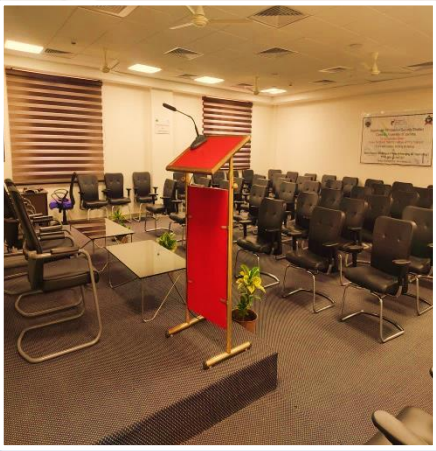
CENTRAL UNIVERSITY OF JAMMU



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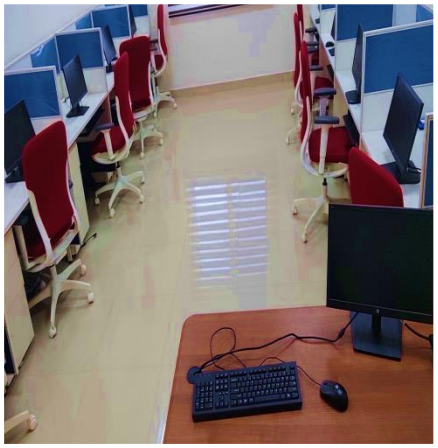
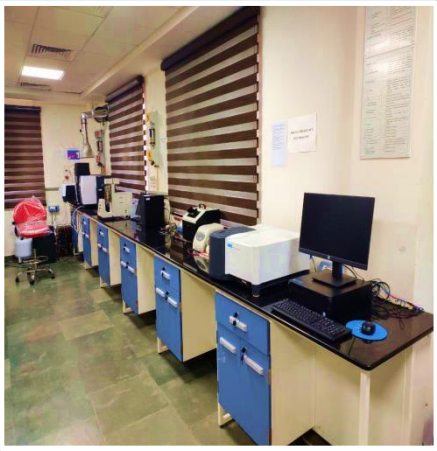
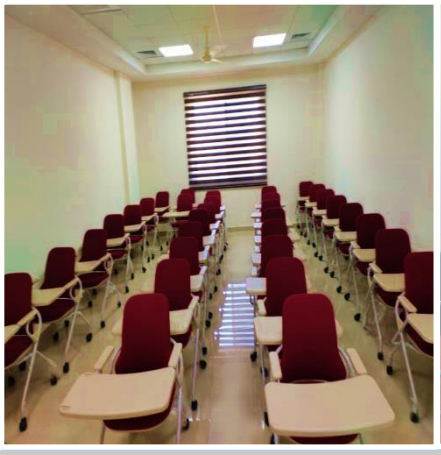
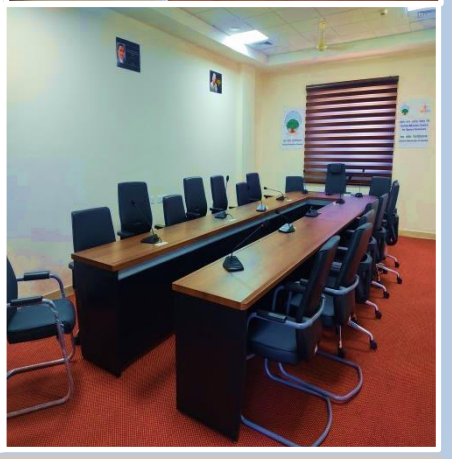
बुद्धिर्ज्ञानेन शुद्ध्यति









B. TECH. in COMPUTER SCIENCE & ENGINEERING (CYBER SECURITY)

Under the mentorship of Defense Research and Development Organisation (DRDO)

DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

SCHOOL OF BASIC AND APPLIED SCIENCES

About

B.Tech. in Computer Science and Engineering (Cyber Security) is a 4 years (8 Semesters) undergraduate degree programme that has been started in 2022 at department of Computer Science and Information Technology, Central University of Jammu under the mentorship of Defence Research and Development Organisation (DRDO). The programme has been designed with a strong balance between practical and theoretical aspects, architectural and analytical approaches, academic research, and industrial practises in order to produce well-prepared cyber security professionals. The key aim of the programme is to provides a complete knowledge of Cyber Network Security, Cyber Crime, Cyber Laws, Data Structures, Cryptography, Design and Analysis of Algorithms, Intrusion Detection and Prevention Systems, Ethical Hacking, Security enhancement schemes etc.

Program Educational Objectives (PEO)	
PEO-1	Apply computer science theory along with mathematics and engineering to educate graduates with a Cyber security specialization that emphasizes comprehensive understanding of Cyber Crime, Cyber Laws, Network Security, Cryptography, Threat Intelligence, Intrusion Detection and Prevention.
PEO-2	Design, implement, test and maintain security tools and technologies to prevent recognise and recover from cyber-attacks.
PEO-3	Communicate effectively with team members, engage in applying technologies and lead teams in cybersecurity industry.
PEO-4	Assess the computing systems from the view point of quality, security, privacy, cost, utility, etiquette and ethics.
PEO-5	Engage in lifelong learning, career enhancement and adapt to changing industrial and societal needs in the domain of Cyber Security.

Program Articulation Matrix

PEO Mission Statements	PEO1	PEO2	PEO3	PEO4	PEO5
Providing quality education through well-designed curriculum that is in sync with the defensive cybersecurity, malware analysis, ransomware analysis, application security, ethical hacking etc.	3	3	2	3	2
Providing cutting-edge research facilities in the thrust areas of Cyber Security to generate knowledge and develop technologies to prevent cyber-attacks.	2	3	3	3	2

Creating connections with world-class organizations in order to strengthen industry-academia collaborations for mutual benefit.	2	3	2	3	2

1-Slightly; 2-Moderately; 3-Substantially

Program Outcomes (POs)

At the end of the program, the student will be able to:

PO1	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and computer science and engineering to the solution of complex engineering problems
PO2	**Problem analysis:** Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences
PO3	**Design/Development of solutions:** Design solutions for complex computer science and engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations
PO4	**Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions
PO5	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex computer science and engineering activities with an understanding of the limitations
PO6	**The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
PO7	**Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development
PO8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	**Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in

	multidisciplinary environments
PO12	**Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

PSO1	Acquire a comprehensive understanding of the cyber security threats and vulnerabilities impacting the computing industry, including software and hardware.
PSO2	Participate in the development of new products in the multidisciplinary fields of computer engineering, technology, and cybersecurity.
PSO3	Demonstrate proficiency in the use of common tools, techniques, and technologies for the analysis, design, development, and implementation of ideal cyber security solutions.
PSO4	In the development of software systems, consider security, privacy, quality, and cost considerations.

Course scheme

B.Tech. in Computer Science and Engineering (Cyber Security) (BCCS)

Semester - I

Course Code	Course Title	Credits	L	T	P	CIA	MSE	ESE	Marks
BECCS1C01IN	Induction Program	0	2	-	-	-	-	-	-
BECCS1C001T	Environmental Sciences	0	2	-	-	-	-	-	-
BECCS1C002T	Applied Mathematics	3	3	0	0	18.75	18.75	37.5	75
BECCS1C003T	Applied Physics	3	3	0	0	18.75	18.75	37.5	75
BECCS1C001L	Applied Physics Laboratory	2	0	0	2	12.5	12.5	25	50
BECCS1C004T	English for Technical Communication	3	3	0	0	18.75	18.75	37.5	75
BECCS1C005T	Data Structure using C programming	4	3	1	0	25	25	50	100
BECCS1C006T	Problem Solving and Computer Programming in C	3	3	0	0	18.75	18.75	37.5	75

BECCS1C002L	Problem Solving and Computer Programming in C Laboratory	2	0	0	2	12.5	12.5	25	50
Total		**20**				**-**	**-**	**-**	**500**

COURSE SYLLABUS

SEMESTER-I

Applied Mathematics

Course Code: BECCS1C002T

Course Title: Applied Mathematics

Semester: I

Credits: 03

Rationale

Linear algebra and differential equations are central to modern mathematics and engineering. The concepts in linear algebra have the power to explain fundamental principles and simplify calculations in engineering, computer science, mathematics, physics, biology, statistics, digital media and economics. Differential equations play an important role in modelling virtually every physical, technical, or biological process, from celestial motion to aerospace design, from bridge design to animation, from financial trends to the interactions between neurons.

Course Outlines

Contents	**No. of Lectures**
Unit - I Linear Algebra: Vector Space; Linear dependence and independence of vectors; Linear Transformations; Inner-products and norms; Rank of a matrix; Consistency of the system of linear equations; Eigen values and eigenvectors of a matrix.	**10**
Unit - II Caley-Hamilton theorem and its applications; Reduction to diagonal form; Reduction of a quadratic form to canonical form - orthogonal transformation and congruent transformation; Properties of complex matrices - Hermitian, skew- Hermitian and Unitary matrices.	**10**
Unit -III Differential Calculus: Taylor's theorem with remainders; Taylor's and Maclaurin's expansions; Functions of several variables - partial differentiation; total differentiation; Euler's theorem and generalization; Change of variables - Jacobians; maxima and minima of functions of several variables (2 and 3 variables) - Lagrange's method of multipliers.	**10**
Unit - IV Ordinary Differential Equations: Geometric interpretation of solutions of first order ODE $y' = (x, y)$; Exact differential equations; integrating factors; orthogonal trajectories.	**10**
Unit - V Higher order linear differential equations with constant coefficients - homogeneous and non-homogeneous; Euler and Cauchy's differential equations; Method of variation of parameters; System of linear differential	**10**

equations.	

Course Outcomes

At the end of the course, the student will be able to**:**

- Understand the concepts of vector space and linear transformations
- Apply orthogonal and congruent transformations to a quadratic form
- Find the maxima and minima of multivariable functions
- Solve arbitrary order linear differential equations with constant coefficients
- Apply the concepts in solving physical problems arising in engineering

Text Books

1. R. K. Jain and S. R. K. Iyengar, *"Advanced Engineering Mathematics"*, Fifth Edition, Narosa Publishing House, 2016
2. ErwinKreyszig,*"AdvancedEngineeringMathematics"*,EighthEdition,JohnWileyandSons,2015

Reference Books

1. GeorgeB.ThomasandRossL.Finney,"*CalculusandAnalyticGeometry*",Pearson,NinthEdition, 2020
2. Dennis G. Zill, "*Advanced Engineering Mathematics*", Jones & Bartlett Learning, Sixth Edition, 2018
3. B. S. Grewal, *"Higher Engineering Mathematics"*, 42nd Edition, Khanna Publications,2012

APPLIED PHYSICS

Course Code: BECCS1C003T

Course Title: Applied Physics

Semester: I

Credits: 03

Rationale

Applied Physics includes the study of a large number of diverse topics all related to things that go in the world around us. It aims to give an understanding of this world both by observation and prediction of the way in which objects will behave. Concrete uses of physical principles and analysis in various fields of engineering and technology are given prominence in the course content.

Course Outlines

Contents	**No of Lectures**
Unit-I Wave Optics and Modern Physics: Interference: Concept of Interference of Light-Division of Amplitude and Wave front with examples- Michelson and Fabry perot Interferometers- Applications Diffraction: Fraunhofer's Class of Diffraction at Single, Double and Multiple Slits-Gratings and Applications Polarization: Production and Detection of Polarised Light—Wave Plates- Optical Activity-Laurent's. half shade polarimeter.	**10**
Unit-II Lasers: Interaction of Radiation with Matter-Spontaneous and Stimulated Emissions-Basic requirements for the construction of Lasers-Construction and working of He-Ne, CO2, Nd-YAG and Semiconductor Lasers, Holography and HNDT Optical Fibers: Principle and working of optical Fiber, structure, Classification and advantages of optical fiber, Light guiding mechanism in Optical Fibers -Numerical Aperture, Signal Degradation, Attenuation, Absorption, Inter and intra modal Dispersions. Fiber optics sensors and optical fiber communications.	**10**
Unit-III Quantum Physics: Quantum Mechanics - Introduction to quantum theory, concepts and experiments led to the discovery, wave particle duality-Davisson-Germer experiment, Heisenberg uncertainty principle, Schrodinger time independent wave equation, the free particle problem - particle in an infinite and finite potential well, quantum mechanical tunnelling – applications; Hydrogen Atom Wave Functions, Angular Momentum Operators, Identical Particles, Quantum Optics - Introduction to quantum optics and Quantum Imaging.	**10**

Unit-IV Engineering Materials: MagneticMaterials:WeissTheoryofFerromagnetism–Properties–Domains–CurieTransition-Hard and soft magnetic materials – Ferrites – Structure, Classification, Applications inComputers. Superconductors: Introduction to superconductivity, Meissner effect - Type-I and Type-II Superconductors – Applications in Computers. Semiconductor Materials and Devices: Types of semiconductor materials, temperature and concentrationeffectsonbandgap,Halleffect,PNjunctiondiode,photodiode,LED,junctiontransistor, phototransistor. Nano-materials – Introduction to Nano-materials and Nano-technology.	**10**
Unit-V **Computers Sensors and Sensing Technologies:** Introduction, The Human Body as a Sensor System, Passive and Active sensors, the sensor as part of a measurement system, sensor properties, Classification of Sensors – Infrared Sensor, Bio Sensors, Piezoelectric Sensors, Thermal Sensors, Quantum Sensors and Applications in Computer Science and Engineering.	**10**

Course Outcomes

At the end of the course, the student will be able to

- Apply the concepts of wave and particle nature of matter and energy for solving problems
- Understand the applications of Interference, diffraction, optical fibers, holography and lasers in engineering
- Understand the basics of semiconductors, magnetism, super conductivity, nano materials and their applications in engineering.
- Comprehend sensing technologies and their applications in computer science and engineering

Text Books

1. AjoyK.Ghatak, "*Optics*", Tata McGraw Hill, Sixth Edition,2017.
2. Gerd Keiser, "*Optical Fibre communications*", McGraw Hill, 4thEdition

Reference Books

1. Arthur Beiser, Shobhit Mahajan, S. Rai Choudhury, "*Concepts of Modern Physics*", McGraw Hill Publications, Sixthedition,2009
2. M.N. Avadhanulu, P.G. Khirsagar, "*A Text Book of Engineering Physics*", 9thedition,2011
3. John Vetelino and Aravind Reghu, "*Introduction to Sensors*", CRC Press, 1st Edition,2010.
4. Narciso Garcia, Arthur Damask and Steven Schwarz, "*Physics for Computer Science Students*", Springer, 2012, 2ndEdition.
5. JeffHecht,"*UnderstandingLasersAnEntry-LevelGuide*",WileyPublications,Fourth edition, 2018.

APPLIED PHYSICS LABORATORY

Course Code: BECCS1C001L

Course Title: Applied Physics Laboratory

Semester: I

Credits: 02

Rationale

Applied physics practical's aims to give an understanding of this world both by observation and prediction of the way in which objects will behave. Concrete uses of physical principles and analysis in various fields of engineering and technology are given prominence.

List of experiments

1. Determination of Wavelength of Sodium light using Newton'sRings.
2. Determination of Wavelength of He-Ne laser – MetalScale.
3. Measurement of Width of a narrow slit using He- NeLaser.
4. Determination of Specific rotation of Cane sugar by Laurent Half-shadePolarimeter.
5. Determination of capacitance by using R-Ccircuit.
6. Determination of resonating frequency and bandwidth by LCRcircuit.
7. Measurement of half-life of radioactive source using GMCounter.
8. Diffraction grating by normal incidence method.
9. Measurement of numerical aperture of opticalfiber.

Course Outcomes

At the end of the course, the student will be able to

- Use CRO, signal generator, spectrometer, polarimeter and GM counter for making measurements
- Test optical components using principles of interference and diffraction of light
- Determine the selectivity parameters in electrical circuits
- Determine the width of narrow slits, spacing between close rulings using lasers and appreciate the accuracy in measurements

Text Books

1. "*Physics Laboratory Manual"* by Physics Department, NITWarangal,2021.
2. P.R. Sasi Kumar, "*Practical Physics*", PHI publications, firstedition,2011

Reference Books/ Online Resources

1. G.L.Squire, "*Practical Physics*", Cambridge University press, fourthedition,2001.
2. Dr.S.K.GuptaKrishna,"*Engineering Physics Practical*", Prakashan Publications, ninth edition,2010.
3. https://nptel.ac.in/courses/115/105/115105110/

ENGLISH FOR TECHNICAL COMMUNICATION

Course Code: BECCS1C004T

Course Title: English for Technical Communication

Semester: I

Credits: 03

Rationale

This course is designed for entry level Engineering and Technology curriculum enabling the students to learn, acquire and apply for their learning and career. The course is aimed at providing effective skills for promoting communication skills through English. Students will benefit in conversing with the peers, faculty and fellow professionals.

Course Outlines

Contents	No. of Lectures
Unit-I Grammar Principles & Effective Sentence Construction (Correction of sentences, Concord) and Vocabulary Building (synonyms and antonyms): Idioms and Phrasal verbs--patterns of use and suggestions for effective employment in varied contexts.- Strategies for bringing variety and clarity in sentences- removing ambiguity - editing long sentences for brevity and clarity- Reported speech- contexts for use of reported speech - its impact on audiences and readers- active and passive voice- reasons for preference for passive voice in scientific English.	**10**
Unit - II Paragraph-writing: Definition of paragraph and types- features of a good paragraph - unity of theme- coherence-linkingdevices-direction-patternsofdevelopment.Note-making-definition-theneedfor note-making - its benefits - various note formats- like tree diagram, block or list notes, tables,etc.	**10**
Unit -III Letter-Writing: Its importance in the context of other channels of communication-qualities of effective letters-types -personal, official, letters for various purposes-emphasis on letter of application for jobs - cover letter and resume types -examples and exercises.	**10**
Unit - IV Reading techniques: Definition- Skills and sub-skills of reading- Skimming and Scanning - their uses and purposes- examples and exercises. Reading Comprehension - reading silently and with understanding- process of comprehension- types of comprehension questions.	**10**
Unit - V Features of Technical English - description of technical objects and process- Report-Writing- definition-purpose-types-structure-formalandinformalreports-stagesindevelopingreport-proposal, progress and final reports-examples andexercises.BookReviews-Oralandwrittenreviewofachosennovel/play/movie-	**10**

focusonappropriatevocabulary and structure - language items like special vocabulary and idiomsused.	

Course Outcomes

At the end of the course, the student will be able to

- Write an effective paragraph using devices of coherence & cohesion, idioms, and phrasal verbs in context.
- Construct an effective résumé and cover letter
- Demonstrate the ability to employ a range of critical reading skills.
- Employ reported speech, active and passive voice in engineering and scientific contexts to compile technicalreports
- Distinguish technical reports from other types of reports such as business reports, analytical reports, and progress reports.
- Interpret technical data presented in the form of graphs, pie charts, and diagrams.
- Demonstrate use of English speech sounds, stress and intonation in day-to-day situations/conversations/interactions.

Text books

1. English for Engineers and Technologists (Combined edition, Vol. 1 and 2) Orient Blackswan 2010.
2. Ashraf, M Rizvi. Effective Technical Communication. Tata McGraw-Hill,2006

Reference books

1. Meenakshi Raman and Sangeetha Sharma. Technical Communication: Principles and Practice 2nd Edition, Oxford University Press,2011.
2. Murphy, Raymond English Grammar in Use with Answers: Reference and Practice for Intermediate Students, Cambridge: CUP, 2004
3. Thomson, A.J. and Martinet, A.V. A Practical English Grammar, OUP, New Delhi: 1986
4. Anne Laws, ―Writing Skills‖, Orient Black Swan, Hyderabad, 2011

Language laboratory:

1. **English Sound System** -vowels, consonants, Diphthongs, phonetic symbols- using dictionary to decode phonetic transcription-- Received Pronunciation, its value and relevance- transcription of exercises-
2. **Stress and Intonation** –word and sentence stress - their role and importance in spoken English- Intonation in spoken English -definition, patterns of intonation- – falling, rising, etc.-use of intonation in dailylife-exercises
3. **Introducing oneself in formal and social contexts**- Role plays. - their uses in developing fluency and communication ingeneral.
4. **Oral presentation** - definition- occasions- structure- qualities of a good

presentation with emphasis on body language and use of visualaids.

5. **Listening Comprehension** -Challenges in listening, good listening traits, some standard listening tests- practice andexercises.
6. **Debate/ Group Discussions**-concepts, types, Do's and don'ts- intensivepractice.

Software:

1. Clear Pronunciation – Part-1 *Learn to SpeakEnglish.*
2. Clear Pronunciation – Part-2 *Speak Clearly withConfidence*
3. Study Skills
4. EnglishPronunciation

DATA STRUCTURES USING C

Course Code: BECCS1C005T

Course Title: Data Structures using C

Semester: I

Credits: 04

Rationale

Data structures plays significant role for designing efficient and accurate algorithms in several application areas of computer engineering. Various data structures such as arrays, stack, queue, trees are used for developing algorithms in Artificial intelligence, computer vision, and image processing etc. Moreover, design and analysis of algorithms using time and space complexity is also important parameter that needs basic knowledge of different data structures.

Course Outlines

Contents	**No. of Lectures**
Unit - I Preliminaries: Concept & notation, common operation on data structures, algorithm complexity, time-space trade-off between algorithm, physical & logical representation of different data structures. Arrays: Arrays defined, representing arrays in memory, various operation (traversal, insertion, deletion), Multidimensional arrays, Address calculation, Sparse arrays.	**10**
Unit - II Stacks: Definition & concepts of stack structure, Implementation of stacks, Operation on stacks (push & pop), Application of stacks (converting arithmetic expression from infix notation to polish and their subsequent evaluation, quick sort technique to sort an array, recursion). Queue: Definition &concept of queues, implementation of queue, operation on queues (insert & delete), Type of queues (circular queue, priority queue).	**10**
Unit -III Linked List: Definition, type (linear, circular, doubly linked), representing linked lists in memory, advantages of using linked list over arrays, various operations on Linked list (traversal, insertion, deletion, etc.).	**10**
Unit - IV Trees Structures: Tree, Binary Trees, Tree Traversal Algorithms (Pre-Order, In-Order, Post-Order), Threaded Trees, Trees in various sorting & Searching Algorithms & their Complexity (Heap Sort, Binary Search Trees). Graphs: Description of graph structure, Implementing graphs in memory, Graph	**10**

traversals (Depth First Searching, Breadth first searching, and Shortest Paths Problems).	
Unit - V Storage Management: Fixed block storage allocation, First-fit Storage Allocation, Storage Release, Buddy System, Garbage Collection. Sorting & Searching: Selection sort, Bubble sort, Merge sort, Radix sort, Quick sort, Linear and binary search with their complexity. Indexing structures like B – trees, ISAM. Hashing techniques for Direct Files.	**10**

Course Outcomes

At the end of the course, the student will be able to**:**

- Understand the concepts of basic data structures.
- Implementation of various data structures using c programming language.
- To apply data structures in a variety of real-life and engineering applications.
- To analyse space and time complexity of different algorithms.
- To understand and use various searching and sorting algorithms in other engineering applications.

Text Books

1. Symour Lipschutz,' Theory and Problems of Data Structures'', St. Schaum's Outline series in Computers, Tata McGraw – Hill.
2. Horowitz, E. , and Sahni, S. , ''Fundamentals of data structures'' , Computer Science Press.
3. Tanhenbaum, A.M., and Augenstein, M.J. , "Data Structures with C" , Prentice – Hall.
4. "Tremblay & Sorenson , An introduction to Data Structures with Applications:, Tata McGraw – Hill.

Reference Books

1. Aho, A.V. , Hopcraft, and Ullman, J.E., ''Data structures and Algorithms'' , Addison Wesley.
2. Thomas Coremen, Introduction to Algorithms, Second edition, Prentice Hall of India (2007) 2nd ed.
3. Mark Allen Weiss, Data Structures & Algorithm analysis in C, Dorling Kingsley (2002) 3rd ed.

Problem Solving and Computer Programming in C

Course Code: BECCS1C006T

Course Title: Problem Solving and Computer Programming in C

Semester: I

Credits: 03

Rationale

Solving problems is the core of computer science. Purpose of programming is to solve problems. Programmers must first understand how a human solves a problem, then understand how to translate this "algorithm" into something a computer can do, and finally how to "write" the specific syntax (required by a computer) to get the job done.

Course Outlines

Contents	**No. of Lectures**
Unit - I Fundamentals of Computers - Historical perspective, Early computers, Components of a computers, Problems, Flowcharts, Memory, Variables, Values, Instructions, Programs. Problem solving techniques - Algorithmic approach, characteristics of algorithm, Problem solving strategies: Top-down approach, Bottom-up approach, Time and space complexities of algorithms.	**10**
Unit - II Number systems and data representation - Basics of C, data types, tokens, keywords, variables, Numbers, Conditional statements - If-else, Switch-case constructs, Loops - while, do-while, for. Problems on Date and factorials, Solutions using flow of control constructs,	**10**
Unit -III Functions - Modular approach for solving real time problems, user defined functions, library functions, parameter passing - call by value, call by reference, return values, Recursion.	**10**
Unit - IV Introduction to Pointers and Arrays - Sorting and searching algorithms, Large integer arithmetic, Single and Multi-Dimensional Arrays, passing	**10**

arrays as parameters to functions, Magic square and matrix operations using Pointers and Dynamic Arrays, Multidimensional Dynamic Arrays	
Unit – V String processing, File operations. Structures and Union, Declaration, member variables, member functions, access modifiers, Templates, Problems on Complex numbers, Date, Time, Large Numbers, factorials, number series and pattern generation.	**10**

Course Outcomes

Upon successful completion of this course, candidates will be able to:

- Design algorithms for solving simple mathematical problems including computing, searching and sorting.
- Compare and contrast algorithms in terms of space and time complexity to solve simple mathematical problems.
- Explore the internals of computing systems to suitably develop efficient algorithms.
- Examine the suitability of data types and structures to solve specific problems.
- Apply control structures to develop modular programs to solve mathematical problems.
- Apply object oriented features in developing programs to solve real world problems.

Text Books

1. Problem Solving and Program Design in C by Jeri R. Hanly, Elliot B. Koffman; Pearson Addison-wesely, 2006.
2. Yashwant Kanetker, Let us C, BPB.
3. Balagurusamy, E., Programming in ANSI C, McGraw-Hill.
4. Computer Science- A Structured Srogramming Approach Using C by Behrouz A. Forouzan, Richard F. Gilberg; 3rd Edition(India Edition), 2007

References Books

1. How to Solve it by Computer, R.G. Dromey, Pearson, 2008.
2. Programming in ANSI C, E Balagurusamy, McGraw Hill Education, 8th Edition.
3. Object-Oriented Analysis and Design with Applications, Grady Booch, Robert Maksimchuk, Michael Engle, Bobbi Young Ph.D., Jim Conallen, Kelli Houston , Addison-Wesley Object Technology Series, 3rd Edition

PROBLEM SOLVING AND COMPUTER PROGRAMMING LABORATORY IN C

Course Code: BECCS1C002L

Course Title: Problem solving and computer programming laboratory in C

Semester: I

Credits: 02

Rationale

Solving problems is the core of computer science. Purpose of programming is to solve problems. Programmers must first understand how a human solves a problem, then understand how to translate this "algorithm" into something a computer can do, and finally how to "write" the specific syntax (required by a computer) to get the job done.

List of practical's

1. Programs on conditional control constructs.
2. Programs on loops (while, do-while, for).
3. Programs using user defined functions and library functions.
4. Programs on arrays, matrices (single and multi-dimensional arrays).
5. Programs using pointers (int pointers, char pointers).
6. Programs on structures.
7. Programs on classes and objects.

Course Outcomes

At the end of the course, the student will be able to

- Design and test programs to solve mathematical and scientific problems
- Develop and test programs using control structures
- Implement modular programs using functions
- Develop programs using classes

Text Books/ Reference books/ Online resources

1. Walter Savitch, "*Problem Solving with C++*", Ninth Edition, Pearson, 2014.
2. Cay Horstmann, Timothy Budd, "*Big C++*", Wiley, 2nd Edition, 2009.
3. R.G. Dromey, "*How to solve it by Computer*", Pearson, 2008.