

St. Xavier's College (Autonomous), Ahmedabad

Syllabus of Semester – II of the following departments under Faculty of Computer Science based on Undergraduate Curriculum Framework to be implemented from the Academic Year 2024-25.

DEPARTMENT OF COMPUTER SCIENCE

BCS CS (Hons.) Category – IV

Logic & Computer Oriented Numerical Methods CS 2101

Course Outcomes

At the end of the syllabus students will be able to

- CO: 1 Apply the concepts of different connectives in logic.
- CO: 2 Convert a logical statement into different normal forms.
- CO: 3 Use the rule of inference in verifying the consistency of premises using direct and indirect method of proof.
- CO: 4 Employ different quantifiers and concepts of bound and free variables in inference calculus.
- CO: 5 Apply different methods to approximate the roots of a given equation mathematically.
- CO: 6 Use programming to approximate the roots of the given equation by applying various methods.
- CO: 7 Apply various methods to approximate the value of the function using interpolation mathematically.
- CO: 8 Use programming to approximate the value of the function by applying various interpolation methods.

CONTENT (Theory)

- Unit: 1** Mathematical Logic
Statement, negation, conjunction, disjunction, statement formulas and truth table, conditional and bi-conditional, well-formed formula, tautology, equivalence of formulas, duality law, tautological implications, D.N.F, C.N.F, P.D.N.F, P.C.N.F.
- Unit: 2** Theory of Inference and the Predicate Calculus
Rules of inference, consistency of premises, the indirect method of proof, automatic theorem proving, Predicates, the statement function, variables, Quantifiers, predicate formulas, free and bound variables, the universe of discourse, the theory of inference for predicate calculus

List of Practical

1. Finding roots of equation using bisection method
2. Finding roots of equation using method of false position
3. Finding roots of equation using secant method
4. Finding roots of equation using Newton Raphson method
5. Finding roots of equation using fixed point iteration
6. Finding the value of the function using Newton's forward interpolation
7. Finding the value of the function using Newton's backward interpolation
8. Finding the value of the function using Stirling's formula
9. Finding the value of the function using Lagrange's interpolation.
10. Finding the value of the function using inverse Lagrange's interpolation
11. Finding the value of the function using Newton's divided difference interpolation
12. Finding the value of the function using inverse Newton's divided interpolation.

Reference Books:

1. Discrete Mathematical Structure with application to computer science – J. P. Trembly \& R. Manohar, McGraw Hill.
2. Logic for computer science – Uwe Schoning, Birkhauser, Boston.
3. Elements of Discrete Mathematics – A computer oriented approach – C. L. Liu, D. P. Mohapatra, TMT.
4. Discrete Mathematics – N. Chandrasekaran, M. Umaparvathi, PHI.
5. Discrete Mathematics \& Combinatorics – T. Sengadir, Pearson.
6. Discrete Mathematics – Schaum series.
7. Discrete Mathematics Kenneth Rosen.
8. Logic and Discrete Mathematics, A concise Introduction- Willem Conradie and Valentin Goranko, Wiley.

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Bridge Course – II Basics of Differentiation and Integration

Course Outcomes

At the end of the syllabus students will be able to

- CO: 1 Demonstrate the understanding of differentiation and use them to solve examples.
CO: 2 Recognize integration as antiderivative and use them in examples to determine their understanding.
CO: 3 Appreciate definite integral as area under curve and acquire the properties of definite integral.

Note: The syllabus is framed specifically for the B group science students who have not learnt Mathematics in 11th and 12th Standard. All the results are without proof.

CONTENT

Unit: 1 Geometric meaning of derivative, derivatives of x^n , e^x , $\log x$, trigonometric functions, inverse trigonometric functions, product rule, quotient rule, chain rule, higher order derivatives.

Unit: 2 Integration of x^n , e^x , trigonometric functions, well known functions like $\frac{1}{x^2 \pm a^2}$, $\frac{1}{\sqrt{x^2 \pm a^2}}$, $\sqrt{x^2 \pm a^2}$, Method of substitution, integration by parts, definite integral (Up to Fundamental Theorem of Integral Calculus). Properties of definite integrals.

Reference Books:

1. A Textbook for class XI & XII, National Council of Educational Research and Training.
2. A Class Book of Mathematics for class XII by Chakrabarty S. K., Biswajit Bhagwati, S. Chand Publishers.