Straight line and Written Down Value Method – Annuity Method – Depreciation Fund or Sinking Fund Method .

- 1. Reddy. T.S., & Dr. A. Moorthy, (2016). Financial Accounting, Margham Publications, Chennai
- 2. David Annand, & Henry Dauderis, (2017). Introduction to Financial Accounting (Athabasca University), U.S. GAAP Adaptation Lyryx .

18MMU601A METRIC SPACES AND COMPLEX ANALYSIS

Semester – VI 8H–6C

Instruction Hours / week: L: 6 T: 2 P: 0	Marks: Internal: 40	External: 60 Total: 100
		End Semester Exam: 3 Hours

Course Objectives

This course enables the students to learn

- The theory of functions of a complex variable with examples.
- Metric spaces, Continuous mappings and Convergence of sequences and series.
- Techniques of complex analysis that make practical problems easy (e.g. graphical rotation and scaling as an example of complex multiplication)
- Subsets of a metric space are open, closed, connected, bounded, totally bounded and/or compact.
- Function on a Complex number, and differentiability on complex functions.
- The Cauchy's Theorem, Cauchy's integral formula, Liouville's Theorem and Laurent's expansion.

Course Outcomes (COs)

On successful completion of this course, the student will be able to

- 1. Understand the various properties of metric spaces
- 2. Definite continuous mappings sequential criterion.
- 3. Understand the basic concepts of Riemann equations, sufficient conditions for differentiability.
- 4. Explore various properties of Analytic functions.
- 5. Understand the Contour integrals and its examples.
- 6. Apply the concept Liouville's theorem and the fundamental theorem of algebra.

UNIT I METRIC SPACES

Definition and examples - Sequences in metric spaces - Cauchy sequences.

Complete Metric Spaces - Open and closed balls – neighbourhood - open set - interior of a set. Limit point of a set - closed set - diameter of a set - Cantor's theorem – Subspaces - dense sets – separable spaces.

UNIT II

CONTINUOUS MAPPINGS

Continuous mappings - sequential criterion and other characterizations of continuity – Uniform Continuity – Homeomorphism - Contraction mappings - Banach Fixed point Theorem - Connectedness - connected subsets of R.

UNIT III LIMITS

Limits - Limits involving the point at infinity - continuity. Properties of complex numbers – regions in the complex plane - functions of complex variable - mappings. Derivatives, differentiation formulas - Cauchy-Riemann equations, sufficient conditions for differentiability.

UNIT IV

ANALYTIC FUNCTIONS

Analytic functions, examples of analytic functions, exponential function, Logarithmic function, trigonometric function, derivatives of functions, definite integrals of functions.

Contours: Contour integrals and its examples - upper bounds for moduli of contour integrals - Cauchy-Goursat theorem, Cauchy integral formula.

UNIT V

CONVERGENCE

Liouville's theorem and the fundamental theorem of algebra.Convergence of sequences and series, Taylor series and its examples - Laurent series and its examples, absolute and uniform convergence of power series.

- 1. Kumaresan S., (2011). Topology of Metric Spaces, Second Edition., Narosa Publishing House, NewDelhi.
- 2. Simmons G.F., (2004).Introduction to Topology and Modern Analysis, McGraw-Hill, New Delhi.
- 3. James Ward Brown., and Ruel V. Churchill., (2009). Complex Variables and Applications, EighthEdition., McGraw Hill International Edition, New Delhi.
- 4. Joseph Bak., and Donald J. Newman., (2010). Complex Analysis, Second Edition., Undergraduate Texts in Mathematics, Springer-Verlag New York.

Semester – VI

8H-6C

18MMU601B RIEMANN INTEGRATION AND SERIES OF FUNCTIONS

Instruction Hours / week: L: 6 T: 2 P: 0 Marks: Internal: 40

External: **60** Total: **100 End Semester Exam:** 3 Hours

Course Objectives

This course enables the students to learn

- The Riemann integration, Point wise and uniform convergence of sequence of functions and Series of functions.
- The concept of continuous functions and their bounded variation property.
- Difference between Riemann Integration and Riemann Stieltjes Integration of functions.
- Fundamental theorems of Calculus and Improper integrals.
- The concept of cauchy criterion for uniform convergence and Weierstrass M-Test.
- About pointwise and uniform convergence of sequence of functions.

Course Outcomes (COs)

On successful completion of the course, students will be able to:

- 1. Understand Riemann sum and definition of Riemann integral.
- 2. Convergence of Beta and Gamma functions
- 3. Know about Pointwise and uniform convergence of sequence of functions
- 4. Theorems on the continuity and derivability of the sum function of a series of functions.
- 5. Understand Cauchy criterion for uniform convergence and Weierstrass M-Test.
- 6. Limit superior and Limit inferior and integration of power series.

UNIT I

RIEMANN INTEGRATION

Riemann integration - inequalities of upper and lower sums - Riemann conditions of integrability - Riemann sum and definition of Riemann integral through Riemann sums - equivalence of two definitions- Riemann integrability of monotone and continuous functions, Properties of the Riemann integral.

UNIT II

CONTINUOUS FUNCTIONS

Definition and integrability of piecewise continuous and monotone functions. - Intermediate Value theorem for Integrals - Fundamental theorems of Calculus - Improper integrals - Convergence of Beta and Gamma functions.

UNIT III CONVERGENCE

Pointwise and uniform convergence of sequence of functions - Theorems on continuity - derivability and integrability of the limit function of a sequence of functions.

UNIT IV SERIES OF FUNCTIONS

Series of functions - Theorems on the continuity and derivability of the sum function of a series of functions - Cauchy criterion for uniform convergence and Weierstrass M-Test.

UNIT V

LIMITS

Limit superior and Limit inferior - Power series - radius of convergence - Cauchy HadamardTheorem - Differentiation and integration of power series - Abel's Theorem - Weierstrass Approximation Theorem.

- 1. Ross K.A., (2004). Elementary Analysis, The Theory of Calculus, Undergraduate Texts in Mathematics, Springer (SIE), Indian reprint,
- 2. Bartle R.G., Sherbert D.R., (2002). Introduction to Real Analysis, Third Edition, John Wiley and Sons (Asia) Pvt. Ltd., Singapore,
- 3. Charles G. Denlinger, (2011). Elements of Real Analysis, Jones & Bartlett (Student Edition)

18MMU602ARING THEORY AND LINEAR ALGEBRA IISemester – VI18MMU602A8H–6C

Instruction Hours / week: L: 6 T: 2 P: 0	Marks: Internal: 40	External: 60 Total: 100
		End Semester Exam: 3 Hours

Course Objectives

This course enables the students to learn

- The behavior of polynomials and operators.
- The Rings and basic properties of rings and ideals.
- The concepts of unique factorization domains, Euclidean domains.
- The transpose of a linear transformation and its matrix in the dual basis.
- The Inner product spaces and norms, Gram-Schmidt orthogonalisation process.
- Least Squares Approximation and Spectral theorem.

Course Outcomes (COs)

On successful completion of this course, the student will be able to

- 1. Polynomial rings over commutative rings, dual spaces, dual basis, double dual, minimal solutions to systems of linear equations, normal and self-adjoint operators.
- 2. Understand the Divisibility in integral domains.
- 3. Study the transpose of a linear transformation and its matrix in the dual basis.
- 4. Know about the Inner product spaces and norms.
- 5. Study Least Squares Approximation, minimal solutions to systems of linear equations.
- 6. Know about the Orthogonal projections and Spectral theorem.

UNIT I

RINGS

Polynomial rings over commutative rings- Division algorithm and consequences- Principal ideal domains- Factorization of polynomials- Reducibility tests- irreducibility tests- Eisenstein criterion-Unique factorization in Z[x].

UNIT II

INTEGRAL DOMAINS

Divisibility in integral domains- Irreducibles- Primes- unique factorization domains- Euclidean domains.

UNIT III VECTOR SPACES

Dual spaces- Dual basis- Double dual- transpose of a linear transformation and its matrix in the dual basis- annihilators- Eigen spaces of a linear operator- Diagonalizability- invariant subspaces and Cayley-Hamilton theorem- The minimal polynomial for a linear operator.

UNIT IV INNER PRODUCT SPACES

Inner product spaces and norms- Gram-Schmidt orthogonalisation process- Orthogonal complements- Bessel's inequality- The adjoint of a linear operator.

Karpagam Academy of Higher Education (Deemed to be University), Coimbatore - 641 021

UNIT V OPERATORS

Least Squares Approximation- Minimal solutions to systems of linear equations- Normal and selfadjoint operators- Orthogonal projections and Spectral theorem.

SUGGESTED READINGS

- 1. Fraleigh.J.B., (2004). A First Course in Abstract Algebra , Seventh Edition , Pearson Education Ltd, Singapore.
- 2. Stephen H. Friedberg., Arnold J. Insel., Lawrence E. Spence, (2004) . Linear Algebra, Fourth Edition., Prentice- Hall of India Pvt. Ltd., New Delhi.

3.S. Lang, (2005). Introduction to Linear Algebra, Second Edition., Springer.

Instruction Hours / week: L: 6 T: 2 P: 0	Marks: Internal: 40	External: 60 Total: 100
		End Semester Exam: 3 Hours

Course Objectives

This course enables the students to learn

- Fundamental concepts of duality, economic interpretation of dual constraints and game theory.
- The simplex method to solve small linear programming models by hand, given a basic feasible point.
- Formulation of a given simplified description of a suitable real-world problem as a linear programming model.
- Revised Simplex Method, Parametric Linear Programming, Integer Linear Programming: Branch and Bound Method, Cutting Plane Method.
- Mathematical Formulation of LPP, Solution of LPP: Graphical Method with special cases, Simplex Method, Big-M Method, Two Phase method. Special cases in simplex method, Duality theory, Dual Simplex algorithm.
- Solution of Transportation problem and Assignment Problems.

Course Outcomes (COs)

On successful completion of this course, the student will be able to

- 1. Formulate a LPP and solve it by simplex and graphical method. Also do post optimal analysis of the formulated problem or other application areas.
- 2. Understand the concepts of Duality, Primal Dual relationship.
- 3. Solve a Transportation and its types.
- 4. Analysis Assignment problem and its models.
- 5. Know the concept of game theory.
- 6. Study the games with mixed strategies, graphical solution procedure, linear programming solution of games.

UNIT I

LINEAR PROGRAMMING

Introduction to Linear Programming Problem – Graphical Linear Programming Solution- Theory of Simplex Method-Optimality and unboundedness-the Simplex algorithm –Simplex method in tableau format- Introduction to artificial variables – two –phase method – Big –M method and their comparison.

UNIT II

PRIMAL DUAL PROBLEMS

Duality – Definition of the dual Problems-Formulation of the dual Problem-Primal Dual relationship: Review of simplex matrix Operations –Simplex tableau Layout-Optimal Dual Solution-Simplex Tableau computations. Economic interpretation of the dual: Economic Interpretation of Dual Variables-Economic Interpretation of Dual Constraints.

UNIT III

TRANSPORTATION METHOD

Transportation Problem: Definition of the Transportation model – Nontraditional Transportation model – The Transportation Algorithm: Determination of the Starting Solution-Northwest –corner method, Least – corner method, Vogel approximation method- Iterative Computations of the Transportation Algorithm.

UNIT IV

THE ASSIGNMENT MODEL

The Assignment Model: Introduction to Assignment model- Mathematical Formulation of Assignment model- Hungarian method for solving assignment problem –Simplex Explanation of the Hungarian method.

UNIT V

GAME THEORY

Game theory: Formulation of two person zero games – Solving two person zero sum games, games with mixed strategies, graphical solution procedure, linear programming solution of games.

SUGGESTED READINGS

- 1. Handy .A. Taha., (2007). Operations Research, Seventh edition, Prentice Hall of India Pvt Ltd, New Delhi .
- 2. Hillier F.S., and Lieberman G.J., (2009). Introduction to Operations Research, Ninth Edition, Tata McGraw Hill, Singapore.
- 3. Mokhtar S. Bazaraa, John J. Jarvis and Hanif D. Sherali, (2004). Linear Programming and Network Flows, Second Edition, John Wiley and Sons, India.
- 4. Hadley G.,(2002). Linear Programming, Narosa Publishing House, New Delhi.

Course Outcomes (COs)

On successful completion of this course, the student will be able to:

- 1. Asses the significance and role of cost accounting
- 2. Import the knowledge on the nature of elements of cost and cost sheet preparation
- 3. Enrich the knowledge on the preparation of various budgets
- 4. Analyze the Financial Statement Analysis
- 5. Prepare budget and budgetary control
- 6. Acquire knowledge of Profit analysis.

UNIT I

Meaning – Definition – Scope – Objectives – Function-Merits and demerits of cost and management accounting – Distribution between cost, management and financial accounting – Elements of cost – Cost concepts and costs classification.

UNIT II

Preparation of cost sheet - stores control - EOQ - maximum, minimum, reordering levels, - Pricing of materials issues - FIFO, LIFO, Average cost, Standard price. Methods of labour cost - remuneration and incentives.

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Semester – VI

2018-2019

Instruction Hours / week: L: 4 T: 2 P: 0 Marks: Internal: 40 External: 60 Total: 100 End Semester Exam: 3 Hours

Course Objectives

This course enables the students to learn

- The area of cost and management accounting
- The major differences and similarities between financial and management accounting •
- The role of management accountant in an organization, and the importance of upholding ethical • standards
- Methods and techniques needed by managers for performing functions such as costing, cost • allocations.
- The concepts preparation of flexible budgets and variance analysis.
- The Financial Statement Analysis. •

COST AND MANAGEMENT ACCOUNTING

UNIT III

Financial Statement Analysis – Preparation of comparative and common size statements – analysis and interpretation – Trend Analysis. Ratio analysis – classification of ratios – liquidity, profitability, solvency ratios – inter firm comparison.

UNIT IV

Fund flow analysis and cash flow analysis (problems only)

UNIT V

Standard costing – Variance Analysis – Material and Labour – variances. Marginal costing – Cost Volume Profit analysis. Budget and Budgetary Control – Preparation of various budgets.

SUGGESTED READINGS

- 1. Jain S.P., and Narang, K.L. (2014). Cost Accounting. Kalyani Publishers, Ludhiana.
- 2. Reddy.T.S. & Dr. A. Moorthy, (2016), Cost Accounting Margham Publications, Chennai.
- 3. Saxena V.K., Vashist C.D. (2015), Advanced Cost And Management Accounting, Sultan Chand

& Sons, New Delhi.

B. Sc. Mathematics			2018-2019
18MMU691	PROJECT	Semester – VI 8H – 6C	-
Instruction Hours / week: L: 8 T: 0 P: 0	Marks: Internal: 40	External: 60 Total: 100 End Semester Exam: 3 Hours	