NEW CURRICULUM AND CREDIT FRAMEWORK FOR UNDERGRADUATE PROGRAMME

PROVISIONAL PROGRAMME AND COURSE STRUCTURE WITH CREDIT DISTRIBUTION: UG DEGREE PROGRAMMES WITH SINGLE MAJOR

w.e.f. A.Y. 2023-2024

BANKURAUNIVERSITY

BANKURA

WESTBENGAL

PIN722155

1. Introduction 3

2. Scheme for CBCS Curriculum for B.A./B.Sc. with major in Mathematics. 5

2.1 Scheme for CBCS Curriculum 5

2.2 Choices for Ability Enhancement Courses……6

2.3 Choices for Value Added Courses 6

3. Major(DSC) Core Courses Syllabus 7

3.1 Core T1 – Calculus, Geometry & Vector Analysis..... 7

3.2 Core T2 - Algebra 9

4. Multidisciplinary(MD) Courses Syllabus..... 10

4.1 MD T1–Basics of Set Theory & Numbers..... 10

4.2 MD T2– Basics of Probability & Statistics..... 12

5. Skill Enhancement Courses(SEC) Syllabus..... 14

5.1 SEC T1–Logic & Sets 14

5.2 SEC T2– C Programming Language(Theory & Practical) 15

1. Introduction

The syllabus for Mathematics at undergraduate level using the Choice Based Credit system has been framed incompliance with UGC, NEP 2020.

The main objective of framing this new syllabus is to give the students a holistic understanding of the subject giving substantial weightage to both the core content and techniques used in Mathematics. Keeping in mind and in tune with the changing nature of the subject, adequate emphasis has been given on new techniques of mapping and understanding of the subject.

Mathematics is the study of quantity, structure, space and change. It has very broad scope inscience, engineering and social sciences. The syllabus has given equal importance to the six main branches of mathematics –Calculus, Geometry and Algebra.

The syllabus has also been framed in such a way that the basic skills of subject are taught to the students, and everyone might not need to go for higher studies and the scope of securing a job after graduation will increase.

It is essential that Mathematics students select their multidisciplinary courses from Physics, Chemistry and/or any branch of Life Sciences disciplines and/or any course from graduation level.

While the syllabus is incompliance with UGC, NEP 2020 curriculum, some changes have been made to ensure all topics are covered and any of the subjects don't become difficult to be completed in one semester. For example, Major(DSC) Core course 1 on "Calculus, Geometry & Vector Analysis" and major core course 2 on "Algebra" now also has introductory concepts on Geometry, Algebra and has been renamed accordingly.

The syllabus of Minor Stream (MN), MN-1 and MN-2 courses are same as of the syllabus of the Major (DSC) core courses, MJC-1 and MJC-2 respectively, but the standard (level) of the question paper may be different.

In generally, evaluation process of each course is carried out through Internal Assessment (IA) and End-Semester Examination (ESE). 10 marks is allotted for Internal Assessment (IA) and 40 marks is allotted for End-Semester Examination (ESE). Question paper of each course for End Semester Examination contains three contents. 05(five) questions to be answered out of 08(eight) questions carrying 02(two) marks of each in Unit –I. 04 (four) questions to be answered out of 06(six) questions carrying 05 (five) marks of each in Unit –II and similarly, 01(one) question to be answered out of 02(two) questions carrying 10(ten) marks of each in Unit–III. Otherwise, the marks distributions of the particular course should be clearly mentioned.

The Bachelor's Degree in B.Sc. (Hons./ Hons. with research) is awarded to the students on the basis of knowledge, understanding, skills, attitudes, values and academic achievements sought to be acquired by learners at the end ofthese programmes. Hence, the course outcomes and course specific outcomes of mathematics for these courses are aimedat facilitating the learners to acquire these attributes, keeping in view of their preferences andaspirations for knowledge of mathematics.

The course outcomes and course specific outcomes of each paper are designed so that these may help learners tounderstand the main objectives of studying the course. This will enable learners to select elective papers depending on the individual inclinations and contemporary requirements. These syllabi in Mathematics under CBCS and NEP 2020 are recommended keeping in view of the wide applications of Mathematics in Science, Engineering, Social science, Business and a host of other areas. The study of the syllabi will enable the students to be equipped with the state of the art of the subject and will empower them to get jobs in technological and engineering fields as well as in business, education and healthcare sectors.

The text books mentioned in references are denotative/demonstrative. The divisions of each paper in units are specified to the context mentioned in courses. These units will help the learnersto complete the study of concerned paper in certain periods and prepare them for examinations.

Hence, the programme has been chalked out in such manner that there isscope of flexibility and innovation in modifications of prescribed syllabi, teaching-learning methodology, assessment technique of students and knowledge levels, learning outcomes of courses, inclusion of new elective courses subject to availability of experts inacross the country.

Programme Objectives (PO):

PO1: Mathematical Reasoning: Application of the mathematical knowledge to the solution of more complex problems in academic and in real life.

PO2: Analyzing Ability: Identification, formulation and solution of a problem which leads to conclusion

using basic principles.

PO3: Developing Confidence: Analyzing more complicated problems and getting solutions helps to build up confidence.

PO4: Design/development of more accuracy: Design and development of methods/ procedures for solutions of problems which meet the specificqueries in industry as well as real life.

PO5: Ability of investigations for more complex problems: Use research-based knowledge and research methods to handle more complex problems.

PO6: Applications of theory based knowledge: Ability to apply the theoretical knowledge including theory, experiment and computational data; analysis and interpretation of data, to get the valid conclusions.

PO7: Ability of Modern tool usage: Application of appropriate techniques, resources, updated software and modernmathematical tools to solve mathematical activities with a good understanding of their limitations.

PO8: Team work practice: Collective efforts for functioning effectively as a member or leader in diverse teams, and/or in multidisciplinary settings.

PO9: Communication skill: Effective Communication skill for scientific activities helps to establish a good researcher with popular face in the scientific community.

PO10: Ability of presentation:Writing the effective reports and design document to give and receive clear instructions/limitations/restrictions for good presentations.

PO11: Life-long learning process: Recognize the needs, proper learning and ability to engage in life-long learning in the broadest context of scientific & technological changes.

PO12: Students undergoing this programme learn to logically question assertions, to recognise patterns and to distinguish between essential and irrelevant aspects of problems. They also share ideas and insights while seeking and benefitting from knowledge and insight of others. This helps them to learn behave responsibly in a rapidly changing interdependent society.

Programme Specific Outcomes (PSO):

The Department of Mathematics offers exciting opportunities to talented students pursuing a Degree/Diploma/Certificate for acquiring a rigorous and modern education in mathematics and for pursuing master's degree in both pure and applied mathematics as well as higher studies based on Mathematics. This Program will introduce the classical topics of mathematics, which helps in acquiring thinking skills to undertake cutting-edge research in a higher education programme.

Career Opportunities:

This program will enable the students to take part and qualify for the state and national level examinations such as JAM, CUET etc. After completion of this programme, the students are well prepared for higher studies such as M. Sc., M.Tech., Integrated Ph.D. program, any professional degree.This programme will also help students to enhance their employability for governmentjobs, jobs in banking, insurance and investment sectors, data analyst jobs and jobs in variousother public and private enterprises.Completion of this programme will also enable the learners to join teaching profession inprimary and secondary schools.The skills and knowledge gained has intrinsic beauty, which also leads to proficiency in analytical reasoning which also helps more professional.

2. Scheme for CBCS Curriculum for B.A./B. Sc. with major in Mathematics

2.1 Scheme for CBCS Curriculum

Semester	Course Name	Course Detail	Credits
I	Major Core (DSC) – 1	Calculus, Geometry & Vector Analysis	4
	Core course (DSC) –1 Practical	-	-
	Minor Stream - 1	Calculus, Geometry & Vector Analysis	4
	Minor Stream – 1 Practical	-	-
	Multidisciplinary – 1	Basics of Set Theory & Numbers	3
	Multidisciplinary – 1 Practical	-	-
	Skill Enhancement Course–1	Logic & Sets	3
	Skill Enhancement Course –1 Practical	-	-
	Ability Enhancement Course –1	Compulsory English : Literature and Communication	2
	Ability Enhancement Course –1 Practical	-	-
	Value Added Course for all - 1	Environmental Studies	4
	Value Added Course for all – 1 Practical	-	-
II	Major Core (DSC) – 2	Algebra	4
	Corecourse (DSC) –2 Practical	-	-
	Minor Stream - 2	Algebra	4
	Minor Stream – 2 Practical	-	-
	Multidisciplinary – 2	Basics of Probability & Statistics	3
	Multidisciplinary – 2 Practical	-	-
	Skill Enhancement Course –2	C Programming Language(Theory & Practical)	3
	Skill Enhancement Course –2 Practical	-	-

	Ability Enhancement Course –2	MIL-1(Santali/Sanskrit/Bengali)	2
	Ability Enhancement Course –2 Practical	-	-
	Value Added Course for all - 2	Health and Wellness/Understanding India: Indian Philosophical Traditions and Value Systems/ Basics of Indian Constitution /Arts and Crafts of Bengal / Historical Tourism in West Bengal	4
	Value Added Course for all – 2 Practical	-	-

2.2 Choices for Ability Enhancement Courses (AEC)

Ability Enhancement Course - 1	Ability Enhancement Course - 2
Compulsory English : Literature and Communication	Santali
	Sanskrit
	Bengali

2.3 Choicesfor Value Added Courses (VAC) common for all

Value Added Courses – 1	Value Added Courses - 2
Environmental Studies	Health and Wellness
	Understanding India: Indian Philosophical Traditions and Value Systems
	Basics of Indian Constitution
	Arts and Crafts of Bengal
	Historical Tourism in West Bengal

B.A./B.Sc. with major in Mathematics

3. Core Subjects Syllabus: B.A./B.Sc. major in Mathematics

3.1 Major (DSC): Core T1–Calculus, Geometry & Vector Analysis

Calculus, Geometry & Vector Analysis	
	4 Credits
Course Objectives: The main objective of this course is to give a deep insight of the differentiations and its consequence applications and techniques of sketching for curves in Cartesian and polar coordinate systems. This course also give the outstanding knowledge of two and three dimensional geometryalso the concept vector calculus.	
Course Specific Outcomes: After completion of this course a student would have • a vast knowledge of Calculus which they can use for their furtherstudy. • a clear idea of characterizations of two dimensional as well as three dimensional geometry. • a clear concept of vector analysis and its applications	
Unit 1	
Higher order derivatives, Leibnitz rule and its applications to problems of type $e^{ax}+bsinx$, $e^{ax}+bcosx$, $(ax+b)^n sinx$, $(ax+b)^n cosx$, Arc length, Derivative of arc length (Cartesian and Polar), Pedal equations, Curvature, Radius of curvature, Centre of curvature, concavity and inflection points, envelopes, asymptotes (Cartesian), Singular points, Classification of double points, Curve tracing in Cartesian coordinates and polar coordinates, Indeterminate forms: L'Hospital's rule.	
Unit 2	
Reduction formulae, derivations and illustrations of reduction formulae of the type $\int sinnxdx, \int cosnx\,dx, \int tannx\,dx,$, $\int secnx\,dx, \int (logx)^n\,dx, \int sin\,nx\,sin\,mxdx,$ Area under Cartesian and Polar curves, parametric equations, parameterizing of a curve, arc length, arc length of parametric curves, area and volume of surface of revolutions.	

Unit 3

Reflection properties of conics, Transformation of axes and second degree equations, Invariants, classification of conics using the discriminant, Pair of straight lines, polar equations of straight lines, circles and conics.

Spheres, Cone, Cylindrical surfaces. Central conicoids, paraboloids, plane sections of conicoids, Tangent, Normal, Enveloping Cone and Cylinder, Generating lines, classification of quadrics, Transformation of axes in space and general equation of second degree.

Unit 4

Product of three or more vectors, Applications in Geometry, introduction to vector valued functions of one independent variable, operations with vector-valued functions of one independent variable, limits and continuity of vector functions, differentiation and integration of vector functions of one independent variable.

Graphical Demonstration (Teaching Aid)

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 degree4 and 5, the derivative graph, the second derivative graph and comparing them.
3. Sketching parametric of curves (e.g. Trochoid, cycloid, epicycloids, hypocycloid).
4. Obtaining surface of revolution of curves.
5. Tracing of conics in Cartesian coordinates/polar coordinates.
6. Sketching of ellipsoid, hyperboloid of one and two sheets, elliptic cone, elliptic, paraboloid, and hyperbolic paraboloid using Cartesian coordinates.

Reference Books

- G. B. Thomas and R.L.Finney, Calculus, 9th Ed.,Pearson Education, Delhi, 2005.
- M. J. Strauss, G. L. Bradley and K. J. Smith, Calculus, 3rd Ed., Dorling Kindersley (India) P. Ltd. (Pearson Education), Delhi, 2007.
- H. Anton, I. Bivens and S. Davis, Calculus, 7th Ed., John Wiley and Sons(Asia) P.Ltd.,Singapore,2002.
- R. Courant and F. John, Introduction to Calculus and Analysis (Volumes I & II), Springer-Verlag, NewYork, Inc., 1989.
- T. Apostol, Calculus, Volumes I and II.
- S. Goldberg, Calculus and Mathematical Analysis.
- J.E. Marsden, and A. Tromba, Vector Calculus, 6th Ed., McGraw Hill, 2011.
- K. C. Maity and R. K. Ghosh, Vector Analysis, New Central Book Agency (P) Ltd., Kolkata.
- R. K. Ghosh and K. C. Maity, An introduction to analysis: Differential Calculus (Part I), New Central Book Agency, 13th Edition, 2011

- M. R. Speigel, Schaum's Outline of Vector Analysis.
- R.M. Khan, Analytical Geometry of Two and Three Dimensions and Vector Analysis, New Central Book Agency, 2010.
- E.H. Askwith, The Analytical Geometry of the Conic Sections, Adam and Charles Black,
- London, 1908.
- S. Karmakar & S. Karmakar, Analytic Geometry: Two Dimensions, CRC Press (Taylor & Francis Group)/Levant Books (India), London, 2022.
- Robert J. T. Bell, An Elementary Treatise On Coordinate Geometry, Macmillan and Company Limited.
- B.K. Kar, Advanced Analytical Geometry and Vector Analysis, Books & Allied Pvt. Ltd., Kolkata, 2000.

3.2 Major (DSC): Core T2-Algebra

Algebra	
	4 Credits
Course Objectives: The main objective of this course is to give a deep insight of the roots of real and complex equations and learn various methods of obtaining roots. Employ De Moivre's theorem in a number of applications and able to knowledge to solve the system of linear equations.	
Course Specific Outcomes: After completion of this course a student would recognize the idea of consistent and inconsistent systems of linear equations by the row echelon form of the augmented matrix, using rank. Also, they are able to find out the eigenvalues and corresponding eigenvectors for a square matrix.	
Unit 1	
Polar representation of complex numbers, n^{th} roots of unity, De Moivre's theorem and its applications. Theory of equations: Relation between roots and coefficients, Transformation of equation, Location of roots: Descartes rule of signs, Sturm's theorem, Cubic and biquadratic equation, Cardon's, Ferrai's and Euler's method. Inequality: The inequality involving AM ≥ GM ≥ HM, Cauchy-Schwartz inequality.	
Unit 2	
Equivalence relations, partial order relation, poset, linear order relation. Well-ordering property of positive integers, Division algorithm, Divisibility and Euclidean algorithm. Prime numbers and their properties, Euclid's theorem. Congruence relation between integers. Principles of Mathematical Induction, statement of Fundamental Theorem of Arithmetic.	
Unit 3	

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 4

Introduction to linear transformations, matrix of a linear transformation, inverse of a matrix, characterizations of invertible matrices. Subspace of $\mathbb{R}^n$, dimension of subspaces of $\mathbb{R}^n$, Geometric significance of subspaces. Rank of a matrix, Eigen values, Eigen Vectors and Characteristic Equation of a matrix. Cayley-Hamilton theorem and its use in finding the inverse of a matrix.

Reference Books

- T. Andreescu and D. Andrica, Complex Numbers from A to Z, Birkhauser, 2006.
- E.G. Goodaire and M.M. Parmenter, Discrete Mathematics with Graph Theory, 3rd Ed., Pearson Education (Singapore) P. Ltd., Indian Reprint, 2005.
- D.C. Lay, Linear Algebra and its Applications, 3rd Ed., Pearson Education Asia, Indian Reprint, 2007.
- K.B. Dutta, Matrix and Linear Algebra. Prentice Hall India Pvt., Ltd., 2004.
- K. Hoffman and R. Kunze, Linear Algebra. 2nd Ed., Prentice Hall India Pvt., Ltd., 2015
- W.S. Burnstine and A.W. Panton, Theory of Equations. 7th Ed. Hodges, Figgis and Company, 1924

4. Multidisciplinary (MD)

4.1 MD T1–Basics of Set Theory & Numbers

Basics of Set Theory & Numbers

	3 Credits

Course Objectives: The course will enable the students to:
i) Obtain the conceptual idea of Sets and related topics like Venn diagram, cardinality of a set etc.
ii) Idea of the relations and different types of mappings.
iii) Learn about the algebraic structure of real numbers.

Course Specific Outcomes: This course specifically enable to the students-

i) Prime numbers and different properties along with operations of these numbers.

ii) Knowing about the idea of real number series.

Unit 1

Sets, Venn diagrams, cardinality of a set, power set, operations on sets, De Morgan's law. Normal set, abnormal set, paradox.

Relations, equivalence relations, equivalence class, partition, Fundamental theorem of equivalence relation, partial order, poset, chain with practical examples.

Unit 2

Mappings, bijective mappings, composition of mappings, inverse of a mapping.

Unit 3

Integers, Well-ordering property of positive integers, Division algorithm, Divisibility and Euclidean algorithm. Prime numbers and their properties, Euclid's theorem. Congruence relation between integers. Principles of Mathematical Induction, statement of Fundamental Theorem of Arithmetic.

Unit 4

Real Numbers: Algebraic structure of real numbers, decimal representation of real numbers, upper and lower bound, lub and glb properties, Archimedean property, density property, modulus, Intervals.

Different series of real numbers (example: Fibonacci series, and its presence in arts and nature).

Reference Books

- I. A. Herstein, Topics in Algebra, Willey Eastern Limited, 2nd Edition, 1975
- M. K. Sen, S. Ghosh, P. Mukhopadhyay and S. K. Maity, Topics in Abstract Algebra, Universities press, 3rd Edition, 2019
- J. A. Gallian, Contemporary Abstract Algebra, Cengage, 9th Edition, 2017
- T. A. Garrity, All the Math You Missed (But Need to Know for Graduate School), Cambridge University Press, 2nd Edition, 2021
- R. K. Ghosh and K. C. Maity, An introduction to analysis: Differential Calculus (Part I), New Central Book Agency, 13th Edition, 2011
- Shanti Narayan and M.D. Raisinghania, Elements of Real Analysis, S. Chand & Company Ltd., New Delhi, 2010
- B. K. Lahiri and K. C. Roy, Real Analysis, The World Press Private Ltd., 3rd Edition, 2008
- S. C. Malik and S. Arora, Mathematical Analysis, New Age International (P) Ltd., 2nd Edition, 1992
- W. Rudin, Principles of Mathematical Analysis, McGrow-Hill Book Company, 3rd Edition, 1976
- R. R. Goldberg, Methods of Real Analysis, Oxford & IBH Publishing Co., 1st Edition, 1964

4.2 MD T2–Basics of Probability & Statistics

Basics of Probability & Statistics	
	3 Credits
Course Objectives: The course will enable the students to: i) understand the concept of random experiment and probability. ii) understand distributions and different types of distribution functions.	
Course Specific Outcomes: This course specifically enable to the students- i) axiomatic idea of probability and its related topics. ii) ii) different types of distribution functions like Discrete and Continuous.	
Unit 1	
Meaning and definition of Statistics; Scope of Statistics in Business, Commerce, Economics and different branches of Science. Organization of data, Primary and Secondary data, Univariate, Bivariate and Multivariate data, Population, Sample, Statistical survey, Errors in Statistics, Law of Statistical regularity, Tabular and graphical representation of data, Frequency distribution, Line, Bar and Pie diagrams, Histogram, Frequency polygon, Ogives.	
Unit 2	
Measures of Central Tendency: Mean (AM, GM and HM), Positional averages: Median and Modes, Different position values: Quartiles, Deciles, Percentiles. Measures of Dispersions: Range, Quartile Deviations (QD), Concept of Mean Deviation (MD), MD about mean and median, Variations, Standard Deviations (SD), Coefficient of Variations (CV). Analysis of Bivariate data: Scatter diagram; Covariance, Correlation Coefficient, Rank Correlation, Fitting of bivariate data, Simple Linear Regression, Regression coefficients and related results.	
Unit 3	
Concept of Probability and its related terms; Definition of Probability: Classical and Statistical, Limitations of these definitions; Geometric Probability; Axioms of Probability, Theorems on total probability and compound probability; Conditional probability, Independent events, Bayes' theorem. Concept of Random variable and distribution functions, Probability mass density and density functions, Binomial, Poisson and Normal distributions.	
Reference Books	

- N. G. Das, Statistical Methods, Vol. 1 & 2 Combined ed., McGraw Hill Education, India, 2017
- J. Sarkhel, S. K. Dutta, An Insight into Statistics, Book Syndicate (P) Ltd., Kolkata, 2012
- A. Gupta, Ground work of Mathematical Probability and Statistics, Academic publishers, 2015.
- P. Mukhopadhyay, Mathematical Statistics, Books & Allied (P) Ltd., Kolkata, 2006.
- R.V. Hogg, Joseph W. Mc Kean and Allen T. Craig, Introduction to Mathematical Statistics,
- I. Miller and Marylees Miller, John E. Freund, Mathematical Statistics with Applications, 7th Ed., Pearson Education, Asia, 2006.
- S. Ross, Introduction to Probability Models, 9th Ed., Academic Press, Indian Reprint, 2007.
- A.M. Gun, M. K. Gupta, B. Dasgupta, Fundamentals of Statistics (Vol. 1 & 2), World Press, India, 2013.

5. Skill Enhancement Courses (SEC)

5.1 SEC T1–Logic & Sets

Logic & Sets	
	3 Credits
Course Outcomes : The course will enable the students to i) Learn the syntax of first-order logic and semantics of first-order languages. ii) Understand the propositional logic and basic theorems like compactness theorem, meta theorem and post-tautology theorem. iii) Familiarize with syntax of propositional logic, sets and their consequences.	
Course Specific Outcomes: The student acquires the knowledge of i) Knowing about the concept of the Post tautology theorem. ii) Assimilating the concept of completeness interpretations and their applications with special emphasis on applications in algebra.	
Unit 1	
Introduction, propositions, truth table, negation, conjunction and disjunction. Implications, biconditional propositions, converse, contra positive and inverse propositions and precedence of logical operators. Propositional equivalence: Logical equivalences. Predicates and quantifiers: Introduction, Quantifiers, Binding variables and Negations.	
Unit 2	
Sets, subsets, Set operations and the laws of set theory and Venn diagrams. Examples of finite and infinite sets. Finite sets and counting principle. Power set of a set. Difference and Symmetric difference of two sets. De Morgan's law, Set identities. Family of sets. Generalized union and intersections. Cartesian product of sets. .	
Unit 3	
Mappings, bijective mappings, composition of mappings, inverse of a mapping.	
Reference Books	

- R.P. Grimaldi, Discrete Mathematics and Combinatorial Mathematics, Pearson Education, 1998.
- P.R. Halmos, Naive Set Theory, Springer, 1974.
- E. Kamke, Theory of Sets, Dover Publishers, 1950.
- M. K. Sen, S. Ghosh, P. Mukhopadhyay and S. K. Maity, Topics in Abstract Algebra, Universities press, 3rd Edition, 2019

5.2 SEC T2 – C Programming Language (Theory & Practical)

C Programming Language (Theory & Practical)	
	3 Credits
Course Outcomes : The course will enable the students to i) understand and apply the programming concepts of C which are important for mathematical investigation and problem solving. ii) use the mathematical library functions for computational objectives. iii) familiarize with syntax and/or error of the different command and their consequences.	
Course Specific Outcomes: The student acquires the knowledge of i) representing the outputs of programs visually in terms of well formatted text and plots. ii) identifying the specific decision making loops and commands.	
Part I : Theory Part	**2 Credits**
Unit 1	
Computer Programming Languages; Classification: Low and Higher level languages; Machine Language, Assembly Language; Source and Object programs; Language Translators: Assembler, Compiler and Interpreter.	
Unit 2	
C Programming Language and its importance: C Tokens, C Character set; Keywords and Identifiers, C Constants and variables, data types, expression, assignment statements, declaration. Operation and Expressions: Assignment, arithmetic, relational, logical, conditional operators. Decision Making and Branching: if statement, if-else statement, if ... else ladder format, Nesting if statement, switch statement, break and continue statements. Simple programs. Looping Statements: While, do-while and for loop. Simple programs.	
Unit 3	

Arrays and Subscripted variables: One and two dimensional arrays, declaration of arrays, initialization of one and two dimensional arrays. Simple programs.
User-defined Functions: Definition of functions, Scope of variables, return values and their types, function declaration, function call by value, nesting of functions, passing of arrays to functions, Recurrence of function. Simple programs; Introduction to Library functions.

Evaluation: Unit I - 05 questions to be answered out of 08 questions carrying 01 marks of each; Unit II - 02 questions to be answered out of 03 questions carrying 05 marks of each and Unit III- 01 question to be answered out of 02 questions carrying 10 marks.

Part II : Practical **1 Credit**

1. Calculate the sum of a finite series.
2. Enter 100 integers into an array and sort them in an ascending order.
3. GCD and LCM of two positive integers.
4. Finding maximum and minimum among some numbers.
5. Testing of prime number.
6. Finding prime numbers within a range.
7. Generating Fibonacci Series.
   Matrix addition.

Evaluation: 01 questions to be answered out of 06 questions carrying 10 marks of each and viva-voce should be held for 05 marks.

Reference Books

- B.W. Kernighan and D.M. Ritchi, The C-Programming Language, 2nd Ed.(ANSI Refresher), Prentice Hall, 1977.
- E. Balagurnsamy, Programming in ANSI C, Tata McGraw Hill, 2004.
- Y. Kanetkar, Let Us C ; BPB Publication, 1999.
- C. Xavier, C-Language and Numerical Methods, New Age International, 1999.
- Reema Thareja, Programming in C (2nd Ed.), Oxford University Press, 2011.
- B. S. Gottfried, Theory and Problems of Programming with C (2nd Ed.), Schaum's Outline Series, Mcgraw-Hill, 1996.
- V. Rajaraman, Computer Oriented Numerical Methods, Prentice Hall of India, 1980.