Chaudhary Devi Lal University Sirsa

(Establishment by the State Legislature Act 9 of 2003)

B.A./ B.Sc. (Multidisciplinary)

Scheme of Examination & Syllabus
for
Mathematics Subject
in
Under Graduate Programmes
as per NEP 2020
1st to 2nd   Semester (1st Year)

With effect from the session 2024-25

DEPARTMENT OF MATHEMATICS

Chaudhary Devi Lal University

Sirsa-125055

Table: Courses and Credit Scheme:

Course Code	Course Title	Level	Credits			Marks		
			L	P	Total	Int	Ext	Total
Discipline Specific Courses (DSC)								
BA/BSC/MD/MAT/1/DSC/101	CALCULUS	100	4	-	**4**	30	70	**100**
BA/BSC/MD/MAT/2/DSC/102	ALGEBRA AND NUMBER THEORY	100	4	-	**4**	30	70	**100**

Course Code	Course Title	Level	Credits			Marks		
			L	P	Total	Int	Ext	Total
Minor Courses (MIC)/Vocational Courses (VOC)								
BA/BSC/MD/MAT/1/MIC/101	BASIC CALCULUS	100	2	-	**2**	15	35	**50**
BA/BSC/MD/MAT/2/MIC/102	BASIC ALGEBRA	100	2	-	**2**	15	35	**50**

Course Code	Course Title	Level	Credits			Marks		
			L	P	Total	Int	Ext	Total
Multidisciplinary Courses (MDC)								
CDLU/MDC/MAT/1/101	INTRODUCTORY MATHEMATICS-1	100	3	-	**3**	25	50	**75**
CDLU/MDC/MAT/2/102	INTRODUCTORY MATHEMATICS-II	100	3	-	**3**	25	50	**75**

Course Code	Course Title	Level	Credits			Marks		
			L	P	Total	Int	Ext	Total
Ability Enhancement Courses (AEC)								
CDLU/AEC/MAT/1/101	FUNCTIONAL ENGLISH-I	100	2	-	**2**	15	35	**50**
CDLU/AEC/MAT/2/102	प्रयोजनमूलक हिन्दी-I	100	2	-	**2**	15	35	**50**

Course Code	Course Title	Level	Credits			Marks		
			L	P	Total	Int	Ext	Total
Skill Enhancement Courses (SEC)/ Internship/Dissertation								
CDLU/SEC/MAT/1/101	Computer Skills	100	3	-	**3**	25	50	**75**
CDLU/SEC/MAT/2/ 102	Programming in C & Numerical Methods (theory)	100	3	-	**3**	25	50	**75**

Course Code	Course Title	Level	Credits			Marks		
			L	P	Total	Int	Ext	Total
Value Added Course (VAC)								
CDLU/VAC/MAT/1/101	CALCULATION SKILLS WITH VEDIC MATHEMATICS-I	100	2	-	**2**	15	35	**50**
CDLU/VAC/MAT/2/102	MATHEMATICS IN INDIA: FROM VEDIC PERIOD TO MODERN	100	-	2	**2**	15	35	**50**

BA/BSC/MD/MAT/1/DSC/101

CALCULUS

Marks (Theory): 70   **Marks (Total): 100**
Marks (Internal Assessment): 30   **Time: 03 Hours**
Credits: = 04

Note for the Paper Setter: The question paper will consist of nine questions in all. The first question will be compulsory and will consist of seven short questions of 2 marks each covering the whole syllabus. In addition, eight more questions of 14 marks each will beset unit-wise comprising of two questions from each of the four units. The candidates are required to attempt one compulsory question and four more questions selecting one question from each unit.

Course Outcomes: This course will enable the students to:
1. Gain knowledge of the concepts and theory of limit, continuity and differentiability of functions.
2. Attain skills of calculating the limit of functions and examining the continuity and differentiability of different types of functions, and perform successive differentiation of functions.
3. To apply the procedural knowledge to obtain the series expansions of functions which find multidisciplinary applications.
4. Understand concepts of asymptotes and curvature, the geometrical meaning of these terms and to have procedural knowledge to solve related problems.
5. Determine singular points of a curve and classify them. Understand the concept of rectification of curves and derive the reduction formulae.
6. Have theoretical knowledge and practical skills to evaluate the area bounded by the curves, and volume and surface area of solids formed by revolution of curves.

Unit – I

ε-δ definition of limit and continuity of a real valued function, Basic properties of limits, Types of discontinuities, Differentiability of functions, Application of L'Hospital rule to indeterminate forms, Successive differentiation, Leibnitz theorem, Taylor's and Maclaurin's series expansion with different forms of remainder.

Unit– II

Asymptotes: Horizontal, vertical and oblique asymptotes for algebraic curves, Asymptotes for polar curves, Intersection of a curve and its asymptotes, Curvature and radius of curvature of curves (cartesian, parametric, polar & intrinsic forms), Newton's method, Centre of curvature and circle of curvature.

Unit – III

Multiple points, Node, Cusp, Conjugate point, Tests for concavity and convexity, Points of inflexion, Tracing of curves, Reduction formulae.

Unit – IV

Rectification, intrinsic equation of a curve, Quadrature, Area bounded by closed curves, Volumes and surfaces of solids of revolution.

Recommended Books/e-resources:
1. Howard Anton, I. Bivens & Stephan Davis (2021). Calculus (12th edition). J. Wiley & Sons.
2. Gabriel Klambauer (1986). Aspects of Calculus (4th edition). Springer.
3. Wieslaw Krawcewicz & Bindhyachal Rai (2003). Calculus with Maple Labs. Alpha Science Int'l Ltd.
4. Gorakh Prasad (2016). Differential Calculus (19th edition). Pothishala Pvt. Ltd.
5. George B. Thomas Jr., Joel Hass, Christopher Heil & Maurice D. Weir (2018). Thomas' Calculus (14th edition). Pearson Education.
6. Monty J. Strauss, Gerald L. Bradley & Karl J. Smith (2002). Calculus (3rd edition). Dorling
   Kindersley (India) Pvt. Ltd.,

BA/BSC/MD/MAT/2/DSC/102
ALGEBRA AND NUMBER THEORY

Marks(Theory):70Marks   **(Total):100**
Marks (Internal Assessment): 30   **Time: 03 Hours**
Credits: 04

Note for the Paper Setter: The question paper will consist of nine questions in all. The first question will be compulsory and will consist of seven short questions of 2 marks each covering the whole syllabus. In addition, eight more questions of 14 marks each will beset unit-wise comprising of two questions from each of the four units. The candidates are required to attempt one compulsory question and four more questions selecting one question from each unit.

Course Outcomes: This course will enable the students to:
1. Gain knowledge of the concepts of symmetric, skew-symmetric, Hermitian, skew-Hermitian, Orthogonal and Unitary matrices, Linear dependence and independence of rows and columns of a matrix.
2. Have knowledge of procedure and cognitive skills used in calculating rank of a matrix, eigen values, characteristic equation, minimal polynomial of a matrix and technical skills used in solving problems based on Cayley-Hamilton theorem.
3. Have knowledge of the concepts used in solving problems based on relations between the roots and coefficients of general polynomial
4. Have deeper and procedural knowledge required for solving cubic and biquadratic equations used in Mathematics as well as many other learning fields of study.
5. To understand the basic concepts of number theory and their applications in problem solving and life- long learning.
6. Attain cognitive skills used in solving linear Diophantine equations in two variables.

Unit I

Symmetric, Skew symmetric, Hermitian and skew Hermitian matrices, Elementary operations on matrices, Rank of a matrix, Inverse of a matrix, Linear dependence and independence of rows and columns of matrix, Row rank and column rank of a matrix, Eigen values, Eigen vectors and characteristic equation of a matrix, Minimal polynomial of a matrix, Cayley-Hamilton theorem and its use in finding the inverse of a matrix, Unitary and orthogonal matrices.

Unit II

Relations between the roots and coefficients of general polynomial equation in one variable, Solutions of polynomial equations having conditions on roots, Common roots and multiple roots, Transformation of equations, Nature of the roots of an equation, Descarte's rule of signs.

Unit III

Solutions of cubic equations (Cardon's method), Biquadratic equations and their solutions. Divisibility, Greatest common divisor (gcd), Least common multiple (lcm), Prime numbers, Fundamental theorem of arithmetic.

Unit IV

Linear congruences, Fermat's theorem, Euler's theorem, Wilson's theorem and its converse, Chinese Remainder theorem, Linear Diophantine equations in two variables.

Recommended Books/e-resources:

1. Stephen H. Friedberg, Arnold J. Insel & Lawrence E. Spence (2022). Linear Algebra (5th edition). Prentice Hall of India Pvt. Ltd.
2. Seymour Lipschutz and Marc Lars Lipson (2013). Linear Algebra. (4th Edition) Schaum's Outline Series, McGraw-Hill.
3. K. B. Dutta (2004). Matrix and Linear Algebra. Prentice Hall of India Pvt. Ltd.
4. Vivek Sahai & Vikas Bist (2013). Linear Algebra (2nd edition). Narosa Publishing House.
5. I.Niven (1991). An Introduction to the Theory of Numbers (5th edition). John Wiley & Sons.
6. H.S. Hall and S.R. Knight (2023). Higher Algebra (7th edition). Arihant Publications.
7. Leonard Eugene Dickson (2009). First Course in the Theory of Equations. The Project Gutenberg EBook (http://www.gutenberg.org/ebooks/29785).

BA/BSC/MD/MAT/1/MIC/101
BASIC CALCULUS

Marks (Theory): 35   **Marks (Total): 50**
Marks (Internal Assessment): 15   **Time: 02 Hours**
Credits: = 02

Note for the Paper Setter: The question paper will consist of five questions in all. The first question will be compulsory and will consist of seven short questions of 1 mark each covering the whole syllabus. In addition, four more questions of 14 marks each will beset unit-wise comprising of two questions from each of the two units. The candidates are required to attempt one compulsory question and two more questions selecting one question from each unit.

Course Outcomes: This course will enable the students to:

1. Gain knowledge of the concepts of limit, continuity and differentiability of functions, calculate the limit of functions
2. examine the continuity and differentiability of different types of functions, and perform successive differentiation of functions and obtain their series expansions, which find multidisciplinary applications within the chosen field of learning.
3. Have deeper understanding of Taylor's and Maclaurin's theorem and use this knowledge for series expansion of various functions, which find multidisciplinary applications within the chosen field of learning.
4. Understand and acquire procedural skills required for accomplishing assigned tasks of determining asymptotes and analyze them geometrically.
5. Comprehend the process of deriving reduction formulae and use this skill to solve typical integrals easily and quickly.

Unit I

Limit and continuity of a real valued function, basic properties of limits, types of discontinuities, Differentiability of functions. Application of L'Hospital rule to Indeterminate forms. Successive differentiation, Leibnitz theorem (statement only), Taylor's and Maclaurin's series expansions with different forms of remainder.

Unit II

Asymptotes: Horizontal, vertical and oblique asymptotes for algebraic curves, Asymptotes for polar curves, Intersection of a curve and its asymptotes. Reduction formulae.

Recommended Books/e-resources:

1. Howard Anton, I. Bivens & Stephan Davis (2021). Calculus (12th edition). Wiley India.
2. Gabriel Klambauer (1986). Aspects of Calculus. Springer-Verlag.
3. Wieslaw Krawcewicz & Bindhyachal Rai (2003). Calculus with Maple Labs. Narosa.
4. Gorakh Prasad (2016). Differential Calculus (19th edition). Pothishala Pvt. Ltd.
5. George B. Thomas Jr., Joel Hass, Christopher Heil & Maurice D. Weir (2018). Thomas' Calculus (14th edition). Pearson Education.
6. Monty J. Strauss, Gerald L. Bradley & Karl J. Smith (2011). Calculus (3rd edition). Pearson Education. Dorling Kindersley (India) Pvt. Ltd.

BASIC ALGEBRA

Marks (Theory): 35   **Marks (Total): 50**
Marks (Internal Assessment): 15   **Time: 02 Hours**
Credits: = 02

Note for the Paper Setter: The question paper will consist of five questions in all. The first question will be compulsory and will consist of seven short questions of 1 mark each covering the whole syllabus. In addition, four more questions of 14 marks each will beset unit-wise comprising of two questions from each of the two units. The candidates are required to attempt one compulsory question and two more questions selecting at least one question from each unit.

After completing this course, the learner will be able to:
1. Gain knowledge of facts, principles and theories to determine rank of a matrix, eigen values, eigen vectors, characteristic equation and minimal polynomial of square matrices.
2. Have procedural knowledge, cognitive and technical skills of solving problems based on Cayley-Hamilton theorem.
3. Gain knowledge about unitary and orthogonal matrices and have skills to solve problems related to them.
4. Understand consistency of homogeneous and non-homogeneous system of linear equations and to learn cognitive and technical skills required for solving such type of problems
5. Have procedural knowledge to determine relation between roots and coefficients of a general polynomial and find solutions of polynomial equations having conditions on roots.

Unit I

Rank of a matrix, Row rank and column rank of a matrix, Eigen values, Eigen vectors and the characteristic equation of a matrix, Minimal polynomial of a matrix. Cayley-Hamilton theorem and its use in finding the inverse of a m of a matrix, Unitary and orthogonal matrices
Unit II

Applications of matrices to a system of linear (both homogeneous and non–homogeneous) equations, Theorems on consistency of a system of linear equations. Relations between the roots and coefficients of general polynomial equation in one variable, Solutions of polynomial equations having conditions on roots.

Recommended Books/e-resources:

1. Stephen H. Friedberg Arnold J. Insel Lawrence E. (2022). Linear Algebra (5th edition). Prentice Hall of India Pvt. Ltd.
2. Seymour Lipschutz and Marc Lars Lipson (2013). Linear Algebra. (4th Edition) Schaum's Outline Series, McGraw-Hill.
3. K. B. Dutta (2004). Matrix and Linear Algebra. Prentice Hall of India Pvt. Ltd.
4. H.S. Hall and S.R. Knight (2023). Higher Algebra (7th edition). Arihant Publications.
5. Leonard Eugene Dickson (2009). First Course in the Theory of Equations. The Project Gutenberg EBook (http://www.gutenberg.org/ebooks/29785).

CDLU/MDC/MAT/1/101
INTRODUCTORY MATHEMATICS-1

 Marks (Theory) : 50   **Marks(Total) : 75**
Marks (Internal Assessment) : 25   **Time : 3 Hrs**
Credits: 03

Note for the Paper Setter: The question paper will consist of seven questions in all. The first question will be compulsory and will consist of four short questions of 2 marks each covering the whole syllabus. In addition, six more questions of 14 marks each will beset unit-wise comprising of two questions from each of the three units. The candidates are required to attempt one compulsory question and three more questions selecting at least one question from each unit.

Course Outcomes: This course will enable the students to:
1. Gain the knowledge of set theory, types of sets and operations on sets. Understand various concepts of matrices and determinants,
2. acquire the cognitive skills to apply different operations on matrices and determinants.
3. Have the knowledge of the basic concepts of complex numbers and acquire skills to solve linear inequalities and quadratic equations.
4. Gain the knowledge of the concepts of Arithmetic progression, Geometric progression and Harmonic progression, and find A.M., G.M. and H.M. of given numbers.
5. Have the conceptual knowledge of straight lines and circles. Find out the slope of a line, angle between two lines, and know about various forms of a straight line and the standard form of a circle.

Unit – I

Sets and their representations, Empty set, Finite and infinite sets, Subsets, Equal sets, Power sets, Universal set, Union and intersection of sets, Difference of two sets, Complement of a set, Venn diagram, De-Morgan's laws and their applications. An introduction to matrices and their types, Operations on matrices, Symmetric and skew-symmetric matrices, Minors, Co-factors. Determinant of a square matrix, Adjoint and inverse of a square matrix,

Unit– II

Complex numbers, Operations on complex numbers, Modulus and argument of a complex number. Linear inequalities, Algebraic solutions of linear inequalities in two variables and their graphical representation Arithmetic progression, Geometric progression, Harmonic progression, Arithmetic mean (A.M.), Geometric mean (G.M.), Harmonic mean (H.M.), Relation between A.M., G.M. and H.M.

Unit – III

Straight lines: Slope of a line and angle between two lines, Different forms of equation of a line: Parallel to co-ordinate axes, Point-slope form, Slope-intercept form, Two-point form, General form; Distance of a point from a straight line.

Recommended Books/e-resources:

1. C. Y. Young (2021). Algebra and Trigonometry. Wiley.
2. S.L. Loney (2016). The Elements of Coordinate Geometry (Cartesian Coordinates) (2nd Edition). G.K. Publication Private Limited.
3. Seymour Lipschutz and Marc Lars Lipson (2013). Linear Algebra. (4th Edition) Schaum's Outline Series, McGraw-Hill.
4. C.C. Pinter (2014). A Book of Set Theory. Dover Publications.
5. J. V. Dyke, J. Rogers and H. Adams (2011). Fundamentals of Mathematics (10th Edition), Brooks/Cole.
6. A.Tussy, R. Gustafson and D. Koenig (2010). Basic Mathematics for College Students (4th Edition). Brooks Cole.

INTRODUCTORY MATHEMATICS-II

Marks (Theory) : 50   **Marks(Total) : 75**
Marks (Internal Assessment) : 25   **Time : 3 Hrs**
Credits: 03

Note for the Paper Setter: The question paper will consist of seven questions in all. The first question will be compulsory and will consist of four short questions of 2 marks each covering the whole syllabus. In addition, six more questions of 14 marks each will beset unit-wise comprising of two questions from each of the three units. The candidates are required to attempt one compulsory question and three more questions selecting at least one question from each unit.

Course Outcomes: This course will enable the students to:
1. Understand types of matrices, algebra of matrices, properties of determinants, adjoint of a matrix, inverse of a matrix, solution of a system of linear equations.
2. Know about the differentiation of standard functions, derivatives of higher order and their use in finding maxima and minima of certain functions.
3. Find Integration as an inverse of differentiation summation, area under a curve, indefinite integrals of standard form, reduction formulae.

Unit-I

Matrices & Determinants: Definition of a matrix. Types of matrices; Algebra of matrices; Properties of determinants; Calculation of values of determinants up to third order, Adjoint of a matrix, elementary row or column operations; Finding inverse of a matrix through adjoint and elementary row or column operations. Solution of a system of linear equations.

Unit-II

Differential Calculus: Differentiation of standard functions, theorems relating to the derivative of the sum, difference, product and quotient of functions, derivative of trigonometric functions, logarithmic functions and exponential functions, differentiation of implicit functions, logarithmic differentiation, derivative of functions, expressed in parametric form.

Unit-III
Integral Calculus: Integration as an inverse of differentiation summation, area under a curve, indefinite integrals of standard form, method of substitution, method of partial fractions, integration by parts, definite integrals, reduction formulae, definite integrals of limit of sum and geometrical interpretation.

Recommended Books/e-resources:

1. Seymour Lipschutz; Linear Algebra, Schaum's series publications. Santi Narayan; Differential Calculus. Santi Narayan; Integral Calculus.
2. Text book of mathematics for class XI and class XII N.C.E.R.T. New Delhi

CDLU/AEC/MAT/1/101
FUNCTIONAL ENGLISH-I

Marks (Theory): 35   **Marks(Total) : 50**
Marks (Internal Assessment) : 15   **Time : 2 Hrs**
Credits: 02

Note for the Paper Setter: The question paper will consist of five questions in all. The first question will be compulsory and will consist of seven short questions of 1 mark each covering the whole syllabus. In addition, four more questions of 14 marks each will beset unit-wise comprising of two questions from each of the two units. The candidates are required to attempt one compulsory question and two more questions selecting at least one question from each unit.

Course Outcomes: After completion of the course, learners will:
1. Have the knowledge of communication.
2. Have speaking skills in social interactions and communication in professional situations such as interviews, group discussions and office environments,
3. Have the knowledge and understanding of the language of communication.
4. Have reading, listening and writing skills.

Unit-I

Introduction: Definition and Theory of Communication, Types and modes of Communication. Language of Communication: Verbal and Non-verbal (Spoken and Written); Personal, Social and Business Barriers and Strategies; Intra-personal, Inter-personal and Group communication. Impact of communication on performance.

Unit-II

Speaking Skills: Monologue, Dialogue, Group Discussion, Effective Oral Communication, Miscommunication, Oral Presentation, Interview, Public Speech.

Recommended Books/e-resources:
1. B.K. Das and A. David, A Remedial Course in English, Book 2, C.I.E.F.L. (O.U.P.) 1980.
2. A.S. Hornby, Oxford Advanced Learner's Dictionary of Current English (O.U.P.) 3, A Textbook of English Phonetics for Indian Students by T. Balasubramanian.
3. Fluency in English - Part II, Oxford University Press, 2006.
4. Business English, Pearson, 2008. Language,
5. Literature and Creativity, Orient Blackswan, 2013.

प्रयोजनमूलक हिन्दी-I

Marks (Theory): 35　　　　　　　　　　　　　　**Marks(Total) : 50**
Marks (Internal Assessment) :15　　　　　　　**Time : 2 Hrs**
Credits: 02

Note for the Paper Setter: The question paper will consist of five questions in all. The first question will be compulsory and will consist of seven short questions of 1 mark each covering the whole syllabus. In addition, four more questions of 14 marks each will beset unit-wise comprising of two questions from each of the two units. The candidates are required to attempt one compulsory question and two more questions selecting at least one question from each unit.

ईकाई-I

पत्र-लेखन-सहकारी पत्र, परिपत्र, कार्यालय आदेश, शिकायत पत्र, आवेदन पत्र, मूलपत्र, पत्रोतर, पावती, अनुस्भारक, सरकारी पत्र, ईमेल-लेखन, शासकीय आदेश, अधिसूचना, पृष्ठाकन, प्रेस विज्ञप्ति, संक्षेपण लेखन- अर्थ परिभाषा प्रक्रिया, नियम (लेखन विधि)

ईकाई-II

अभिनव काव्य गरिमा (काव्य पुस्तक) संप्रसंग व्याख्या व प्रश्नोत्तर

सन्दर्भ पुस्तकें :

1. प्रयोजनमूलक हिन्दी डॉ नरे ॥ मिश्रा (2017) राजपाल एण्ड सन्ज, कश्मीरी गेट, दिल्ली
2. हिंदी साहित्य का इतिहासः डॉ रामसजन पाण्डेय (2012) संजय प्रकाशन, दिल्ली
3. अभिनव काव्य गरिमाः डॉ नरे ॥ मिश्रा (2012) राजकमल प्रकाशन, दिल्ली
4. प्रयोजनमूलक हिन्दीः सिद्धांत और प्रयोग दंगल झाल्टे, वाणी प्रकाशन, दिल्ली 5 राजभाषा हिंदीः विवेचना और प्रयुक्तिः डा कि गोर वासवानी, वाणी प्रकाशन, दिल्ली
5. राजभाषा हिंदी और उसका विकासः हीरालाल बाछोतिया, किताब घर प्रकाशन, दिल्ली
6. अनुवाद विज्ञानः सिद्धांत एंव प्रविधि, भोलानाथ तिवारी, किताब घर प्रकाशन, दिल्ली

CDLU/SEC/MAT/1/101
COMPUTER SKILLS

Marks (Theory) : 50   **Marks(Total)   :   75**
Marks (Internal Assessment) : 25   **Time   : 3 Hrs**
Credits: 03

Note for the Paper Setter: The question paper will consist of seven questions in all. The first question will be compulsory and will consist of four short questions of 2 marks each covering the whole syllabus. In addition, six more questions of 14 marks each will beset unit-wise comprising of two questions from each of the three units. The candidates are required to attempt one compulsory question and three more questions selecting at least one question from each unit.

Course Outcomes: After completion of the course, learners will be able to:
   1. Know about Operating System, Overview of various Computer & Mobile Operating systems and Applications.
   2. Perform various features of Word processing such that Table, Mail merge, Hyperlink, etc.
   3. Prepare a business presentation on MS PowerPoint.
   4. Perform various mathematical, logical, and other functions on a large set of data using MS Excel.

Unit-I

Windows: Installation of Windows, Windows Desktop, My computer, My documents, Network neighbourhood, Recycle Bin, Quick launch tool bar, System tray, Start menu, Task bar - System Tray - Quick launch tool bar - Start button - Parts of Windows, Keyboard Accelerators: Key board short keys or hotkeys, Working with Notepad & WordPad, Creating & Editing Images with Microsoft paint, using the Calculator, Personalising Windows.

Unit-II

MS-Word: Working with Documents, formatting page & setting Margins, converting files to different formats, Importing & Exporting documents, Formatting Documents - Setting Font styles, Font selection- style, Setting Paragraph style, Alignments, Indents, Line Space, Margins, Bullets& Numbering. Setting Page style - Formatting Page, Page tab, Margins, Layout settings, Border & Shading, Columns, Header & footer, Setting Footnotes & end notes, page break, Setting Document styles, Table of Contents, Index, Page Numbering, date & Time, Creating Tables- Table settings, Borders, Alignments, Insertion, deletion, Merging, Splitting, Sorting, Drawing - Inserting Clip Arts, Pictures/Files, Tools –Spell Checks, Mail merge, Templates, Printing Documents.

Unit-III

MS-Excel: Spread Sheet & its Applications, Opening Spreadsheet, Menus, working with Spreadsheets- opening, saving files, setting Margins, spread sheet addressing - Rows, Columns & Cells, Referring Cells & Selecting Cells – Shortcut Keys. Entering & Deleting Data, Inserting Data, Insert Cells, Column, rows & sheets, Inserting Functions, Formula - finding total in a column or row, Mathematical operations (Addition, Subtraction, Multiplication, Division, Exponentiation), Formatting Spreadsheets- Labelling columns & rows, Formatting- Cell, row, column & Sheet, Category - Alignment, Font, Border & Shading, Hiding/ Locking Cells, working with sheets – Sorting, Filtering, Creating Charts, Tools – Error checking, Spell Checks.

Recommended Books/e-resources:
1. Bharihoka, D. (2012). Fundamentals of Information Technology. New Delhi: Excel Book.
2. Boockholdt, J. L. (1999). Accounting Information System: Transaction Processing and Control. Boston: Irwin McGraw Hill.
3. Gelinas, U. J., & Steve, G. S. (2002). Sutton, Accounting Information System. Mason: South Western Thomson Learning.
4. Hall, J. A. (2006). Accounting Information System. Nashville: South Western College Publishing.
5. Rajaraman, V. (2018). Introduction to Information Technology. New Delhi: PHI Learning Pvt. Ltd.

Note: Open-Source Software or MS Excel, MS Access, and Tally may be used at appropriate places.

CDLU/SEC/MAT/2/102
PROGRAMMING IN C & NUMERICAL METHODS (THEORY)

Marks (Theory) : 50   **Marks(Total) : 75**
Marks (Internal Assessment) : 25   **Time   : 3 Hrs**
Credits: 03

Note for the Paper Setter: The question paper will consist of seven questions in all. The first question will be compulsory and will consist of four short questions of 2 marks each covering the whole syllabus. In addition, six more questions of 14 marks each will beset unit-wise comprising of two questions from each of the three units. The candidates are required to attempt one compulsory question and three more questions selecting at least one question from each unit.

Course Outcomes: The course will enable the students to:
1. Understand the Programme Model of computer, Algorithms, Flow Charts, Input/Output functions.
2. Understand the concept of solution of Simultaneous linear algebraic equations by different methods.
3. Learn about the different methods to provide the solutions of algebraic and transcedental equations.
4. Understand the different methods to solve the System of linear equations using different numerical methods.
5. Learn about finite differences operators, concept of interpolation with equal and unequal intervals. Learn about the Gauss forward and backward interpolation formulae, different methods to solve eigen value problems.

Unit– I

Programmer's model of a computer, Algorithms, Flow charts, Data types, Operators and expressions, Input / Output functions. Decisions control structure: Decision statements, Logical and conditional statements, Implementation of Loops, Switch Statement & Case control structures. Functions, Preprocessors and Arrays.

Unit– II

Solution of Algebraic and Transcendental equations: Bisection method, Regula-Falsi method, Secant method, Newton-Raphson's method. Newton's iterative method for finding pth root of a number. Simultaneous linear algebraic equations: Gauss-elimination method, Gauss-Jordan method, Triangularization method (LU decomposition method). Crout's method, Cholesky Decomposition method. Iterative method, Jacobi's method, Gauss-Seidal's method, Relaxation method.

Unit– III

Finite Differences operators and their relations. Finding the missing terms and effect of error in a difference tabular values, Interpolation with equal intervals: Newton's forward and Newton's backward interpolation formulae. Interpolation with unequal intervals: Newton's divided difference, Lagrange's Interpolation formulae. Central Differences: Gauss forward and Gauss's backward interpolation formulae, Sterling, Bessel Formula. Eigen Value Problems: Power method, Jacobi's method, Given's method, House-Holder's method, QR method, Lanczos method

Recommended Books/e-resources:
1. V. Rajaraman, Programming in C, Prentice Hall of India, 1994
2. Byron S. Gottfried, Theory and Problems of Programming with C, Tata McGraw-Hill Publishing Co. Ltd., 199
3. Babu Ram, Numerical Methods, Pearson Publication.
4. R.S. Gupta, Elements of Numerical Analysis, Macmillan's India 2010.

CALCULATION SKILLS WITH
VEDIC MATHEMATICS-I

Marks (Theory): 35   **Marks(Total) : 50**
Marks (Internal Assessment) : 15   **Time : 2 Hrs**
Credits: 02

Note for the Paper Setter: The question paper will consist of five questions in all. The first question will be compulsory and will consist of seven short questions of 1 mark each covering the whole syllabus. In addition, four more questions of 14 marks each will beset unit-wise comprising of two questions from each of the two units. The candidates are required to attempt one compulsory question and two more questions selecting at least one question from each unit.

Course Outcomes: After completion of the course, learners will:
1. Gain the knowledge of Sutras and Upsutras from Vedic Mathematics. Perform simple arithmetic calculations with speed and accuracy.
2. Have the procedural knowledge of multiplication of complicated numbers quickly with the aid of Vedic sutras and generate tables of any number.
3. Make use of Vedic sutras to quickly divide, and find LCM and HCF of many digit numbers.
4. Acquire the cognitive skills to calculate square and cube roots of numbers speedily with accuracy.

Unit I

History of Vedic Mathematics and introduction to its Sutras and Upsutras. Addition in Vedic Mathematics: Without Carrying, Dot Meth method subtraction in Vedic Mathematics: Nikhilam Navatashcaramam Dashatah (All from 9 last 10). Fraction: Addition and Subtraction. Multiplication of two numbers of two digits (Ekadhikena Purvena method), Multiplication of two numbers of three digits, (Ekanyunena Purvena method, Urdhva Tiryagbhyam method, Nikhilam Navatashcaramam Dashatah Method

Unit II

Division: Nikhilam Navatashcaramam Dashatah (two digits divisor), ParavartyaYojyet Method (three digits divisor). Divisibility: Ekadhikena Purvena Method (two digits divisor), Eknunen Purvena Method (two digits divisor) LCM, HCF. Squares of any two digits numbers: Base method, Squares of numbers ending in 5: Ekadhikena Purvena Method. 34(1044) Square Roots: Dwandwa Yoga (Duplex) Method, Square root (four digit number).

Recommended Books/e-resources:

1. U. S. Patankar and S. M. Patankar (2018). Elements of Vedic Mathematics. TTU Press.
2. V.Singhal (2014).Vedic Mathematics for all ages. Motilal Banarsidas Publishers.
3. R.K.Thakur (2013).The Essentials of Vedic Mathematics. Rupa Publications. New Delhi.
4. P. Tiwari and V.K. Pandey (2012). Vedic Mathematics - Modern Research Methods. Campus Books International.
5. S. K. Kapoor (2006).Vedic Geometry Course. Lotus Press.
6. A. Gupta (2004). Power of Vedic Mathematics with Trigonometry. Jaico Publishing House.
7. S.B.K. Krishna Trithaji (1990). Vedic Mathematics. Motilal Banarsidas, New Delhi.

MATHEMATICS IN INDIA: FROM VEDIC PERIOD TO MODERN

Times

Marks (Theory): 35   **Marks(Total) : 50**

Marks (Internal Assessment) : 15   **Time : 2 Hrs**

Credits: 02

Note for the Paper Setter: The question paper will consist of five questions in all. The first question will be compulsory and will consist of seven short questions of 1 mark each covering the whole syllabus. In addition, four more questions of 14 marks each will beset unit-wise comprising of two questions from each of the two units. The candidates are required to attempt one compulsory question and two more questions selecting at least one question from each unit.

Course Outcomes: After completion of the course, learners will:

1. Have knowledge about the development of mathematical ideas and techniques in Indian mathematics during Vedic and Ancient period. Attain sufficient level of the historical background and contributions of notable Indian mathematicians to explore Indian knowledge system further.

2. Have deeper knowledge about development of mathematics during the Medieval period. Theoretical knowledge used in various branches of mathematics like techniques of calculus and spherical trigonometry found in the Kerala school of astronomy and mathematics will be gained. Learn about the biography and contributions of eminent Indian mathematicians during this period and Indian knowledge system as such.

3. Gain knowledge about development of mathematics in modern period. Have knowledge of notable work of Srinivasa Ramanujan and other mathematicians with other aspects of the old and strong traditions of mathematics in India. Familiarize with biographies of Mathematicians in modern period. 34(1037)

4. Have Knowledge about the prestigious Fields Medal, Abel Prize in the subject of mathematics and their significance. Gain theoretical knowledge about illustrious contributions of contemporary Indian mathematicians.

Unit I

Ancient Period: Development of Indian mathematics during Vedic and Ancient period. Overview of the Vedic period, Mathematical ideas in the Vedas and manuscripts in Indian mathematics. Life, background, notable works, mathematical contribution of Baudhayana, Pingala, Aryabhata, Brahmagupta, Bhaskaracharya, Mahaviracharya and Lilavati. Medieval Period: Kerala School of Mathematics, Madhava of Sangamagrama, Nilakantha Somayaji, Jyesthadeva: Overview of historical backgrounds and their contribution.

Unit II

Modern Period: Srinivasa Ramanujan, Satyendra Nath Bose, Radhanath Sikdar, P.C. Mahalanobis, D.R. Kaprekar: Early life, Education, Challenges, Achievements and their contribution. Medals and Prizes in Mathematics and Contemporary Mathematicians: Introduction to the prestigious Fields Medal, Abel Prize and their significance. Biography and contributions of illustrious mathematicians from India: Subrahmanyan Chandrasekhar, C.R. Rao, S.R. Srinivasa Varadhan, Manjul Bhargava, Akshay Venkatesh, Harish- Chandra and Shakuntala Devi.

Recommended Books/e-resources:

1. C. N. Srinivasiengar (1967). History of Mathematics in India. The World Press Pvt. Ltd., Calcutta.
2. A.K. Bag (1979). A Cultural History of Mathematics in Ancient India. Chaukhamba Orientalia, Varanasi.
3. George Gheverghese Joseph (2016). Indian Mathematics: Engaging with the World from Ancient to Modern Times. World Scientific.
4. T.A. Sarasvati Amma (2007). Geometry in Ancient and Medieval India. Motilal Banarsidass Publishers Limited
5. S. Balachandra Rao (1998). Indian Mathematics and Astronomy: Some Landmarks. Jnana Deep Publications
6. John Stillwell (2010). Mathematics and its History. Springer (Includes a section on Indian mathematics)
7. Ramakalyani V. Sita Sunder Ram (2021). History and development of Mathematics in India. National mission for Mathematics and DK Printworld (P) Ltd, New Delhi.
8. Gerard G. Emch (2005). Contribution to the history of Indian Mathematics. Hindustan Book Agency.
9. R. B. Singh (2008). Origin and development of Mathematics. Vista International Publishing House, New Delhi.
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