

CC 1- Fundamentals of Computing - using C Language

Course Objective: The course is designed to provide a working knowledge and skills of programming with C Language. Students will be able to develop logics which will help them to create programs. Also by learning the basic programming constructs they can easily be able to grasp any other new computer languages in future.

Sl	Course Outcome (CO)
1	Remember & Understand the Computer Fundamentals
2	Remember & Understand the Program methods using C
3	Understand general problem solving using C
4	Understand & Apply control flow, function of PS, Arrays & Pointers using C
5	Analyse the Structure and Input & Output using C
6	Application & Analysis using guided competitive programming laboratory work

THEORY- CYS (T) 101

CO	Blooms Level (if applicable)	Modules	%age of questions
CO1	1,2	M1, M2	20
CO2	1,2	M2, M3	20
CO3	1,2	M2, M3	20
CO4	2,3	M3, M4	20
CO5	2,3,4	M3, M4, M5	20
CO6	1,2,3,4	M2, M3, M6	
			100

PRACTICAL- CYS 191

CO	Blooms Level (if applicable)	Modules	%age of questions
CO1	1,2		
CO2	1,2	M2, M3	15
CO3	1,2	M2, M3	40
CO4	2,3	M3, M4	35
CO5	2,3,4	M3, M4, M5	10
CO6	1,2,3,4		
			100

Credits- 4T +2P

Module 1-Computer fundamentals: Computing systems: hardware & software, Architecture & organization history: von Neumann Architecture: memory, processor, I/O; Data vs Information: Bit, byte number system: binary, octal, hexadecimal, 1's, 2's complement arithmetic, digital logic: AND, OR etc. BIOS, Booting, Application software, system software, Introduction of Operating systems, program, process; introduction of programming languages: brief overview of Pascal, FORTRAN, and BASIC. **(Total Hours-8)**

Module 2- Programming Method: Debugging, macro, User defined Header, User defined Library Function, make file **(Total Hours-5)**

Module 3- General problem solving concepts: Algorithm and Flowchart for problem solving with Sequential Logic Structure, Decisions and Loops, time & space complexity; Imperative languages: Introduction to imperative language; syntax and constructs of a specific language (ANSI C). Variable Names, Data Type and Sizes (Little Endian Big Endian), Constants, Declarations, Arithmetic Operators, Relational Operators, Logical Operators, Type Conversion, Increment Decrement Operators, Bitwise Operators, Assignment Operators and Expressions, Precedence and Order of Evaluation, proper variable naming and Hungarian Notation **(Total Hours-6)**

Module 4- Control Flow, Function of PS, Arrays& Pointers: Statements and Blocks, If-Else-If, Switch, Loops – while, do, for, break and continue, Goto Labels, structured and un- structured programming. Basics of functions, parameter passing and returning type, C main return as integer, External, Auto, Local, Static, Register Variables, Scope Rules, Block structure, Initialisation, Recursion, Preprocessor, Standard Library Functions and return types. Arrays, Pointers and address, Pointers and Function Arguments, Pointers, Address Arithmetic, character Pointers and Functions, Pointer Arrays, Pointer to Pointer, Multi-dimensional array and Row/column major formats, Initialization of Pointer Arrays, Command line arguments, Pointer to functions, complicated declarations and how they are evaluated. (Total Hours-16)

Module 5- Structures Input & Output: Basic Structures, Structures and Functions, Array of structures, Pointer of structures, Self-referral Structures, Table look up, Typedef, Unions, Bit-fields. Standard I/O, Formatted Output – printf, Formated Input – scanf, Variable length argument list, file access including FILE structure, fopen, stdin, sdtout and stderr, Error Handling including exit, perror and error.h, Line I/O, related miscellaneous functions, scope of advance C, a brief introduction of VDU basics, Mouse programming, C- assembly. **(Total Hours-9)**

Module 6- Competitive Programming Laboratory

1. Algorithm and flowcharts of small problems like GCD
2. Structured code writing with:
 - a. Small but tricky codes
 - b. Proper parameter passing
 - c. Command line Arguments
 - d. Variable parameter
 - e. Pointer to functions
 - f. User defined header
 - g. Make file utility
 - h. Multi file program and user defined libraries
 - i. Interesting substring matching / searching programs
 - j. Related assignments

(Total Hours-12)

Text Books:

1. Herbert Schildt, "C: The Complete Reference", Fourth Edition, McGrawHill.
2. B. Gottfried, "Programming in C", Second Edition, Schaum OutlineSeries.
3. R.S. Salaria, "Problem Solving and Programming in C", Khanna PublishingHouse

Reference Books:

1. B. W. Kernighan and D. M. Ritchi, The 'C Programming Language", Second Edition,PHI.
2. YashavantKanetkar, "Let Us C", BPBPublishations.
3. R.S. Salaria, "Computer Concepts and Programming in C", Khanna PublishingHouse

CC 2- Mathematics and Statistics (including Lab)

Course Objective: The course is designed to provide a basic understanding and knowledge of Mathematics, Probability and Statistics for Computing. Students will be able to apply Mathematics and Statistics to solve problems related to Cyber Security.

Sl	Course Outcome (CO)
1	Learn& Understand the Mathematics for Computation
2	Apply the Mathematics to Computational Problems
3	Learn and Understand Probability Theory and Basic Statistics
4	Apply Combinatorics to Build Statistical Distribution
5	Apply Probability Theory to Cyber Security Problems
6	Analyse Data to Build Statistical Models

THEORY- CYS(T) 102

CO	Blooms Level (if applicable)	Modules	%age of questions
CO1	1,2,3	M1, M2	15%
CO2	1,2,3	M1, M2	25%
CO3	1,2,3	M3, M4	15%
CO4	1,2,3,4	M3, M4, M5	25%
CO5	1,2,3,4	M3, M4, M5	20%
CO6	3,4		
			100

PRACTICAL- CYS 192

CO	Blooms Level (if applicable)	Modules	%age of questions
CO1	1,2,3		
CO2	1,2,3	M1, M2	40%
CO3	1,2,3		
CO4	1,2,3,4	M3, M4, M5	20%
CO5	1,2,3,4	M3, M4, M5	20%
CO6	3,4	M5, M6	20%
			100

Credits-4T+2P

Module 1: Discrete Mathematics

Sets, Relation and Function: Operations and Laws of Sets, Cartesian Products, Binary Relation, Partial Ordering Relation, Equivalence Relation, Image of a Set, Sum and Product of Functions, Bijective functions, Inverse and Composite Function, Size of a Set, Finite and infinite Sets, Countable and uncountable Sets, Cantor's diagonal argument and The Power Set theorem, Schroeder-Bernstein theorem.

Principles of Mathematical Induction: The Well Ordering Principle, Recursive definition, The Division algorithm: Prime Numbers, The Greatest Common Divisor: Euclidean Algorithm, The Fundamental Theorem of Arithmetic.

(Total Hours-8)

Module 2: Algebraic Structures and Morphism

Algebraic Structures with one Binary Operation, Semi-Groups, Monoids, Groups, Congruence Relation and Quotient Structures, Free and Cyclic Monoids and Groups, Permutation Groups, Substructures, Normal Subgroups, Algebraic Structures with two Binary Operation, Rings, Integral Domain and Fields. Boolean Algebra and Boolean Ring,

Identities of Boolean Algebra, Duality, Representation of Boolean Function, Disjunctive and Conjunctive Normal Form

(Total Hours-8)

Module 3: Combinatorics and Probability

Set Theory, Basic Probability and Venn diagram, Compound Probability of independent events, Dependent events, Permutations and Combinations, Probability using Combinatorics, pigeon-hole principle

(Total Hours-6)

Module 4: Frequency Distribution

Data presentation- Frequency table, histogram, Bar chart and frequency polygons, stem and leaf plots, measure of location and spread, box and whisker plots

(Total Hours-10)

Module 5: Introduction to Statistics

Definition and scope of Statistics, concepts of statistical population and sample.

Data: quantitative and qualitative, attributes, variables, scales of measurement - nominal, ordinal, interval and ratio. Presentation: tabular and graphic, including histogram and ogives.

Measures of Central Tendency: mathematical and positional. Measures of Dispersion: range, quartile deviation, mean deviation, standard deviation, coefficient of variation, moments, skewness and kurtosis.

(Total Hours-14)

Module 6: Bivariate Statistics

Definition, scatter diagram, simple, partial and multiple correlation (3 variables only), rank correlation. Simple linear regression, principle of least squares and fitting of polynomials and exponential curves.

Theory of attributes, consistency of data, independence and association of attributes, measures of association and contingency.

(Total Hours-10)

Text Books:

1. Russell Merris, Combinatorics, Wiley-Interscience series in Discrete Mathematics and Optimisation
2. N. Chandrasekaran and M. Umaparvathi, Discrete Mathematics, PHI
3. Goon A.M., Gupta M.K. and Dasgupta B. (2002): Fundamentals of Statistics, Vol. I & II, 8th Edn. The World Press, Kolkata.

Paper: English Communication

Code: CYS-164

Course Objective: The course is designed to develop the student’s communicative competence in English by giving adequate exposure in the four communication skills - LSRW - listening, speaking, reading and writing and the related sub-skills, thereby, enabling the student to apply the acquired communicative proficiency in social and professional contexts.

Sl	Course Outcome	Mapped modules
1	Students will be able to Remember & Understand the basic concepts of the usage of English grammar & vocabulary in communication.	M1
2	Students will be able to Comprehend facts and ideas by organizing, comparing, translating, interpreting, giving descriptions, and stating the main ideas given in written texts.	M1, M2
3	Students will be able to Synthesise and Apply acquired linguistic knowledge in producing various types of written texts	M1, M3
4	Students will be able to Comprehend facts and ideas from aural inputs and Synthesise and Apply acquired linguistic knowledge in giving spoken response	M1, M4

Module Number	Content	Total Hours	%age of questions	Blooms Level (if applicable)	Remarks (If any)
M 1	Functional grammar & Vocabulary	2	10	1,2	
M 2	Reading Skills	2	20	1,2	
M 3	Writing Skills	8	40	2,3,4,	
M 4	Listening & Speaking Skills	8	30	2,3,4	
		20	100		

Paper: English Communication

Code: CYS 164

Contact Hours / Week: 2L

Credits: 2

Module 1 : Functional Grammar & Vocabulary : Tense: Formation and application; Affirmative / Negative / Interrogative formation; Modals and their usage; Conditional sentences; Direct and indirect speech; Active and passive voice; usage of common phrasal verbs, synonyms & antonyms.

1L + 1T

Module 2 : Reading Skills: Comprehension passages; reading and understanding articles from technical writing. Interpreting texts: analytic texts, descriptive texts, discursive texts; SQ3R reading strategy.

1L + 1T

Module 3 : Writing Skills: Writing business letters - enquiries, complaints, sales, adjustment, collection letters, replies to complaint & enquiry letters; Job applications, Résumé, Memo, Notice, Agenda, Reports – types & format, E-mail etiquette, advertisements 4L + 4T

Module 4 : Listening & Speaking

Listening: Listening process, Types of listening; Barriers in effective listening, strategies of effective listening

Speaking: Presentations, Extempore, Role-plays, GD, Interview

4L + 4T

Suggested readings:

1. Bhatnagar, M & Bhatnagar, N (2010) Communicative English for Engineers and Professionals. New Delhi: Pearson Education.
2. Raman, M & Sharma, S (2017) Technical Communication. New Delhi: OUP.
3. Kaul, Asha (2005) The Effective Presentation: Talk your way to success. New Delhi: SAGE Publication.
4. Sethi, J & Dhamija, P.V. (2001), A Course in Phonetics and Spoken English. New Delhi: PHI.
5. Murphy, Raymond (2015), English Grammar in Use. Cambridge: Cambridge University Press