Curriculum and Syllabus

B Tech - Computer Science and Engineering (Cyber Security)

(BTC-CYS)

2024
GENERAL INFORMATION

ABBREVIATIONS USED IN THE CURRICULUM

Cat - Category
L - Lecture
T - Tutorial
P - Practical
Cr - Credits
ENGG - Engineering Sciences (including General, Core and Electives)
HUM - Humanities (including Languages and others)
SCI - Basic Sciences (including Mathematics)
PRJ - Project Work (including Seminars)
AES - Aerospace Engineering
AIE - Computer Science and Engineering - Artificial Intelligence
BIO - Biology
CCE - Computer and Communication Engineering
CHE - Chemical Engineering
CHY - Chemistry
CSE - Computer Science and Engineering
CVL - Civil Engineering
CUL - Cultural Education
CYS - Cyber Security
EAC - Electronics and Computer Engineering
ECE - Electronics and Communication Engineering
EEE - Electrical and Electronics Engineering
ELC - Electrical and Computer Engineering
HUM - Humanities.
MAT - Mathematics
MEE - Mechanical Engineering
PHY - Physics

Course Outcome (CO) – Statements that describe what students are expected to know and are able to do at the end of each course. These relate to the skills, knowledge and behaviour that students acquire in their progress through the course.

Program Outcomes (POs) – Program Outcomes are statements that describe what students are expected to know and be able to do upon graduating from the Program. These relate to the skills, knowledge, attitude and behaviour that students acquire through the program. NBA has defined the Program Outcomes for each discipline.

Program Objectives

The B Tech program in CSE (Cyber Security) is intended to mould students into well prepared Cyber Security professionals and has been designed with a good balance between theoretical & practical aspects, analytical and architectural methods complemented by academic research and industry best practices. Through this program students acquire necessary theoretical background, insights into general and technical aspects of Cyber Security, a good understanding of analytical methods and management practices in the field.

Program Educational Objectives (PEOs)

The PEOs outlined below describe the expectations of what graduates will accomplish in their careers, and how they perform during the first few years after graduation.

Areas or fields where graduates can find employment: Hundreds of Cyber Security career roles in pretty much every vertical market in the industry.
Preparedness of graduates to take up higher studies: There are various tracks with ample funding to take up masters and subsequently PhD programs around the world.

- Find employment in Computer Science & Engineering and/or Cyber Security field in a professional organization.
- Apply conceptual and practical knowledge of Cyber Security along with tools and technologies to avoid, identify, counter, and recover from cyber threats.
- Communicate Cyber Security risks, threats, and countermeasures to convince decision makers to apply this understanding to develop cyber defense strategies.
- Contribute to product development as individual contributors in corporations and/or entrepreneurs in inter disciplinary fields of computer engineering & technology and Cyber Security.
- Identify, analyze, and utilize professional and academic literature in the field of Cyber Security to help solve problems and stay up to date with the rapidly changing context of global security concerns.

Program Outcomes (PO):

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **Design and development of solutions:** Design solutions for complex 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.

4. **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.

5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

6. **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.

7. **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.

8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **Individual and teamwork:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **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.

11. **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.

12. **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 (PSO):

1. Gain a thorough understanding of the Cyber Security landscape with its growing threats and vulnerabilities in the world of computing including software and hardware. Attain skills to comprehend and anticipate future challenges and devise methods to meet them and also, be articulate and skilled to convince all the stakeholders.
2. Acquire and demonstrate the ability to use standard tools, practices and technologies for the analysis, design, development and implementation of innovative and optimal Cyber Security solutions without compromising the privacy needs of individual and entities and the security concerns of law enforcement agencies.
# CURRICULUM

## SEMESTER I

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Total (19L + 2T + 6P = 27 hrs) 23
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Total (18 L + 0 T + 12 P = 30 hrs) 22+[3]

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Total (17 L + 1 T + 12 P = 30 hrs) 22+[3]
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Total (15 L + 0 T + 18 P = 33 hrs) 21

## SEMESTER VIII

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Total (0 L + 0 T + 30 P = 30hrs) 10

Total Credits 167

*Professional Elective* - Electives categorised under Engineering, Science, Mathematics, Live-in-Labs, and NPTEL Courses. Student can opt for such electives across departments/campuses. Students with CGPA of 7.0 and above can opt for a maximum of 2 NPTEL courses with the credits not exceeding 8.

**Free Electives** - This will include courses offered by Faculty of Humanities and Social Sciences/Faculty Arts, Commerce and Media / Faculty of Management/Amrita Darshanam - (International Centre for Spiritual Studies).

***Live-in-Labs*** - Students undertaking and registering for a Live-in-Labs project, can be exempted from registering for an Elective course in the higher semester.
# PROFESSIONAL ELECTIVES

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## Electives in Business Systems

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Course Objectives

- To introduce the students to the fundamentals of mechanics of writing
- To facilitate them with the style of documentation and specific formal written communication
- To initiate in them the art of critical thinking and analysis
- To help them develop techniques of scanning for specific information, comprehension and organization of ideas
- To enhance their technical presentation skills.

Course Outcomes

CO1: To gain knowledge about the mechanics of writing and the elements of formal correspondence.  
CO2: To understand and summarize technical documents.  
CO3: To apply the basic elements of language in formal correspondence.  
CO4: To interpret and analyze information and to organize ideas in a logical and coherent manner.  
CO5: To compose project reports/ documents, revise them for language accuracy and make technical presentations.

CO-PO Mapping

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Syllabus

Unit 1

Mechanics of Writing: Grammar rules -articles, tenses, auxiliary verbs (primary & modal) prepositions, subject-verb agreement, pronoun-antecedent agreement, discourse markers and sentence linkers.  
General Reading and Listening comprehension - rearrangement & organization of sentences.
Unit 2

Different kinds of written documents: Definitions - descriptions - instructions - recommendations - user manuals - reports - proposals
Formal Correspondence: Writing formal Letters.
Mechanics of Writing: impersonal passive & punctuation
Scientific Reading & Listening Comprehension.

Unit 3

Technical paper writing: documentation style - document editing - proof reading - Organizing and formatting.
Mechanics of Writing:Modifiers, phrasal verbs, tone and style, graphical representation.
Reading and listening comprehension of technical documents.
Mini Technical project (10 - 12 pages). Technical presentations

Textbook


Reference(s)

Pre-Requisite(s): Nil

Course Objectives:

- Understand the field of digital security and concepts of access control mechanism.
- To introduce keywords and jargons involved in securing browser
- Understanding network basic and familiarize on security of network protocols
- Awareness and understanding on cyber-attacks and data privacy

Course Outcomes:
CO1: Apply a solid foundation in digital security and measures taken to protect device from threats.
CO2: Learning access control mechanism and understand how to protect servers
CO3: Understand the importance of a network basics and brief introduction on security of network protocols
CO4: To understand cyber-attacks and learn data privacy issues and preventive measures

CO-PO Mapping

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Syllabus

Unit 1
Basics of digital security, protecting personal computers and devices, protecting devices from Virus and Malware, Identity, Authentication and Authorization, need for strong credentials, keeping credentials secure, protecting servers using physical and logical security, World Wide Web (www), the Internet and the HTTP protocol, security of browser to web server interaction,

Unit 2
Networking basics (home network and large-scale business networks), Networking concepts (CIDR, subnets), and protocols (DNS, DHCP, IP). Security of protocols, sample application hosted on-premises.

Unit 3
Introduction to cyber-attacks, application security (design, development and testing), operations security, monitoring, identifying threats and remediating them, Principles of data security - Confidentiality, Integrity and Availability.
Textbooks


References:


Prerequisites: Nil

Course Objectives

- Understand the basic concepts of vector space, subspace, basis and dimension.
- Familiar the inner product space. Finding the orthogonal vectors using inner product.
- Understand and apply linear transform for various matrix decompositions.

Course Outcomes

CO1: Solve systems of linear equations and analyze vector properties.
CO2: Apply concepts of vector spaces, inner products, and orthogonality.
CO3: Perform linear transformations, analyze matrices, and understand change of basis.
CO4: Utilize techniques like diagonalization, Jordan/rational forms, and SVD.

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Syllabus

Unit 1


Unit 2

Unit 3

Linear Transformations: Positive definite matrices - Matrix norm and condition number - QR- Decomposition - Linear transformation - Relation between matrices and linear transformations - Kernel and range of a linear transformation. Change of basis, Similarity of linear transformations, Diagonalization and its applications, Jordan form and rational canonical form, SVD.

Textbook


Reference(s)

Pre-Requisite(s): Nil

Course Objective

The main objective of the course is to expose to the development of Physics with special emphasis on Quantum mechanics which enable a computer science engineer to apply this in the field of emerging areas like quantum computing.

Course Outcomes

CO1: To be exposed to the fundamental concepts of Wave nature of Particles and Particle nature of Waves.
CO2: To understand various atomic models and their application to phenomena like spectrum formation including LASERS.
CO3: To be introduced to the basics of Quantum mechanics like Wave function, Operators, States of wave function etc.
CO4: To be able to apply quantum mechanics to simple applications like particle in a box, tunnelling of particle across a barrier etc. Equipment use in water treatment.
CO5: Apply Quantum mechanics in the emerging field of Quantum computing.

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Syllabus

Unit 1


Unit 2

Unit 3

Quantum mechanics: Wave function, Probability density, expectation values - Schrodinger equation – time dependent and independent, Linearity and superposition, expectation values, operators, Eigen functions and Eigen values.

Unit 4

Application of 1D Schrodinger Wave equation: Free particle, Particle in a box, Finite potential well, Tunnel effect, Harmonic oscillator.

Unit 5

Intro to Quantum computing- Q bits- II Quantum correlations: Bell inequalities and entanglement, Schmidt decomposition, super dense coding, teleportation, module.

Textbook


Reference Books

Prerequisites: Nil

Course Objectives

- This course provides the foundations of computational problem solving.
- The course focuses on principles and methods thereby providing transferable skills to any other domain.
- The course also provides a foundation for developing computational perspectives of one’s own discipline.

Course Outcomes

CO1: Apply algorithmic thinking to understand, define and solve problems.
CO2: Design and implement algorithm(s) for a given problem.
CO3: Apply the basic programming constructs for problem solving.
CO4: Understand an algorithm by tracing its computational states, identifying bugs and correcting them.

CO-PO Mapping

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Syllabus

Unit 1

Problem Solving and Algorithmic Thinking Overview – problem definition, Problem Solving framework - logical reasoning; Algorithm – definition, practical examples, properties, representation, algorithms vs programs.

Unit 2

Algorithmic thinking – Constituents of algorithms – Sequence, Selection and Repetition, input-output; Computation – expressions, logic; Problem Understanding and Analysis – Variables, name binding - Algorithms to programs.
Unit 3


Textbook


Reference(s)

Prerequisites: Nil

Course Objectives

- Understand basic connections between science and engineering.
- To impart basic knowledge of electrical quantities and provide working knowledge for the analysis of DC and AC circuits.
- Understand the characteristics and applications of diode and Transistors.
- To facilitate understanding of Thyristors and operational amplifier circuits.

Course Outcomes

CO1: Ability to understand engineering concepts as well as basic electric and magnetic circuits.
CO2: Ability to analyse DC and AC circuits.
CO3: Ability to understand the basic principles of PN junctions and transistors.
CO4: Ability to analyse basic transistor and op-amp based circuits.

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Syllabus

Unit 1

Unit 2

PN Junction diodes, Diode Characteristics, Diode approximation- Clippers and Clampers, Rectifiers: Half wave, Full wave, Bridge- Zener Diode- Design of regulator and characteristics, Optoelectronic devices, Introduction to BJT, Characteristics and configurations, Transistor as a Switch.

Unit 3


Textbook


Reference Book(s)

Prerequisites: Nil

Course Objectives

- Computer hardware essentials is designed to introduce students to a basic understanding of the different types of computing devices, computer components (CPU, memory, power supplies, etc.), and operating systems.
- It also introduces building a fully functional Linux and installing applications.
- Understand the basic of circuit building.

Course Outcomes

CO1: Understand components of computer system (computer memory and ports)
CO2: Understand the procedure for installation of OS - Linux and supporting, upgrading and new applications
CO3: Understand the concepts of number system, logic circuits, Boolean algebra and strategies for minimization of logic circuits
CO4: Design combinational circuits — multiplexers, decoders and encoders
CO5: Design sequential circuits — Flip flops, registers, counters, design using FSM

CO-PO Mapping

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Syllabus

Unit 1

information using system tools. Linux operating system and basic Linux commands. Mobile Architecture: hardware components

Unit 2


Unit 3


Textbook


Reference(s)

Course Objective

- The course is designed as an introductory guide to the variegated dimensions of Indian cultural and intellectual heritage, to enable students to obtain a synoptic view of the grandiose achievements of India in diverse fields.
- It will equip students with concrete knowledge of their country and the mind of its people and instill in them some of the great values of Indian culture.

Course Outcomes

CO1: Be introduced to the cultural ethos of Amrita Vishwa Vidyapeetham, and Amma’s life and vision of holistic education.
CO2: Understand the foundational concepts of Indian civilization like puruśārtha-s, law of karma and varṇāśrama.
CO3: Gain a positive appreciation of Indian culture, traditions, customs and practices.
CO4: Imbibe spirit of living in harmony with nature, and principles and practices of Yoga.
CO5: Get guidelines for healthy and happy living from the great spiritual masters.

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Syllabus

Unit 1

Introduction to Indian culture; Understanding the cultural ethos of Amrita Vishwa Vidyapeetham; Amma’s life and vision of holistic education.

Unit 2

Goals of Life – Purusharthas; Introduction to Varnasrama Dharma; Law of Karma; Practices for Happiness.
Unit 3

Symbols of Indian Culture; Festivals of India; Living in Harmony with Nature; Relevance of Epics in Modern Era; Lessons from Ramayana; Life and Work of Great Seers of India.

Text Book

Cultural Education Resource Material Semester-1

Reference Book(s)

1. The Eternal Truth (A compilation of Amma’s teachings on Indian Culture)
3. Awaken Children (Dialogues with Mata Amritanandamayi) Volumes 1 to 9
Course Objective

- Mastery Over Mind (MaOM) is an Amrita initiative to implement schemes and organize university-wide programs to enhance health and well-being of all faculty, staff, and students (UN SDG 3).
- It gives an introduction to immediate and long-term benefits of MA OM meditation and equips every attendee to manage stressful emotions and anxiety, in turn facilitating inner peace and harmony.
- This course will enhance the understanding of experiential learning based on the University’s mission: “Education for Life along with Education for Living” and is aimed to allow learners to realize and rediscover the infinite potential of one’s true Being and the fulfilment of life’s goals.

Course Outcomes

CO1: To be able to describe what meditation is and to understand its health benefits
CO2: To understand the causes of stress and how meditation improves well-being
CO3: To understand the science of meditation
CO4: To learn and practice MAOM meditation in daily life
CO5: To understand the application of meditation to improve communication and relationships
CO6: To be able to understand the power of meditation in compassion-driven action

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Syllabus

Unit 1: Describe Meditation and Understand its Benefits (CO1)

A: Importance of meditation. How does meditation help to overcome obstacles in life
   Reading 1: Why Meditate? (Swami Shubamritananda ji)
   Video Resource: Pre-recorded Video with Swami Shubhamritananda Puri
Unit 2: Causes of Stress and How Meditation Improves Well-being (CO2)

A: Learn how to prepare for meditation. Understand the aids that can help in effectively practicing meditation. Understand the role of sleep, physical activity, and a balanced diet in supporting meditation.


Unit 3: The Science of Meditation (CO3)

A: A preliminary understanding of the Science of meditation. What can modern science tell us about this tradition-based method?
B: How meditation helps humanity according to what we know from scientific research

Reading 1: Does Meditation Aid Brain and Mental Health (Dr Shyam Diwakar)

Unit 4: Practicing MA OM Meditation in Daily Life (CO4)

Guided Meditation Sessions following scripts provided (Level One to Level Five)

Reading 1: MA OM and White Flower Meditation: A Brief Note (Swami Atmananda Puri)

Unit 5: Improving Communication and Relationships (CO5)

How meditation and mindfulness influence interpersonal communication. The role of meditation in improving relationship quality in the family, at the university and in the workplace.


Unit 6: Meditation and Compassion-driven Action (CO6)

Understand how meditation can help to motivate compassion-driven action. (Pre-recorded video with Dr Shobhana Madhavan)


Video Resource: Pre-recorded Video with Dr. Shobhana Madhavan
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### Text Book/ Reference Book(s)

Prerequisites: Nil

Course Objectives

- Familiarization of various concepts in logic and proof techniques.
- Understand the concepts of various types of relations, partial ordering and equivalence relations.
- Understand the concepts of generating functions and apply them to solve the recurrence relations.

Course Outcomes

CO1: Apply logical reasoning, counting principles, and proof techniques.
CO2: Analyze and manipulate relations, identifying their properties.
CO3: Solve counting problems using advanced techniques and recurrence relations.
CO4: Analyze graphs, identify special types, and apply graph algorithms.

CO-PO Mapping

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Syllabus

Unit-1


Unit-2

Relations and Their Properties: Representing Relations, Closure of Relations, Partial Ordering, Equivalence Relations and partitions.
Unit-3


Unit-4

Graphs: Special types of graphs, connectivity, Euler and Hamiltonian Paths.
Trees: Applications of trees, Tree traversal, Spanning trees.

Textbook


Reference(s)

Prerequisites: Nil

Course Objectives

- To familiar basic results in number theory and understand it applications in information security.
- Familiar few important concepts in number theory like primitive roots, quadratic residues etc.
- Understand the basic concepts of algebraic structures like groups rings and fields.
- Understand the hard problems in number theory and abstract algebra and its applications.

Course Outcomes

**CO1:** Understand integers with divisibility properties and realize the group structure in integers using modular operations.

**CO2:** To Understand concepts of quadratic residues and Primitive roots.

**CO3:** To understand the basic concepts of algebraic structures like groups, rings and fields

**CO4:** To Understand the computationally hard problems like factorization and discrete logarithm problems and the techniques to solve these problems.

**CO-PO Mapping**

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Syllabus

**Unit 1**

Algorithms for integer arithmetic: Divisibility, GCD, modular arithmetic, modular exponentiation, congruence, Chinese remainder theorem, orders and primitive roots, quadratic residues, integer and modular square roots, continued fractions, and rational approximations.

**Unit 2**

Algebraic Structures - Groups, Rings and Fields; Representation of finite fields: Prime and extension fields, representation of extension fields, polynomial basis, primitive elements, irreducible polynomials.
Unit 3


Textbook


Reference(s)

Pre-Requisite(s): Nil

Course Objectives

- To introduce the frequency domain concepts and filter design in signal processing applications.
- To develop knowledge in efficient transforms for signal analysis.
- To provide knowledge in designing and developing signal processing systems suitable for various applications.

Course Outcomes

CO1: To understand the concepts of signals and systems.
CO2: To analyze the frequency domain characteristics of discrete time signals and systems
CO3: To comprehend realization structures for filters.
CO4: To develop a digital signal processing system for different applications.

CO-PO Mapping

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Syllabus

Unit 1

Basic signals: unit step, unit impulse, sinusoidal and complex exponential signals - Types of signals- Basic operations on signals - system properties -Time Domain characterization of continuous time and discrete time LTI system-Convolution Integral - Convolution sum-Analysis of LTI system described by differential and difference equations.

Unit 2

Unit 3


Textbook


Reference(s)

Pre-Requisite(s): Nil

Course Objectives

- This course aims at introducing the concepts of computer architecture and organization.
- It describes overview of MIPS architecture in terms of instruction set, data path and pipelining.
- It introduces pipelining and memory systems in detail along with performance metrics for designing computer systems.

Course Outcomes

**CO1:** Understand the design principles of Instruction Set Architecture (ISA) by taking MIPS as reference.
**CO2:** Understand design of instruction execution using Multiple Clock Cycles and Analyze / Evaluate the performance of processors.
**CO3:** Understand Pipelined architecture and Design of 3 and 5 stage pipeline processor in MIPS
**CO4:** Understand the working of Arithmetic and Logic Unit and the concepts of Memory Organization.
**CO5:** Understand the microprocessor design, microcontroller, and addressing modes.

**CO-PO Mapping**

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Syllabus

**Unit 1**

Unit 2


Unit 3


Textbook


Reference(s)

24CYS113  COMPUTER PROGRAMMING  L-T-P-C: 3-0-0-3

Pre-Requisite(s): 24CYS102 Problem Solving and Algorithmic Thinking

Course Objectives

- This course provides the foundations of programming, using C.
- The basic syntax and semantics of a typical, low-level programming language, and the principles and methods of using it, will form the focus of this course.

Course Outcome

CO1: Understand the typical programming constructs: data (primitive and compound), control, modularity, recursion etc. thereby to understand a given program

CO2: Understand and analyze a given program by tracing, identifying coding errors and debugging them.

CO3: Make use of the programming constructs appropriately and effectively while developing computer programs.

CO4: Develop computer programs that implement suitable algorithms for problem scenarios and applications.

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Syllabus

Unit 1

Unit 2

Pointers: introduction, compatibility, arrays and pointers, Dynamic memory allocation, arrays of pointers, pointer arithmetic. Strings: fixed length and variable length strings, strings and characters, string input, output, array of strings, string manipulation functions, sorting of strings.

Unit 3

Structures: structure vs array comparison, complex structures, structures and functions, Union. Files and streams, file input output, command line arguments.

Textbook


Reference(s)

Pre-Requisite(s): 24CYS102 Problem Solving and Algorithmic Thinking

Course Objectives

- This course provides the foundations of programming.
- Apart from the usual mechanics of a typical programming language, the principles and methods will form the focus of this course.
- Shift from learn to program programming to learn forms the core of this course.

Course Outcome

CO1: Understand the typical programming constructs: data (primitive and compound), control, modularity, recursion etc. thereby to understand a given program
CO2: Understand and analyze a given program by tracing, identifying coding errors and debugging them.
CO3: Make use of the programming constructs appropriately and effectively while developing computer programs.
CO4: Develop computer programs that implement suitable algorithms for problem scenarios and applications.

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Syllabus

Unit 1

Unit 2


Unit 3


Textbook


Reference(s)

3. Anita Goel and Ajay Mittal, Computer fundamentals and Programming in C, Pearson Education India; 2016
Prerequisite(s): Nil

Course Objectives

- To introduce different classical cryptographic techniques and its theoretical security analysis.
- To provide and demonstrate different cryptanalysis attacks against the cryptographic techniques, and their attack models.
- To show the impact of these ciphers on society during the time of their use.

Course Outcomes

CO1: Identify the basic language & terminologies of cryptography.
CO2: Demonstrate Encryption and Decryption methods using various classical ciphers.
CO3: Perform cryptanalysis of classical cryptography.
CO4: Understand the concepts of symmetric cryptosystem.

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Syllabus


Textbook(s)


Reference(s)

Course Objective

- To deepen students’ understanding and further their knowledge about the different aspects of Indian culture and heritage.
- To instil into students a dynamic awareness and understanding of their country’s achievements and civilizing influences in various fields and at various epochs.

Course Outcome

CO1: Get an overview of Indian contribution to the world in the field of science and literature.
CO2: Understand the foundational concepts of ancient Indian education system.
CO3: Learn the important concepts of Vedas and Yoga sutras and their relevance to daily life.
CO4: Familiarize themselves with the inspirational characters and anecdotes from the Mahabharata and Bhagavad-Gita and Indian history.
CO5: Gain an understanding of Amma’s role in the empowerment of women

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Syllabus

Unit 1

To the World from India; Education System in India; Insights from Mahabharata; Human Personality. India’s Scientific System for Personality Refinement.

Unit 2

The Vedas: An Overview; One God, Many Forms; Bhagavad Gita – The Handbook for Human Life; Examples of Karma Yoga in Modern India.
Unit 3

Chanakya’s Guidelines for Successful Life; Role of Women; Conservations with Amma.

Textbook

_Cultural Education Resource Material Semester-2_

**Reference Book(s)**

1. Cultural Heritage of India. R.C. Majumdar. Ramakrishna Mission Institute of Culture.
3. Indian Culture and India’s Future. Michel Danino. DK Publications.
Pre-Requisite(s): Nil

Course Objectives

- To build an understanding of basics of optimization techniques
- To introduce basics of linear programming and meta-heuristic search techniques
- To understand the basics of an evolutionary computing paradigm known as genetic algorithms and its application to engineering optimization problems

Course Outcomes

CO1: Formulate mathematical models for optimization problems
CO2: Analyze the complexity of solutions to an optimization problem
CO3: Develop hybrid models to solve an optimization problem
CO4: Apply Evolutionary Computation Methods to find solutions to complex problems

CO-PO Mapping

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Syllabus

Unit 1

Introduction to optimization: optimal problem formulation, engineering optimization problems, optimization algorithms, numerical search for optimal solution.
Calculus: Single variable nonlinear optimization - Optimality criteria, maxima, minima and inflection point with problems, Multivariable nonlinear optimization- Optimality criteria, Hessian matrix, convexity and concavity of a function, global minima and maxima, local minima and maxima, and saddle point with problems.
Unit 2

Geometry of LPP, Simplex algorithm, two phases of Simplex method, Revised Simplex method, Duality in LPP, Dual simplex method

Unit 3

Region elimination methods: Interval halving method, Fibonacci search method, golden section search method.
Point estimation method: successive quadratic search method.
Derivative based methods: Bisection method, Secant method, Newton’s method.

Unit 4


Unit 5

Nature inspired optimization techniques: Genetic Algorithm (GA) (Genetic Operations on Binary Strings, Analysis of GA), Introduction to Particle Swarm Optimization and ant colony Optimisation.

Textbooks


Reference Books

Pre-Requisite(s): Nil

Course Objectives

- To impart the design, development and implementation of Dynamic Web Pages.
- To develop programs for Web using JavaScript
- To give an introduction to responsive web design
- To deploy web applications

Course Outcome

CO1: Understand the basics of World Wide Web and UI Design Principles.
CO2: Develop interactive Web pages using HTML
CO3: Build a professional document using Cascaded Style Sheets.
CO4: Construct websites for user interactions using JavaScript.
CO5: Develop and deploy web applications using Node.js

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Syllabus

Unit 1

Unit 2


Unit 3


Text Book(s)


Reference(s)

Pre-Requisite(s): 24CYS104 - Computer Hardware and System Essentials

Course Objectives

- To introduce the structure and implementation of modern operating systems, virtual machines and their applications.
- To summarize techniques for achieving process synchronization and managing resources like memory, CPU, and files and directories in an operation system.
- To study common algorithms used for both pre-emptive and non-pre-emptive scheduling of tasks in operating systems (such a priority, performance comparison, and fair-share schemes) will be done.
- To give a broad overview of memory hierarchy and the schemes used by the operating systems to manage storage requirements efficiently.

Course Outcomes

CO1: Understand the architecture and functionalities of modern OS.
CO2: Understand and apply the algorithms for resource management and scheduling.
CO3: Analyze and apply semaphores and monitors for classical and real-world synchronization scenarios.
CO4: Engage in independent learning as a team to study characteristic features of modern operating systems.

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Syllabus

Unit 1

Unit 2


Unit 3


Textbook(s)


Reference Book(s)

Pre-Requisite(s): 24CYS203 Operating Systems, 24CYS104 Computer Hardware and System Essentials

Course Objectives

- This course aims to provide the students an in-depth understanding of process management, inter process communication and implementation of various CPU scheduling algorithms.
- To impart an in-depth knowledge on semaphores, threads, deadlock, paging and page replacement techniques.
- To implement various file Organization methods and file allocation strategies.

Course Outcomes

CO1: Experiment with Linux commands
CO2: Implement program for file and process management using system calls
CO3: Choose the best CPU scheduling algorithm for a given problem instance
CO4: Identify the performance of various page replacement algorithms
CO5: Develop algorithm for deadlock avoidance, detection and file allocation strategies

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Syllabus

Unit 1

Unit 2


Unit 3


Textbook(s)


Reference Book(s)

3. Russ Cox, Frans Kaashoek, Robert Morris, xv6: a simple, Unix-like teaching operating system; 2020
Pre-Requisite(s): 24CYS113 Computer Programming

Course Objectives

- Primary objective of this course is to introduce advanced programming concepts such as Object-oriented paradigm, advanced pointers and so forth.
- This course focuses on learning Python and C++ with an emphasis on ADT and STL usage for implementing data structures.

Course Outcomes

CO1: Understand the object-oriented programming concepts in statically typed languages and thereby understand a given program.

CO2: Implement ADT in static object-oriented paradigm.

CO3: Analyze the similarities, differences and code efficiency among object-oriented programming languages.

CO4: Develop computer programs that implement suitable algorithms for given problem scenarios and applications.

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Syllabus

Unit 1

Overview of Object-Oriented Paradigm, Objects as a group of variables, Classes as a named group of methods and data, morphing from structures to classes, Input and Output, Access Specifiers, Member functions: Accessor, Mutator and Auxiliary, Constructors and Destructors, New and Delete Operators, Overloading, Inheritance: Handling Access and Specialization through Overriding, Polymorphism: Virtual Functions, Abstract Class and Virtual Function Tables. Interfaces: Define, Implement, Typing, Extending/Evolving Interface, Annotations, overriding and hiding methods: static, interface and instance methods. Object Class, Final Class and Methods, Packages.
Unit 2


Unit 3

Revisiting Object-Oriented Concepts in Java; Wrapper classes, String, and StringBuilder classes, Number, Math, Random, Array methods, Date-Time. Java files and I/O, Exceptions, Inner classes, Collection framework- Comparator and Comparable, Vector and Array list, Iterator and Iterable, Collection Interfaces: Collection, Set, List, Queue, Dequeue, Map, Object ordering, Sorted Set, Sorted Map, Generics, Serialization. Concurrency Creating Threads, Thread states, Runnable threads, Coordinating Threads, Interrupting Threads, Multi-threading, Runnable Interface.

Text Book(s)


Reference(s)

Pre-Requisite(s): Nil

Course Objective

- To understand the concepts of database design, database languages.
- To understand database-system implementation and maintenance.
- To expose to some of the recent trends in databases.

Course Outcomes

**CO1:** Formulate and apply relational algebraic expressions, SQL and PL/SQL statements to query relational databases.

**CO2:** Design and build ER models for real world databases.

**CO3:** Design and build a normalized database management system for real world databases.

**CO4:** To learn different high-level databases and selection of right database.

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Syllabus

**Unit 1**

Unit 2


Unit 3

Advanced SQL. Case Study: Different types of high-level databases – MongoDB, Hadoop/Hbase. Tips for choosing the right database for the given problem.

Text Book(s)


Reference(s)

Pre-Requisite(s): 24CYS114 Classical Cryptography

Course Objective

- To introduce the basic terminology, concepts, and standards of cryptography.
- Familiarize students with the main approaches, algorithms, and protocols in modern cryptography.
- To explain the principles and underlying mathematical theory of today’s cryptographic algorithms.
- To provide an understanding of potential weaknesses and problems with ciphers

Course Outcomes

CO1: Understand the concepts of symmetric cryptosystem.
CO2: Understand different techniques for message integrity.
CO3: Understand the concepts of public key cryptosystem.
CO4: Understand the concept of digital signatures.

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Syllabus


Textbooks:


Reference Books:


3. W. Mao, Modern Cryptography – Theory and Practice, Pearson Education; 2004

Pre-requisite: An open mind and the urge for self-development, basic English language skills, knowledge of high school level mathematics.

Course Objectives
- Assist students in inculcating Soft Skills and developing a strong personality
- Help them improve their presentation skills
- Support them in developing their problem solving and reasoning skills
- Facilitate the enhancement of their communication skills

Course Outcomes
CO1 - Soft Skills: To develop greater morale and positive attitude to face, analyse, and manage emotions in real life situations, like placement process.
CO2 - Soft Skills: To empower students to create better impact on a target audience through content creation, effective delivery, appropriate body language and overcoming nervousness, in situations like presentations, Group Discussions and interviews.
CO3 - Aptitude: To analyze, understand and employ the most suitable methods to solve questions on arithmetic and algebra.
CO4 - Aptitude: To investigate and apply suitable techniques to solve questions on logical reasoning and data analysis.
CO5 - Verbal: To infer the meaning of words and use them in the right context. To have a better understanding of the basics of English grammar and apply them effectively.
CO6 - Verbal: To identify the relationship between words using reasoning skills. To develop the capacity to communicate ideas effectively.

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Syllabus

Soft Skills
Soft Skills and its importance: Pleasure and pains of transition from an academic environment to work-environment. New-age challenges and distractions. Learning to benefit from constructive criticisms and feedback, Need for change in mindset and up-skilling to keep oneself competent in the professional world.

Managing Self: Knowing oneself, Self-perception, Importance of positive attitude, Building and displaying confidence, Avoiding being overconfident, Managing emotions, stress, fear. Developing Resilience and handling failures. Self-motivation, Self-learning, and continuous knowledge up-gradation / Life-long learning. Personal productivity - Goal setting and its importance in career planning, Self-discipline, Importance of values, ethics and integrity, Universal Human Values.

Aptitude
Problem Solving I
**Ratio, Proportion & Variation**: Basics, Alligations, Mixtures, and Partnership.

**Averages**: Basics, and Weighted Average.

**Data Interpretation**: Tables, Bar Diagrams, Venn Diagrams, Line Graphs, Pie Charts, Caselets, Mixed Varieties, Network Diagrams and other forms of data representation.

**Verbal**

**Vocabulary**: Familiarize students with the etymology of words, help them realize the relevance of word analysis and enable them to answer synonym and antonym questions. Create an awareness about the frequently misused words, commonly confused words and wrong form of words in English.

**Grammar (Basic)**: Help students learn the usage of structural words and facilitate students to identify errors and correct them.

**Reasoning**: Stress the importance of understanding the relationship between words through analogy questions.

**Speaking Skills**: Make students conscious of the relevance of effective communication in today’s world through various individual speaking activities.

**References**:

5. The hard truth about Soft Skills, by Amazon Publication.
6. Verbal Skills Activity Book, CIR, AVVP
7. English Grammar & Composition, Wren & Martin
8. Nova’s GRE Prep Course, Jeff Kolby, Scott Thornburg & Kathleen Pierce
9. Cracking the New GRE 2012
10. Kaplan’s – GRE Comprehensive Programme
14. How to Prepare for Data Interpretation for the CAT, Arun Sharma.

**Evaluation Pattern**

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**Pass / Fail**

*CA - Can be presentations, speaking activities and tests.*
AMRITA VALUE PROGRAMMES

22AVP201 Message from Amma’s Life for the Modern World
Amma’s messages can be put to action in our life through pragmatism and attuning of our thought process in a positive and creative manner. Every single word Amma speaks and the guidance received in on matters which we consider as trivial are rich in content and touches the very inner being of our personality. Life gets enriched by Amma’s guidance and She teaches us the art of exemplary life skills where we become witness to all the happenings around us still keeping the balance of the mind.

22ADM211 Leadership from the Ramayana
Introduction to Ramayana, the first Epic in the world – Influence of Ramayana on Indian values and culture – Storyline of Ramayana – Study of leading characters in Ramayana – Influence of Ramayana outside India – Relevance of Ramayana for modern times.

22ADM201 Strategic Lessons from the Mahabharata
Introduction to Mahabharata, the largest Epic in the world – Influence of Mahabharata on Indian values and culture – Storyline of Mahabharata – Study of leading characters in Mahabharata – Kurukshetra War and its significance - Relevance of Mahabharata for modern times.

22AVP204 Lessons from the Upanishads
Introduction to the Upanishads: Sruti versus Smrti - Overview of the four Vedas and the ten Principal Upanishads - The central problems of the Upanishads – The Upanishads and Indian Culture – Relevance of Upanishads for modern times – A few Upanishad Personalities: Nachiketas, SatyakamaJabala, Aruni, Shvetaketu.

22AVP205 Message of the Bhagavad Gita

22AVP206 Life and Message of Swami Vivekananda
Brief Sketch of Swami Vivekananda’s Life – Meeting with Guru – Disciplining of Narendra - Travel across India - Inspiring Life incidents – Address at the Parliament of Religions – Travel in United States and Europe – Return and reception India – Message from Swamiji’s life.

22AVP207 Life and Teachings of Spiritual Masters India
Sri Rama, Sri Krishna, Sri Buddha, AdiShankaracharya, Sri Ramakrishna Paramahamsa, Swami Vivekananda, Sri RamanaMaharshi, Mata Amritanandamayi Devi.

22AVP208 Insights into Indian Arts and Literature
The aim of this course is to present the rich literature and culture of Ancient India and help students appreciate their deep influence on Indian Life - Vedic culture, primary source of Indian Culture – Brief introduction and appreciation of a few of the art forms of India - Arts, Music, Dance, Theatre.

22AVP209 Yoga and Meditation
The objective of the course is to provide practical training in YOGA ASANAS with a sound theoretical base and theory classes on selected verses of Patanjali’s Yoga Sutra and Ashtanga Yoga. The coverage also includes the effect of yoga on integrated personality development.

22AVP210 Kerala Mural Art and Painting
Mural painting is an offshoot of the devotional tradition of Kerala. A mural is any piece of artwork painted or applied directly on a wall, ceiling or other large permanent surface. In the contemporary scenario Mural painting is not restricted to the permanent structures and are being done even on canvas. Kerala mural paintings are the frescos depicting mythology and legends, which are drawn on the walls of temples and churches in South India, principally in Kerala. Ancient temples, churches and places in Kerala, South India, display an
abounding tradition of mural paintings mostly dating back between the 9th to 12th centuries when this form of art enjoyed Royal patronage. Learning Mural painting through the theory and practice workshop is the objective of this course.

**22AVP213 Traditional Fine Arts of India**

India is home to one of the most diverse Art forms world over. The underlying philosophy of Indian life is ‘Unity in Diversity’ and it has led to the most diverse expressions of culture in India. Most art forms of India are an expression of devotion by the devotee towards the Lord and its influence in Indian life is very pervasive. This course will introduce students to the deeper philosophical basis of Indian Art forms and attempt to provide a practical demonstration of the continuing relevance of the Art.

**22AVP214 Principles of Worship in India**

Indian mode of worship is unique among the world civilizations. Nowhere in the world has the philosophical idea of reverence and worshipfulness for everything in this universe found universal acceptance as it in India. Indian religious life even today is a practical demonstration of the potential for realization of this profound truth. To see the all-pervading consciousness in everything, including animate and inanimate, and constituting society to realise this truth can be seen as the epitome of civilizational excellence. This course will discuss the principles and rationale behind different modes of worship prevalent in India.

**22AVP215 Temple Mural Arts in Kerala**

The traditional percussion ensembles in the Temples of Kerala have enthralled millions over the years. The splendor of our temples makes art enthusiast spellbound, warmth and grandeur of color combination sumptuousness of the outline, crowding of space by divine or heroic figures often with in vigorous movement are the characteristics of murals.

The mural painting specially area visual counterpart of myth, legend, gods, diries, and demons of the theatrical world, Identical myths are popular the birth of Rama, the story of Bhima and Hanuman, Shiva, as Kirata, and the Jealousy of Uma and ganga the mural painting in Kerala appear to be closely related to, and influenced by this theatrical activity the art historians on temple planes, wood carving and painting the architectural plane of the Kerala temples are built largely on the pan-Indians almost universal model of the Vasthupurusha.

**22AVP218 Insights into Indian Classical Music**

The course introduces the students into the various terminologies used in Indian musicology and their explanations, like Nadam, Sruti, Svar – svara nomenclature, Stayi, Graha, Nyasa, Amsa, Thala, Saptatalas and their angas, Shadangas, Vadi, Samavadi, Anuvadi. The course takes the students through Carnatic as well as Hindustani classical styles.

**22AVP219 Insights into Traditional Indian Painting**

The course introduces traditional Indian paintings in the light of ancient Indian wisdom in the fields of aesthetics, the Shadanga (Sixs limbs of Indian paintings) and the contextual stories from ancient texts from where the paintings originated. The course introduces the painting styles such as Madhubani, Kerala Mural, Pahari, Cheriyal, Rajput, Tanjore etc.

**22AVP220 Insights into Indian Classical Dance**

The course takes the students through the ancient Indian text on aesthetics the Natyasastra and its commentary the AbhinavaBharati. The course introduces various styles of Indian classical dance such as Bharatanatyan, Mohiniyatton, Kuchipudi, Odissy, Katak etc. The course takes the students through both contextual theory as well as practice time.

**22AVP221 Indian Martial Arts and Self Defence**

The course introduces the students to the ancient Indian system of self-defense and the combat through various martial art forms and focuses more on traditional Kerala’s traditional KalariPayattu. The course introduces the various exercise technique to make the body supple and flexible before going into the steps and techniques of the martial art. The advanced level of this course introduces the technique of weaponry.
Pre-Requisite(s): Nil

Course Objectives

- To introduce the modern theory of probability, statistics and its applications to modeling and analysis of stochastic systems.
- To understand the important models of discrete and continuous probability distributions and widely used models of sampling distributions.
- To know important applications of probability and statistics in engineering as indispensable tools in decision analysis.

Course Outcome

CO1: Understand the concept of probability and its features.
CO2: Identify the characteristics of different discrete and continuous probability distributions.
CO3: Identify the type of statistical situation to which different distributions can be applied
CO4: Apply and calculate expected value and moments

CO-PO Mapping

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Syllabus

Unit 1


Unit 2
Random variables, Probability Distributions and Probability mass functions, Cumulative Distribution functions, mathematical expectation, variance, moments, and moment generating function.

Unit 3

Standard discrete distributions - Binomial, Poisson, Uniform, Geometric distributions, Negative binomial and Hypergeometric Distributions - Standard continuous distributions - Uniform, Exponential, Gamma, Beta and Normal distributions. Chebyshev’s theorem.

Unit 4

Two dimensional random variables - Joint, marginal and conditional probability distributions for discrete and continuous cases, independence, expectation of two-dimensional random variables - conditional mean, conditional variance, covariance and correlation.

Unit 5


Textbooks:


Reference Books:

Pre-Requisite(s): 24CYS111 Digital Signal Processing, 24MAT109 Linear Algebra

Course Objectives

- To study the image fundamentals and mathematical transforms necessary for image transform.
- To study image processing techniques like image enhancement, image reconstruction, image compression, image segmentation and image representation.

Course Outcomes

CO1: Understand fundamental principles of image processing and perform basic operations on pixels.
CO2: Apply the image processing algorithms and filters in spatial domain for image enhancement and restoration.
CO3: Analyze images in the frequency domain and explore the frequency domain filters for image enhancement and restoration.
CO4: Apply segmentation algorithms on Images and analyze their performance.
CO5: Apply morphological processing on images for simple image processing applications.

CO-PO Mapping

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Syllabus

Unit 1


Unit 2

Unit 3


Textbook(s)


Reference(s)

Pre-Requisite(s): 24CYS203 Operating System and 24CYS205 Database Management System

Course Objectives

- Capable of analysing, evaluating and enhancing the security of information systems by identifying potential threats and possible countermeasures in the field of database and system security.

Course Outcome

CO1: A quick refresher to the fundamentals of Database and Operating Systems
CO2: Exploring access control security models and policies in database and operating systems
CO3: Familiarize the Challenges, Attacks and Defences in Database Systems
CO4: Exploring the basic functionalities of different types of Malwares
CO5: Familiarize the Challenges, Attacks and Defences in Operating Systems

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Syllabus:


Textbooks:

References

Pre-Requisite(s): 24CYS203 Operating System and 24CYS205 Database Management System

Course Objectives

- To experiment with various security vulnerabilities, attacks and countermeasures in OS and Databases

Course Outcome:

**CO1:** Experimenting with fundamentals of Database and Operating Systems
**CO2:** Experimenting with access control models in Database and Operating Systems
**CO3:** Exploring Challenges, Attacks and Defences in Database Systems with demonstration
**CO4:** Exploring the basic functionalities of different types of Malwares
**CO5:** Exploring Challenges, Attacks and Defences in Operating Systems with demonstration

**CO-PO Mapping**

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Syllabus

**List of Experiments**

1. Exploring the concepts of binaries, libraries (static and dynamic) and Makefile
2. Implementing the discretionary access control mechanism in operating Systems (linux)
3. Implementing the discretionary access control mechanism in databases (mysql)
4. Linux Virtualization (Chroot)
5. Implementing the mandatory access control mechanism (SElinux or AppArmor)
6. Virtual private databases (Oracle label Security)
7. Exploring different types of Malwares and analysis (Static, Dynamic tools and Cuckoo sandbox)
8. Exploring the Honeypot IDS(KFSensor)
9. Exploring the file system of Android Mobile operating system and Malware Analysis (MobSF)

**Textbook**


Reference:

Pre-Requisite(s): 24MAT109 Linear Algebra, 24CYS211 Probability and Statistics

Course Objectives

- The aim of this course is to provide foundational knowledge in machine learning.
- The students will learn to implement, train and validate the machine learning models and understand the recent algorithms in machine learning through case studies.

Course Outcomes

CO2: Design and implement various machine learning algorithms in a range of real-world applications.
CO3: Understand strengths and weaknesses of many popular machine learning approaches.
CO4: Analyse the underlying mathematical relationships within and across Machine Learning algorithms.
CO5: Apply the paradigms of supervised and un-supervised learning on use cases of security.

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Syllabus

Unit 1

Foundations of supervised learning - Decision trees and inductive bias, Regression Vs Classification, Supervised: Linear Regression, Logistic Regression, Generalisation, Training, Validation and Testing, Problem of Overfitting, Bias vs Variance, Performance metrics, Decision Tree, Random Forest, Perceptron, Beyond binary classification. Case study: Anomaly detection

Unit 2

Advanced supervised learning - Naive Bayes, Bayesian Belief Network, K-Nearest Neighbour, Support vector machines, Markov model, Hidden Markov Model, Parameter Estimation: MLE and Bayesian Estimate, Expectation Maximisation, Neural Networks.
Unit 3


Text Book(s)


Reference(s)

Pre-Requisite(s): 24CYS113 Computer Programming

Course Objectives

- This course aims to provide the students with an in-depth understanding of structure and implementation of the common data structures used in computer science.
- It imparts the ability to solve problems by choosing and applying the right data structures.
- It also imparts the ability to improve the efficiency of programs by applying the right data structures.

Course Outcomes

CO1: Understand the linear data structures – Stacks, Queue and Linked List and their functionalities.
CO3: To impart familiarity with various sorting, searching and hashing techniques.
CO4: Develop skills to identify and apply appropriate data structures to solve problems and improve their efficiency.

CO-PO Mapping

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Syllabus

Unit 1

Unit 2


Unit 3


Text Book


Reference(s)

Pre-Requisite(s): 24CYS181 Computer Programming Lab

Course Objectives

- To implement basic linear and non-linear data structures and their major operations.
- To implement applications using the right data structures.
- To implement algorithms for various sorting techniques

Course Outcomes

CO1: Implementing concepts and functionalities of Data Structures efficiently.
CO2: Analyzing the time complexity of implemented algorithms.
CO3: Implement linear and non-linear data structures using linked lists.
CO4: Design and apply various data structures such as stacks, queues, trees, graphs, etc. to solve various computing problems.
CO5: Implement various kinds of searching and sorting techniques.
CO6: Identify and use a suitable data structure and algorithm to solve a real-world problem.

CO-PO Mapping

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Syllabus

List of data structures and algorithms to be implemented:

1. Implementation of linear sorting, and Divide and Conquer based sorting algorithms
2. Array and Linked list implementation of List, Stack and Queue ADTs.
3. Doubly linked list and circular linked list
4. Applications of List, Stack and Queue ADTs.
5. Array based and linked structure-based implementation of Binary Tree operations
6. Implementation of Merkle Trees
7. Implementation of priority queues-heaps
8. List based implementation of hash tables
9. Implementation of skip lists
10. Implementation of binary search trees, AVL trees and Splay trees
11. Implementation of graph traversals

Text Book


Reference(s)

Pre-Requisite(s): 24CYS204– Advanced Programming and 24CYS203- Operating System

Course Objectives

- This course covers the fundamentals of Android programming using the Android SDK.
- To provide and discuss various techniques and tools to develop & deploy Android Applications.
- To demonstrate various applications of Android programming and its practical implications.

Course Outcome

CO1: Demonstrate their understanding of the fundamentals of Android operating systems.
CO2: Able to use Android software development tools.
CO3: Design and develop software with reasonable complexity on mobile platform.
CO4: Ability to debug the programs and deploy the software to mobile devices.

CO-PO Mapping

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Syllabus


Text Book(s)


Reference(s)

Pre-requisite: An inquisitive mind, basic English language skills, knowledge of high school level mathematics.

Course Objectives
- Assist students in inculcating Soft Skills and developing a strong personality
- Help them improve their presentation skills
- Aid them in developing their problem solving and reasoning skills
- Facilitate them in improving the effectiveness of their communication

Course Outcomes
CO1 - Soft Skills: To develop greater morale and positive attitude to face, analyse, and manage emotions in real life situations, like placement process.
CO2 - Soft Skills: To empower students to create better impact on a target audience through content creation, effective delivery, appropriate body language and overcoming nervousness, in situations like presentations, Group Discussions and interviews.
CO3 - Aptitude: To analyze, understand and employ the most suitable methods to solve questions on arithmetic and algebra.
CO4 - Aptitude: To investigate and apply suitable techniques to solve questions on logical reasoning and data analysis.
CO5 - Verbal: To learn to use more appropriate words in the given context. To have a better understanding of the nuances of English grammar and become capable of applying them effectively.
CO6 - Verbal: To be able to read texts critically and arrive at/predict logical conclusions. To learn to organize speech and incorporate feedback in order to convey ideas with better clarity.

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Syllabus

Soft Skills

Communication: Process, Language Fluency, Non-verbal, Active listening. Assertiveness vs. aggressiveness. Barriers in communication. Digital communication

Presentations: Need, importance, preparations, research and content development, structuring and ensuring flow of the presentation. Ways and means of making an effective presentation: Understanding and connecting with the audience – using storytelling technique, managing time, appropriate language, gestures, posture, facial expressions, tones, intonations and grooming. Importance of practice to make an impactful presentation.

Aptitude

Problem Solving II
Equations: Basics, Linear, Quadratic, Equations of Higher Degree and Problems on ages.
Logarithms, Inequalities and Modulus: Basics
Time, Speed and Distance: Basics, Average Speed, Relative Speed, Boats & Streams, Races and Circular tracks.
**Logical Reasoning:** Arrangements, Sequencing, Scheduling, Venn Diagram, Network Diagrams, Binary Logic, and Logical Connectives.

**Verbal**

**Vocabulary:** Aid students learn to use their vocabulary to complete the given sentences with the right words. Usage of more appropriate words in different contexts is emphasized.

**Grammar (Basic-intermediate):** Help students master usage of grammatical forms and enable students to identify errors and correct them.

**Reasoning:** Emphasize the importance of avoiding the gap (assumption) in arguments/statements/communication.

**Reading Comprehension (Basics):** Introduce students to smart reading techniques and help them understand different tones in comprehension passages.

**Speaking Skills:** Make students be aware of the importance of impactful communication through individual speaking activities in class.

**Writing Skills:** Introduce formal written communication and keep the students informed about the etiquette of email writing.

**References:**
5. The hard truth about Soft Skills, by Amazon Publication.
6. Verbal Skills Activity Book, CIR, AVVP
7. English Grammar & Composition, Wren & Martin
8. Nova’s GRE Prep Course, Jeff Kolby, Scott Thornburg & Kathleen Pierce
9. Cracking the New GRE 2012
10. Kaplan’s – GRE Comprehensive Programme
14. How to Prepare for Data Interpretation for the CAT, Arun Sharma.

**Evaluation Pattern**

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*CA - Can be presentations, speaking activities and tests.
Pre-Requisite(s): Nil

Course Objectives

- To introduce fundamental communication models
- To understand the fundamental principles of digital modulation and demodulation methods.
- To quantify the impact of noise and channel impairments on digitally modulated signals.
- To design digital signals and optimum receivers to combat the impact of noise and channel impairments.

Course Outcomes

**CO1:** Understand the fundamental principles of digital modulation and demodulation methods.

**CO2:** Identify and list various issues present in the design of a communication system

**CO3:** Apply the time domain and frequency domain concepts of signals in data communication

**CO4:** Design suitable error detection and error correction algorithms to achieve error free data communication.

**CO-PO Mapping**

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Syllabus

**Unit 1**

Introduction to communication systems, Data, signal and Transmission: Analog and Digital, Transmission modes, Transmission Impairments, data rates for different types of multimedia data (audio, video, text), Data Rate Limits - Nyquist's and Shannon's capacity equations, Performance, Digital Transmission: Digital data over Digital channel, Analog data over Digital channel, Analog Transmission: Analog data over Analog channel, Digital data over Analog channel. Source of noises and attenuation methods- Delay Distortion, Noise, Thermal Noise, Intermediation Noise, Crosstalk Noise, Impulse Noise, Channel Capacity.
Unit 2


Unit 3

Information Theory: Measure of Information, Entropy, Discrete and Continuous channel, Shannon's encoding algorithms, Error Detection and Correction: Block Coding, Linear Block Codes, hamming distance, Cyclic Codes, Checksum – CRC - capabilities of CRC, FEC: Hamming code, constant ratio code, convolutional Code-Threshold decoding, Sequential decoding, Viterbi decoding.

Text book(s)


Reference(s)

Pre-Requisite(s): 24CYS113 Computer Programming and 24CYS213 System Security

Course Objectives

- This course facilitates learning various techniques for systems and applications programmers to write code securely, as well as to find and mitigate vulnerabilities in existing code.

Course Outcomes

CO1: Understand the common security threats in software applications.
CO2: Identify and mitigate the vulnerabilities due to string manipulation errors.
CO3: Identify and mitigate the vulnerabilities based on dynamic memory management errors and integer operations.
CO4: Identify and mitigate the vulnerabilities due to errors in formatted output functions and concurrency.

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Syllabus


Textbooks:

References:


Pre-Requisite(s): 24CYS215- Data Structures and Algorithms

Course Objectives

- To provide the fundamentals of algorithm design and analysis, specifically in terms of design techniques, application of these design techniques for real-world problem solving and analysis of complexity and correctness of algorithms.
- To provide understanding of how the worst-case time complexity of an algorithm is defined, how asymptotic notation is used to provide a rough classification of algorithms.
- To explain various computational models, order notation and complexity measures to analyse complexity & performance of algorithms associated with real-world problems.

Course Outcomes

CO1: Evaluate the correctness and analyze complexity of algorithms.
CO2: Understand and implement various algorithmic design techniques and solve classical problems.
CO3: Design solutions for real world problems by identifying, applying and implementing appropriate design techniques.
CO4: Analyze the impact of various implementation choices on the algorithm complexity.

CO-PO Mapping

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Syllabus

Unit 1

Unit 2


Unit 3


Text Book


Reference(s)

Pre-Requisite(s): 24CYS104 - Computer Hardware and System Essentials

Course Objectives

- This course introduces the fundamental principles of computer networks including important layers and protocols.
- This course will focus on the most important layers including transport layer and link layer along with their functionalities.
- This course will help students with network programming and debugging capabilities.

Course Outcomes

**CO1**: Understand the basic architectural components of computer networks and apply mathematical foundations to solve computational problems in computer networking.

**CO2**: Apply network application services, protocols and programming.

**CO3**: Analyze protocols for data transfer mechanisms, buffer management and flow handling mechanisms.

**CO4**: Analyze devices for routing and apply routing protocols.

**CO5**: Apply and Analyze network access protocols and error handling codes to design Local Area Network.

**CO6**: Comprehend concepts of virtualization and data centric networking.

**CO-PO Mapping**

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Syllabus

Unit 1

Unit 2


Unit 3


Text Book


Reference(s)

Pre-Requisite(s): 24CYS104 - Computer Hardware and System Essentials

Course Objectives

- To be familiarized with the use network commands.
- To learn socket programming.
- To implement and analyze various network protocols.
- To use simulation tools to analyze the performance of various network protocols.

Course Outcomes

CO1: Hands on training regarding the design, troubleshooting, modelling and evaluation of computer networks.

CO2: Perform simulations that will help them evaluate their design approaches and expected network performance.

CO3: Use simulation tools to analyze the performance of various network protocols.

CO4: Analyze and simulate various routing algorithms.

CO-PO Mapping

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Syllabus

List of Experiments:

1. Basic Networking commands.
2. Socket Programming - Client server communication using sockets (TCP and UDP)
3. Implementation of unicast, broadcast and multicast Communication
4. Implementation of Checksum and congestion control algorithms
5. Implementation and simulation of algorithm for routing protocols
6. Implementation of SMTP protocol using UDP

10. Setting up a Network LAN with subnetting and CIDR concept for a specific scenario.

**Text Book(s)**


**Reference(s)**

2. https://www.nsnam.org/
3. https://www.wireshark.org/
Pre-Requisite(s): 24MAT109 - Linear Algebra, 24CYS211 - Probability and Statistics

Course Objectives

- This course provides a comprehensive introduction to artificial intelligence, emphasizing advanced topics such as advanced search, reasoning and decision-making under uncertainty.
- This course aims to make the learners understand the basic principles in AI and Neural Networks.

Course Outcome

CO1: Understand the fundamental of Artificial Intelligence (AI) and Neural Networks.
CO2: Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.
CO3: Apply the understanding of AI techniques in various applications of intelligent agents, expert systems, and artificial neural networks.
CO4: Demonstrate an ability to share in discussions of AI, its current scope and limitations, and societal implications.

CO-PO Mapping

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Syllabus

Unit 1

Introduction to AI and systems - Problem formulation, problem definition, Control Strategies, Search Strategies - Depth first, Breadth first, problem characteristics, system characteristics, problem solving methods - problem graphs, matching, indexing, heuristic functions, A* search algorithm, Hill climbing, Constraint satisfaction - related algorithms, handling uncertainty in terms of probability, measure of performance.
Unit 2

Knowledge representation - Game playing - Predicate logic, Introduction to Predicate calculus, Resolution, use of predicate calculus, Knowledge representation using other logic - Structured representation of knowledge. Knowledge inference - Production based system, Frame based system. Inference - Backward chaining, Forward chaining, Rule value approach. Planning and machine learning - Basic plan generation systems

Unit 3


Text Book


Reference(s)

1. Hawkins J, Blakeslee S. On intelligence: How a new understanding of the Brain Will lead to the creation of Truly Intelligent Machines. Macmillan; 2004
Pre-requisite: Willingness to learn, communication skills, basic English language skills, knowledge of high
school level mathematics.

Course Objectives
- Help students understand corporate culture, develop leadership qualities and become good team players
- Assist them in improving group discussion skills
- Help students to sharpen their problem solving and reasoning skills
- Empower students to communicate effectively

Course Outcomes
CO1 - Soft Skills: To improve the inter-personal communication and leadership skills, vital for arriving at win-win situations in Group Discussions and other team activities.
CO2 - Soft Skills: To develop the ability to create better impact in a Group Discussions through examination, participation, perspective-sharing, ideation, listening, brainstorming and consensus.
CO3 - Aptitude: To identify, investigate and arrive at appropriate strategies to solve questions on geometry, statistics, probability and combinatorics.
CO4 - Aptitude: To analyze, understand and apply suitable methods to solve questions on logical reasoning.
CO5 - Verbal: To be able to use diction that is more refined and appropriate and to be competent in spotting grammatical errors and correcting them.
CO6 - Verbal: To be able to logically connect words, phrases, sentences and thereby communicate their perspectives/ideas convincingly.

CO-PO Mapping

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Syllabus

Soft Skills
Group Discussions: Advantages of group discussions, Types of group discussion and Roles played in a group discussion. Personality traits evaluated in a group discussion. Initiation techniques and maintaining the flow of the discussion, how to perform well in a group discussion. Summarization/conclusion.

Aptitude
Problem Solving III
Geometry: 2D, 3D, Coordinate Geometry, and Heights & Distance.
Statistics: Mean, Median, Mode, Range, Variance, Quartile Deviation and Standard Deviation.
**Logical Reasoning:** Blood Relations, Direction Test, Syllogisms, Series, Odd man out, Coding & Decoding, Cryptarithmetic Problems and Input - Output Reasoning.

**Verbal**

**Vocabulary:** Create an awareness of using refined language through idioms and phrasal verbs.

**Grammar (Upper Intermediate-Advanced):** Train Students to comprehend the nuances of Grammar and empower them to spot errors in sentences and correct them.

**Reasoning:** Enable students to connect words, phrases and sentences logically.

**Oral Communication Skills:** Aid students in using the gift of the gab to interpret images, do a video synthesis, try a song interpretation or elaborate on a literary quote.

**Writing Skills:** Practice closet tests that assess basic knowledge and skills in usage and mechanics of writing such as punctuation, basic grammar and usage, sentence structure and rhetorical skills such as writing strategy, organization, and style.

**References:**

5. The hard truth about Soft Skills, by Amazon Publication.
6. Verbal Skills Activity Book, CIR, AVVP
7. English Grammar & Composition, Wren & Martin
8. Public Sector – Engineer Management Trainee Recruitment Exam (General English)
9. Nova’s GRE Prep Course, Jeff Kolby, Scott Thornburg & Kathleen Pierce
11. Quantitative Aptitude for All Competitive Examinations, Abhijit Guha.
13. How to Prepare for Data Interpretation for the CAT, Arun Sharma.
15. Quantitative Aptitude for Competitive Examinations, R S Aggarwal.

**Evaluation Pattern**

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*CA - Can be presentations, speaking activities and tests.
Course Objectives
• To study the nature and facts about environment
• To appreciate the importance of environment by assessing its impact on the human world
• To study the integrated themes and biodiversity, pollution control and waste management

Course Outcomes
CO1: Ability to understand aspects of nature and environment
CO2: Ability to analyse impact of environment on human world
CO3: Ability to comprehend pollution control and waste management

CO – PO Mapping

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Syllabus
Unit 1

Unit 2

Unit 3

Text Book(s)

Reference(s)

Evaluation Pattern

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*CA – Can be Quizzes, Assignment, Projects, and Reports
Course Objectives

- Identify and analyse the various challenge indicators present in the village by applying concepts of Human.
- Centered Design and Participatory Rural Appraisal.
- User Need Assessment through Quantitative and Qualitative Measurements
- Designing a solution by integrating Human Centered Design concepts
- Devising proposed intervention strategies for Sustainable Social Change Management

Course Outcome

CO1: Learn ethnographic research and utilise the methodologies to enhance participatory engagement.
CO2: Prioritize challenges and derive constraints using Participatory Rural Appraisal.
CO3: Identify and formulate the research challenges in rural communities.
CO4: Design solutions using human centered approach.

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Syllabus

This initiative is to provide opportunities for students to get involved in coming up with technology solutions for societal problems. The students shall visit villages or rural sites during the vacations (after 4th semester) and if they identify a worthwhile project, they shall register for a 3-credit Live-in-Lab project, in the fifth semester.

Thematic Areas

- Agriculture & Risk Management
- Education & Gender Equality
- Energy & Environment
- Livelihood & Skill Development
- Water & Sanitation
- Health & Hygiene
- Waste Management & Infrastructure

The objectives and the projected outcome of the project will be reviewed and approved by the department chairperson and a faculty assigned as the project guide.

Evaluation Pattern

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<th>ASSESSMENT</th>
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<td>Village Visit Assignments and Reports</td>
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<td>Problem Identification and Assessment</td>
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<td>Ideation: Defining the Needs, Proposed Designs &amp; Review</td>
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Pre-Requisite: 24CYS101 - Cyber Security Essentials

Course Objectives

- To provide the fundamentals of digital and cyber space, impact of the activities.
- To cover the fundamentals of cyber-crime and steps involved in collecting the evidences through various tools.
- To provide basics of Cyber-crime incidents and how Cyber Law address them.

Course Outcomes

CO1: Explain the concept of digital forensics and cyber forensics
CO2: Understand and able to perform cyber forensics for the cybercrime incident
CO3: Able to use different forensics tools and standard to report the real-world cyber incidents
CO4: Familiarizing the fundamentals of Anti-forensics and Cyber laws

CO-PO Mapping

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Syllabus

Unit 1

Classifications of Cyber Crimes against individuals, property and nation, Need for Digital forensics and steps in digital forensics (scientific methods), Number System: Binary, Decimal, Hexadecimal, ASCII, and Unicode representation of data, Arenas for digital forensics: disk, network, wireless, database, mobile, e-mail, GPS and memory, Incident handling and response with forensic triage, Ethical Hacking and future of cybercrime.

Unit 2

Locard's exchange principle and digital forensic investigation models, types: artifacts, identifying raw and proprietary forensic storage formats, identification of potential evidence: slack space, swap space,
steganography, recovery of hidden, deleted and corrupt data, standard file formats with their headers and forensic file carving, planning your investigation, order of volatility and forensic triage, overview of file systems.

**Unit 3**


**Unit 4**

Forensic laboratory requirements: setting up of lab, evaluating lab staff, selection of appropriate forensic workstations, backup and recovery plans, generating forensically sound reports., IPR and Cyber Laws in India - IT Act 2000 and 2008 Amendment and like-minded IPC sections, Code of Ethics, Expert Witness and analyzing sample forensic reports.

**Unit 5**

Validating and gathering evidence using DOS Commands and Unix/Linux Commands, Forensic imaging using DD commands, Software tools - Open Source and proprietary digital forensic frameworks, Hardware tools - write blockers, images and evidence protection containers/bags, NIST tools - CFReDS, CTFF and NSRL and analyzing e-mail headers and network packets.

**Textbook(s)**


**Reference(s)**

Pre-Requisite(s): 24CYS113 Computer Programming, and 24CYS204 Advanced Programming

Course Objectives

- This course provides a quick overview of different paradigms of programming languages.
- It focuses primarily on the functional programming paradigm using Haskell & Rust.

Course Outcomes

CO1: Understand and implement pure functional programs in Haskell
CO2: Understand and implement programs in Rust
CO3: Formulate abstractions with higher order procedures.

CO-PO Mapping

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Syllabus

Programming Paradigms - Overview of various Programming Paradigms. Functional Programming with Haskell - GHCI interpreter - functions and types, functional composition, numbers, lists, tuples, type classes, pattern matching, higher order functions: currying, lambdas, maps and filters, folds, IO monad.
Introduction to Rust - Data types, Operators, Decision Making, Loops, Functions, Tuple and Array, Ownership, Borrowing, Slices, Structure, Modules, Collections, Error Handling, File Input and Output, Package Manager, Iterator and Closure, References, Concurrency - Basics of RUST and Memory safe.

Text Book(s)


Reference(s)

2. Steve Klabnik, Carol Nichols. The Rust Programming Language. No Starch Press; 2018
Pre-Requisite(s): 24CYS304 - Computer Networks

Course Objectives

- This Course provides the understanding about the fundamental concepts of Network Security.
- To transfer a message securely over insecure channel.
- To be able to maintain the confidentiality, Integrity and Availability of data transferred over a Network.

Course Outcome

CO1: Understand various techniques for Network Protection and explore new tools and attacks in network security domain.
CO2: Familiarize the LAN based attacks and their mitigations.
CO3: Exploring Secure Network Communication protocols and attacks.

CO-PO Mapping

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Syllabus

Unit 1

Techniques for Network Protection, Monitoring and Detection: Firewalls, packet filter and stateful firewalls, application aware firewalls, personal firewalls-IPtables, Proxies, NAT, Intrusion Detection System-Snort, Signature and Anomaly based detection, Honeypots and Honeynets, Network Log management-syslog or SPLUNK; RBAC: Role mining; DNS-Dig tool: DNSSEC-DS and NSEC records.

Unit 2

Protocols and Standards: SCP, SSH, SSL3.0, TLS 1.2, STARTTLS, IPSec, VPN and Secure HTTP; Encrypting and Signing Emails: PGP- GPG/open PGP, DKIM and SPF; Single Sign On (SSO)-OAUTH and OPENID.
Unit 3

Attack Techniques: Network reconnaissance-Nmap and vulnerability audits-openVAS; DNS based attacks, Phishing-DNSTwist; Network based malware attacks: Remote access Trojan-Poison Ivy and Domain name generation algorithm based Botnets; LAN attacks: ARP Cache poisoning- Ettercap/arpspoof, MAC flooding, Man in the middle attacks, Port Stealing, DHCP attacks, VLAN hopping; Network Sniffing - Wireshark and Password Cracking-John the Ripper; Attacks on SSL/TLS: SSL stripping, Drown and Poodle attack; Network packet creation and Manipulation using scapy and dpkt libraries.

Text Books


References:

Pre-Requisite(s): 24CYS114 Classical Cryptography and 24CYS206 Modern Cryptography

Course Objectives

- The course will provide mechanisms and properties of cryptographic protocols that establish and maintain security properties of information exchange in two-party and multiparty settings within ambient open communications networks.

Course Outcome

CO1: Acquire an overview and understanding of the problems, notions, definitions, design principles and proof techniques for selected cryptographic protocols.

CO2: Evaluate a given security protocol against the state of the art.

CO3: Understanding and analyzing some typical applications of cryptographic protocols in networked systems.

CO-PO Mapping

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Syllabus

Protocols for identification and login: Interactive protocols, ID protocols, Password protocols, Challenge-response protocols, Schnorr’s identification protocol, Proving properties in zero-knowledge.

Authenticated Key Exchange: Goals for authentication and Key Establishment, encryption-based protocol and its attacks, Perfect forward secrecy, Protocol based on ephemeral encryption, Attacks on Insecure variations, Identity protection, One-sided authenticated key exchange, Security of protocol AKE1, Password authenticated key exchange - Phishing attacks, Protocol PAKE0, Protocol PAKE1, Protocol PAKE2, Explicit key confirmation. Key exchange protocol with an online TTP, Insecure variations of protocol Online TTP

Classes of Key Agreement protocols: Diffie Hellman Key Agreement, MTI Protocols, Diffie Hellman-Based Protocols. Protocols not based on Diffie Hellman.

Pairing based cryptographic protocol: ID based encryption schemes, Boneh and Franklin’s Scheme, Shamir’s encryption and signature schemes.

Conference Key protocols: Security goals, Static and dynamic groups, Generalizing Diffie-Hellman key agreement.

Text Books:

2. Boneh, Dan, and Victor Shoup. A graduate course in applied cryptography. Draft 0.5; 2020

References:

Pre-Requisite(s): 24CYS215 - Data Structures and Algorithms

Course Objectives

- To provide an overview of the problems that can be solved by various kinds of abstract machines such as finite state machine and pushdown automata.
- To understand how lexical analysis and syntax analysis are done using regular expressions and context free grammars respectively.
- To understand various intermediate representations and code generation algorithms for compiler design.

Course Outcome

CO1: Design and development of various finite state machines and regular expressions.
CO2: Apply the concepts of finite automata and regular expressions for the lexical analysis of a program.
CO3: Demonstrate the push down automata and context free grammar to recognize Context free languages and apply the same for syntax analysis or parsing.
CO4: Generate intermediate code and target code for a simple compiler.

CO-PO Mapping

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Syllabus

Unit 1

Finite State Machines: Deterministic Finite Automata (DFA) - Non-Deterministic Finite Automata (NFA) - Equivalence of NFA and DFA - Minimization of DFA - Regular Expression Regular Language - Properties of Regular Languages - Definition of a compiler - phases of compiler - Lexical Analysis.

Unit 2

Context Free Languages (CFL) and Parsing: Pushdown Automata - Context Free Grammar (CFG) - Properties of CFL - Normal Forms - Syntax analysis - top-down parser - Non recursive predictive parser - Bottom-up parser - SLR - CLR.
Unit 3


Text Book(s)


Reference(s)

Pre-requisite: Self-confidence, presentation skills, listening skills, basic English language skills, knowledge of high school level mathematics.

Course Objectives
- Help students prepare resumes and face interviews with confidence
- Support them in developing their problem-solving ability
- Assist them in improving their problem solving and reasoning skills
- Enable them to communicate confidently before an audience

Course Outcomes
CO1 - Soft Skills: To acquire the ability to present themselves confidently and showcase their knowledge, skills, abilities, interests, practical exposure, strengths and achievements to potential recruiters through a resume, video resume, and personal interview.
CO2 - Soft Skills: To have better ability to prepare for facing interviews, analyse interview questions, articulate correct responses and respond appropriately to convince the interviewer of one’s right candidature through displaying etiquette, positive attitude and courteous communication.
CO3 - Aptitude: To manage time while applying suitable methods to solve questions on arithmetic, algebra and statistics.
CO4 - Aptitude: To investigate, understand and use appropriate techniques to solve questions on logical reasoning and data analysis.
CO5 - Verbal: To use diction that is less verbose and more precise and to use prior knowledge of grammar to correct/improve sentences.
CO6 - Verbal: To understand arguments, analyze arguments and use inductive/deductive reasoning to arrive at conclusions. To be able to generate ideas, structure them logically and express them in a style that is comprehensible to the audience/recipient.

Syllabus

Soft Skills
Leadership: Initiating and managing change, Internal problem solving, Evaluation and co-ordination, Growth and productivity, Importance of Professional Networking.
Facing an interview: Importance of verbal & aptitude competencies, strong foundation in core competencies, industry orientation / knowledge about the organization, resume writing (including cover letter, digital profile and video resume), being professional. Importance of good communication skills, etiquette to be maintained during an interview, appropriate grooming and mannerism.

Aptitude
Problem Solving II
Sequence and Series: Basics, AP, GP, HP, and Special Series.
Data Sufficiency: Introduction, 5 Options Data Sufficiency and 4 Options Data Sufficiency.

Logical reasoning: Clocks, Calendars, Cubes, Non-Verbal reasoning and Symbol based reasoning.

Campus recruitment papers: Discussion of previous year question papers of all major recruiters of Amrita Vishwa Vidyapeetham.

Competitive examination papers: Discussion of previous year question papers of CAT, GRE, GMAT, and other management entrance examinations.

Miscellaneous: Interview Puzzles, Calculation Techniques and Time Management Strategies.

Verbal

Vocabulary: Empower students to communicate effectively through one-word substitution.

Grammar: Enable students to improve sentences through a clear understanding of the rules of grammar.

Reasoning: Facilitate the student to tap his reasoning skills through Syllogisms, critical reasoning arguments and logical ordering of sentences.

Reading Comprehension (Advanced): Enlighten students on the different strategies involved in tackling reading comprehension questions.

Public Speaking Skills: Empower students to overcome glossophobia and speak effectively and confidently before an audience.

Writing Skills: Practice formal written communication through writing emails especially composing job application emails.

References:

5. The hard truth about Soft Skills, by Amazon Publication.
6. Verbal Skills Activity Book, CIR, AVVP
7. English Grammar & Composition, Wren & Martin
8. Public Sector – Engineer Management Trainee Recruitment Exam (General English)
9. Nova’s GRE Prep Course, Jeff Kolby, Scott Thornburg & Kathleen Pierce
10. A Modern Approach to Verbal Reasoning – R.S. Aggarwal
14. How to Prepare for Data Interpretation for the CAT, Arun Sharma.
15. How to Prepare for Logical Reasoning for the CAT, Arun Sharma.
18. A Modern Approach to Verbal & Non-Verbal Reasoning, R S Aggarwal

Evaluation Pattern

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<tr>
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*CA - Can be presentations, speaking activities and tests.
Course Objectives

- Proposal writing in order to bring in a detailed project planning, enlist the materials required and propose budget requirement.
- Use the concept of CoDesign to ensure User Participation in the Design Process in order to rightly capture user needs/requirements.
- Building and testing a prototype to ensure that the final design implementation is satisfies the user needs, feasible, affordable, sustainable and efficient.
- Real time project implementation in the village followed by awareness generation and skill training of the users (villagers)

Course Outcome

CO1: Learn co-design methodologies and engage participatorily to finalise a solution
CO2: Understand sustainable social change models and identify change agents in a community.
CO3: Learn Project Management to effectively manage the resources
CO4: Lab scale implementation and validation
CO5: Prototype implementation of the solution

CO-PO Mapping

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Syllabus

The students shall visit villages or rural sites during the vacations (after 6th semester) and if they identify a worthwhile project, they shall register for a 3-credit Live-in-Lab project, in the fifth semester.

Thematic Areas

- Agriculture & Risk Management
- Education & Gender Equality
- Energy & Environment
- Livelihood & Skill Development
- Water & Sanitation
- Health & Hygiene
- Waste Management & Infrastructure

Evaluation Pattern

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Pre-Requisite(s): Nil

Course Objectives

- Understanding various system process models and build a secure environment.
- Apply vulnerability analysis into architecture and design process, access controlled and clean environment to build software, target environment hardening and secure application deployment.
- To familiarize with containerization for software development and also focus on security testing of software and software security economics

Course Outcome

CO1: Develop secure system models depending on user requirements.
CO2: Able to build analysis model and apply threat model for analysing the vulnerabilities in the system.
CO3: Understanding software security economics and practices in containerized development.
CO4: Develop security testing of software and understand basics of security governance, risk and compliance.

CO-PO Mapping

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Syllabus

Unit 1

Unit 2

Requirements Engineering: Tasks Initiation-Elicitation-Developing Use Cases-Building the analysis Model-Negotiation- Validation Requirements Modelling - building the analysis model, Scenario based methods, UML Models, Data Models. Design engineering Design concepts, Design models, software architecture, architectural styles and patterns, Architectural design: styles and patterns, architectural design, Refining architecture to components. Performing user interface Design-Golden Rules-User Interface Analysis and Design- Interface Analysis-Interface design steps. Threat Modeling –STRIDE, Information flow and vulnerability model to build security into life cycle phase of software (and hardware) components, Vulnerability analysis into architecture and design process, Access-controlled and clean environment to build software, Target environment hardening and secure application deployment, Attack trees.

Unit 3

Containerized development: Docker, Kubernets, Continuous Integration and Continuous Delivery (CI/CD). Security testing of software: Unit testing, integration testing, validation and system testing, fuzzing. Software security economics- logging/ monitoring and physical and operational security aspects. Basics of security governance, risk and compliance.

Text Book


Reference(s)

Pre-Requisite(s): 24CYS203 - Operating System, 24CYS205 - Database Management System

Course Objectives

- Introduction to distributed systems and cloud computing.
- Understand different cloud architectures and technology.
- Illustrate the use of Hadoop clusters and Peer to Peer Systems

Course Outcome

CO1: Classify and describe the architecture and taxonomy of parallel and distributed computing, including shared and distributed memory, and data and task parallel computing

CO2: Characterize the distinctions between Infrastructure, Platform and Software as a Service (IaaS, PaaS, SaaS) abstractions, and Public and Private Clouds, and analyze their advantages and disadvantages.

CO3: Exploring Hadoop clusters and Peer to Peer Systems

CO-PO Mapping

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Syllabus

Introduction to distributed systems, Distributed computing paradigms, Inter process communication mechanisms, Process models in distributed systems, The CAP theorem, Consistency models and Replication, Consensus algorithm: Clock Synchronization – Logical clocks – Mutual Exclusion, global positioning of nodes, Distributed Commit protocols – 2PC, 3PC, Check-pointing and Recovery, Election algorithms, Failure Models, Paxos algorithm- Apache Zookeeper, Distributed file system – Eg: CODA and Ceph, Distributed storage implementation – Data sharding, nosql key value stores and its properties – Eg: Google Big Table, Amazon DynamoDB. Cloud computing benefits and its challenges, Types – Private, Public and Hybrid clouds, Models – IaaS, PaaS and SaaS. Role of virtualization in enabling the cloud computing; Business Agility: Benefits and challenges to cloud architecture. AWS cloud services and management – scalability, availability, concurrency with practical aspects, REST API services including load balancing, server authentication and debug handling, AWS Zelkova for Provable Security. Hadoop cloud computing framework – HDFS and MapReduce, Cloud data processing using Pig and Hive, Amazon EMR for creating Hadoop clusters within AWS. Peer to Peer Systems – Napster, Gnutella, FastTrack, BitTorrent, Distributed Hash Tables, IPFS.
Text Book(s)


Reference(s)


Pre-Requisite(s): 24CYS202 User Interface Design

Course Objectives

- The course will cover the concepts involved in web application development.
- The course will introduce to various vulnerabilities in web applications and their mitigation techniques.

Course Outcome

CO1: Apply client-side web development to design interactive front-end web user interfaces.
CO2: Use server-side web application concepts to develop back-end web server application
CO3: Identify and mitigate various client-side web application security vulnerabilities
CO4: Identify and mitigate various server-side web application security vulnerabilities

CO-PO Mapping

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Syllabus:


Text Books/References:

Pre-Requisite(s): 24CYS381 Computer Networks Lab and 24CYS281 Operating System Lab

Course Objectives

- This course provides a quick overview of understanding the network topology and its attacks by visualizing it with network simulators.
- It also focuses on exploring network protocols and its attacks in Linux environment.
- Providing a platform to experiment with advanced testbed technologies, and formal verification of protocols.

Course Outcome

CO1: Familiarization of open-source network simulators and its experiments.
CO2: Understanding the protocol dynamics, simulation with active queue management schemes and visualization of attacks.
CO3: Familiarization with Linux Kernel Protocol implementation, kernel modification and recompilation.
CO4: Exploring the formal verification of protocols, network emulation, and testbed technologies.

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Syllabus

Experiments with open-source network simulators (NS2 and NS3): Installation and configuration, Creation of network topology and understanding of packet switched network, Simulation and visualization of different types of traffic—congestion controlled and non-congestion controlled, Trace analysis and visualization of protocol dynamics (throughput; packet drop, buffer dynamics, congestion window, round-trip-time, bandwidth delay product, receiver window, etc), Simulation with active queue management schemes, Simulation and visualization of attacks (e.g. IP spoofing and reflection attacks). Socket programming: implementation of IP spoofing and reflection DDoS attacks. Linux Kernel: Familiarization with Linux kernel protocol implementation (TCP/IP) implementation, Tracing and debugging of Linux Kernel TCP/IP source code, Kernel modification and recompilation, Implementation of a non-attack in Linux kernel Network Emulation and testbeds: Network emulation and traffic control using tc (traffic control), dummynet and other advanced tools, Familiarization with advanced testbed technologies (e.g. Emulab, DETER and PlanetLab, etc.), formal verification of protocol: SPIN, UPPAL.
Textbooks:

Issariyakul T, Hossain E. Introduction to network simulator 2 (NS2), Springer, Boston, MA; 2009.

References:

3. https://deter-project.org/
6. https://uppaal.org/
Course Objectives

- First phase of academic project covers problem formulation, study of relevant literature and presentation of findings.
- Gives an opportunity for practical application of computer science in security and help the students to innovate.
- This in turn supports publications, patenting and entrepreneurship

Course Outcomes

CO1: Ability to formulate scientific problem and prepare project execution plan.
CO2: Ability to find and analyse related literature.
CO3: Ability to present, articulate and defend the findings.

CO-PO Mapping

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</table>
Course Objectives

- To know about Indian constitution
- To know about central and state government functionalities in India
- To know about Indian society

Course Outcomes

CO1: Understand the functions of the Indian government
CO2: Understand and abide the rules of the Indian constitution
CO3: Understand and appreciate different culture among the people

CO-PO Mapping

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Syllabus

Unit 1

Unit 2
Union Government – Structures of the Union Government and Functions – President – Vice President – Prime Minister – Cabinet – Parliament – Supreme Court of India – Judicial Review.

Unit 3

Text Book(s)

Reference(s)

Evaluation Pattern

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*CA – Can be Quizzes, Assignment, Projects, and Reports
Course Objectives

- Second phase of academic project covers implementation, testing, scientific knowledge dissemination through research articles, and documentation.
- Gives an opportunity for practical application of computer science in security and help the students to innovate.
- This in turn supports scientific/research publications, patenting and entrepreneurship.

Course Outcomes

CO1: Fine-tune the scientific problem and prepare project execution plan
CO2: Design and develop the prototype
CO3: Implement, analyze the findings of the proposed problem
CO4: Present, articulate and defend the solution

CO-PO Mapping

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PROFESSIONAL ELECTIVE - I

24CYS331 WIRELESS SENSOR NETWORK SECURITY L-T-P-C:3-0-0-3

Pre-Requisite(s): 24CYS304 - Computer Networks, 24CYS113 - Computer Programming

Course Objectives

- This course introduces the features of Wireless Sensor Networks, their architecture, its protocols, routing, localization and positioning schemes.
- The course also emphasizes on providing an overview of threats in WSN, security primitives to create secure WSN protocols, detection techniques and cryptographic primitives for hardware implementation.

Course Outcomes

CO1: Understand the basic features of Wireless Sensor networks.
CO2: Understand the protocols of Wireless sensor network, its Routing, Localization and Positioning schemes.
CO3: Understand the security attacks, threats and vulnerabilities of WSN.
CO4: Analyze the security frameworks, privacy protection mechanisms and intrusion detection techniques of WSN.
CO5: Understand secure routing, and data aggregation in WSNs.

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Syllabus

Unit 1


Unit 2


Unit 3


Text Book(s)


Reference(s)

3. Anna Hac. Wireless Sensor Networks Designs, John Wiley and Sons; 2004
Pre-Requisite(s): 24CYS304 - Computer Networks

Course Objectives

- The focus of this course is to enable students to understand the aspects of information and network security that arise in this challenging and ever-evolving space of mobile communication systems.
- The enable students to understand mobile/cellular telephony, and wireless network with physical layer considerations.

Course Outcomes

CO1: Understand relevant aspects of information security in mobile and wireless networks
CO2: Understand the physical layer security mechanisms and protocols in wireless communication
CO3: Understand the authentication and key transport protocol mechanisms used in wireless network security
CO4: Understand security issues and provide solutions for practical wireless systems.

CO-PO Mapping

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Syllabus

Unit 1

Fundamentals of Physical layer security – Information theoretic secrecy metrics – channel models - Secret Communication - Coding for Security - Asymptotic Analysis - Key Generation from wireless channels Key agreement techniques.

Unit 2


Unit 3

Text Book(s)


Reference(s)

2. Edney J, Arbaugh WA. Real 802.11 security: Wi-Fi protected access and 802.11 i. Addison-Wesley Professional; 2004.
Pre-Requisite(s): 24CYS113 Computer Programming

Course Objectives

- This course covers the fundamentals of IoT and provides skills for IoT based product development.
- The skills students learn in this subject include the selection of sensors, protocols, hardware boards, interfacing, and implementation for product building. Real life case studies are introduced in this course.

Course Outcomes

CO1: Understand the key techniques and theory behind the Internet of Things.
CO2: Apply effectively the various enabling technologies (both hardware and software) for IoT.
CO3: Understand the integration of Cloud and IoT, Edge and Fog Computing.
CO4: Apply various techniques for Data Accumulation, Storage and Analytics.
CO5: Design and build IoT systems for any one interesting Use case.

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Syllabus

Unit 1


Unit 2

Protocols for IoT - infrastructure protocol IPV4/V6|RPL), Identification (URLs), Transport (WiFi, LiFi, BLE), Discovery, Data Protocols, Device Management Protocols. - A Case Study with MQTT/CoAP usage. Cloud and Data analytics- Types of Cloud - IoT with cloud challenges - Selection of cloud for IoT applications - Fog
computing for IoT - Edge computing for IoT - Cloud security aspects for IoT applications - RFM for Data Analytics - Case Study with AWS / AZURE / Adafruit / IBM Bluemix.

Unit 3

Case studies with architectural analysis: IoT applications - Smart City - Smart Water - Smart Agriculture - Smart Energy - Smart Healthcare - Smart Transportation - Smart Retail - Smart Waste Management.

Text Book


Reference(s)

PROFESSIONAL ELECTIVE-2

24CYS334 PROGRAM OBFUSCATION L-T-P-C:3-0-0-3

Pre-requisite: 24CYS212 - Multimedia Processing & 24CYS302 Secure Coding

Course Objectives

- To understand Obfuscation algorithms, application of code obfuscation techniques along with tamper proofing and watermarking.
- To provide understanding of program analysis using static and dynamic approach and familiarize with some of the reverse engineering tools.
- To explain various software similarity measures and a brief focus on data hiding techniques

Course Outcome

CO1: Study different methods of obfuscating code and various application of code obfuscation, watermarking, tamper proofing.
CO2: Understand program analysis using static and dynamic analysis and familiarize with reverse engineering tools
CO3: Can identify different software watermarking methods and how to resist attacks.
CO4: Apply software similarity analysis for testing purpose and also understand some of the hiding techniques in different media

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Syllabus

Unit 1:


Unit 2:
Dynamic Obfuscation, Software tamper proofing – checking for tampering, responding mechanisms, remote tamper proofing. Software watermarking – different methods and its applications, tamper proofing watermarks, improving resilience and stealth, dynamic watermarking methods-by exploiting aliasing, parallelism, and expanding execution paths.

**Unit 3:**

Software similarity analysis- k-gram based analysis, API based analysis, tree and graph-based analysis, metrics-based analysis. Basics on hardware for protecting software.

**Case Study:** Data hiding in digital Audio and Video, Operating System Data Hiding, Virtual Data Hiding, Data Hiding in Network Protocols, Data Hiding among Android Mobile Devices and Apple iOS, Forensics and Anti-Forensics, Mitigation Strategies.

**Text Book(s):**


Pre-Requisite: 24CYS04 Computer Networks & 24CYS02 Secure Coding

Course Objectives

- Understand the legal aspects, industry ethics and the approaches and methodologies used when performing a penetration test.
- Be able to use the appropriate penetration testing tools for a given scenario and understand their output.
- Discuss implications of common vulnerabilities and recommend ways to rectify or mitigate them.

Course Outcome

CO1: To gain knowledge about vulnerability assessment and penetration testing.
CO2: To learn about various types of attacks, attackers and security threats and vulnerabilities present in the computer system.
CO3: To examine how social engineering can be done by attacker to gain access of useful & sensitive information about the confidential data.
CO4: To gain knowledge of the tools, techniques and ethical issues likely to face the domain of ethical hacking and VAPT.

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Syllabus

Unit 1

Unit 2


Unit 3


Textbooks:

Prerequisite(s): Nil

Course Objectives

- To provide an understanding of Decentralized blockchain-based systems, such as Bitcoin and Ethereum, and its position in the present technological landscape.
- To understand the impact and role of Blockchain Technology in financial, information, and other infrastructures. This course covers the technical aspects of public distributed ledgers, blockchain systems, cryptocurrencies, and smart contracts

Course Outcome

CO1: Understand the basic principles of Distributed Ledger Technology
CO2: Able to demonstrate the cryptographic primitives in Blockchain technology
CO3: Understand and evaluate various consensus protocols
CO4: Develop Smart Contracts and create a DApp using Ethereum Blockchain
CO5: Analyze a real-world use case and provide how blockchain could be used to address the challenges faced

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Syllabus

Blockchain Data Structure – Hash Chain - Distributed Database - Blockchain Architecture - Terminologies in Blockchain: Hashes - Transactions - Addresses - Wallet - Private Key Storage - Ledgers - Blocks - Chaining Blocks; Consensus and multiparty agreements: Proof of Work (PoW) - Proof of Stake (PoS) - Delegated Proof of Stake (DPoS) - Proof of Elapsed Time (PoET) - Proof of Importance - Reputation-based mechanisms - Practical Byzantine Fault Tolerance (PBFT); Blockchain Platforms: Cryptocurrencies (Bitcoin, Litecoin, Ethereum) - Hyperledger - Ethereum; Blockchain implementation; Smart Contract - Web3.js - MetaMask; Forking; Soft Fork - Hard Fork - Cryptographic Changes and Forks; Blockchain as a Service - IPFS and Blockchain - Challenges in Blockchain; Concurrency, Scalability and Privacy.

Text Book(s)

1. Imran Bashir, Mastering Blockchain; 2017.


**Reference(s)**


PROFESSIONAL ELECTIVE - 3

24CYS337  FORMAL METHODS FOR SECURITY  L-T-P-C:3-0-3-3

Prerequisite: 24MAT118: Discrete Mathematics

Course Objectives

- To provide basic understanding and fundamentals of Formal Methods and its role in Security.
- To discuss various methods for Logic and Program Verification.
- To demonstrate different tools available to perform analysis and detect security vulnerabilities.

Course Outcome

CO1: Introduction to Formal Methods - Logic and Program Verification.
CO2: Understand Temporal Logic and Model Checking for program verifications.
CO3: Verification of concurrent and reactive programs/systems using model-checking and propositional temporal logic.
CO4: Application of static and dynamic program analysis and model checking for detecting common security vulnerabilities in programs and communication protocols.
CO5: Familiarizing SPIN, PVS, TAMARIN, Frama-C and Isabelle tools.

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Syllabus

Formal Methods – Definition - Need for Formal Methods - Propositional and Predicate Logic, and theorem-proving, Fixed-points and their role in program analysis and model-checking, Verification of sequential programs using weakest preconditions and inductive methods, and verification of concurrent and reactive programs/systems using model-checking and propositional temporal logic (CTL and LTL), Application of static and dynamic program analysis and model-checking for detecting common security vulnerabilities in programs and communication protocols, Information flow and taint analysis for security of web applications, SPIN, PVS, TAMARIN, Frama-C and Isabelle tools.
Text Book(s)


Reference(s)

Pre-Requisite(s): Nil

Course Objectives

- To develop crypto algorithms on hardware platform by enabling security features.
- Familiarize with different side channel attacks and its preventive techniques.
- Understanding the fault-tolerance and verification of cryptographic hardware.

Course Outcomes

CO1: Able to develop crypto algorithms and incorporate security features on FPGA.
CO2: Identify side channel attack and its prevention techniques.
CO3: Able to understand different approaches for hardware Trojan and Piracy detection and analysis.
CO4: Evaluation and verifying of cryptographic Hardware.

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Syllabus

Unit 1

Development of crypto algorithms and other security features on to hardware platform, standards of security – FIPS, 140-2 level 3. Overview of different issues of hardware security - Basics of Digital Design on Field-programmable Gate Array (FPGA), Optimization of Cryptographic Hardware on FPGA, Physically Unclonable Functions (PUFs), PUF Implementations, PUF Quality Evaluation, Design Techniques to Increase PUF Response Quality.

Unit 2

Side-channel Attacks on Cryptographic Hardware: Current-measurement based Side channel Attacks (Case Study: Kocher’s Attack on DES), Design Techniques to Prevent Side channel Attacks, Improved Side-channel Attack Algorithms (Template Attack, etc.), Cache Attacks.
Unit 3

Testability and Verification of Cryptographic Hardware: Fault-tolerance of Cryptographic Hardware, Fault Attacks, Verification of Finite-field Arithmetic Circuits Hardware Trojans: Hardware Trojan Nomenclature and Operating Modes, Countermeasures such as Design and Manufacturing Techniques to Prevent/Detect Hardware Trojans, Logic Testing and Side-channel Analysis based techniques for Trojan Detection

Textbooks:

2. Bhunia, Swarup, and Mark Tehranipoor. Hardware security: a hands-on learning approach. Morgan Kaufmann; 2018

References:


24CYS339 BIOMETRICS AND SECURITY L-T-P-C:3-0-0-3

Pre-Requisite: 24CYS212 Multimedia Processing

Course Objectives

- Understand the technological uplifts with biometrics compared to traditional securing mechanisms and standards applied to security
- To understand the concepts of different types of biometrics and to enable design of biometric system and its privacy risks
- To familiarize with biometric interface and biometric applications

Course Outcome

CO1: Apply biometric matching to identify algorithms for finger biometric technology, check the performance measures and its security
CO2: Develop facial biometric, iris biometric, voice biometric, physiological biometrics for identification technology.
CO3: Understand different types of user interfaces.
CO4: Designing privacy sympathetic biometric systems and identifying the area of biometric applications

CO-PO Mapping

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**Biometric Fundamentals and Standards:** Biometrics versus traditional techniques, Characteristics, Key biometric processes: Verification -Identification -Biometric matching, Performance measures in biometric systems, Assessing the privacy risks of biometrics -Designing privacy sympathetic biometric systems, Different biometric standards, Application properties.

**Physiological Biometrics:** Facial scan, Ear scan, Retina scan, Iris scan, Finger scan, Automated fingerprint identification system, Palm print, Hand vascular geometry analysis, Knuckle, DNA, Dental, Cognitive Biometrics -ECG, EEG.

**Behavioral Biometrics:** Signature scan, Keystroke scan, Voice scan, Gait recognition, Gesture recognition, Video face, Mapping the body technology.

**User interfaces:** Biometric interfaces: Human machine interface -BHMI structure, Human side interface: Iris image interface -Hand geometry and fingerprint sensor, Machine side interface: Parallel port -Serial port -Network topologies, Case study: Palm Scanner interface.

**Biometric applications:** Categorizing biometric applications, Application areas: Criminal and citizen identification –Surveillance -PC/network access -E-commerce and retail/ATM, Costs to deploy, Issues in deployment, Biometrics in medicine, cancellable biometrics.

**Text Books/References:**

2. John R Vacca, Biometric Technologies and Verification Systems, Elsevier, USA; 2009
Pre-Requisite: 24CYS206 Modern Cryptography 24CYS314 Applied Cryptography

Course Objectives

- To provide students with a comprehensive understanding of quantum cryptography and post-quantum cryptographic algorithms, particularly those based on lattice problems.
- Gain practical skills in implementing and analyzing these algorithms using modern computational tools.
- To equip students with the knowledge required to address current and future security challenges posed by quantum computing.

Course Outcome

CO1: Understand and comprehend quantum cryptography principles
CO2: Grasp Post-Quantum Cryptographic Algorithms
CO3: Learn the standard CRYSTALS-Kyber and CRYSTALS-Dilithium
CO4: Apply Number Theoretic Transforms and Solve Advanced Lattice Problems

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Syllabus

Unit 1

Introduction to Qubits, Quantum Entanglement, Bell’s Inequality, Density matrices, Measurements, Quantum algorithms, No cloning theorem, Quantum Key Distribution, BB84 protocol, E91 protocol, privacy amplification, randomness extractor.

Unit 2

Properties of Lattices, Worst case to Average case reduction, Cryptographic hard problems, LWE, SIS problems, Ring and module Variants.

Unit 3
Key encapsulation mechanisms, Number Theoretic Transforms, CRYSTALS-Kyber, CRYSTALS-Dilithium.

Text Books/References:

9. Dilithium official repository and documentation.
10. Kyber official repository and documentation.
Pre-Requisite: NIL

Course Objectives

- To introduce students to the fundamental concepts and methodologies of cyber analytics
- To understand and apply frameworks like MITRE ATT&CK, MITRE Shield, and MITRE CAR
- To develop skills in data collection, analysis, and threat detection using cyber analytics tools
- To equip students with the knowledge required to address current and future security challenges posed by quantum computing.

Course Outcome

CO1: To gain knowledge about fundamental concepts related to process of cyber analytics in the cybersecurity domain
CO2: To understand and apply frameworks like MITRE ATT&CK, MITRE Shield, and MITRE CAR
CO3: To develop skills in data collection, analysis, and threat detection using cyber analytics tools
CO4: To apply cyber analytics skill for threat detection, threat prevention, incident response, forensic analysis and risk detection.
CO5: To interpret and analyze information and to organize ideas in a logical and coherent manner.

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Syllabus

Unit 1

Introduction to Cyber Analytics - Overview and significance of cyber analytics - Key concepts, terminologies, and metrics used in cyber analytics.

Unit 2
MITRE ATT&CK Framework - In-depth understanding of Tactics, Techniques, and Procedures (TTPs) - Mapping and analyzing cyber threats using the ATT&CK framework - Practical applications and case studies.

Unit 3

MITRE Shield Framework - Principles of active defense and deception in cybersecurity - Implementing MITRE Shield strategies in real-world scenarios - Integration of Shield with ATT&CK for comprehensive defense mechanisms.

Unit 4

MITRE Cyber Analytics Repository (CAR) - Introduction to the MITRE CAR framework - Developing and engineering detection analytics - Hands-on exercises and labs using CAR data sets.

Unit 5

Advanced Cyber Analytics Techniques - Advanced data collection and preprocessing techniques - Machine learning applications in cyber analytics - Predictive analytics, anomaly detection, and their practical implementation.

Text Books/References:

4. MITRE Shield Framework, MITRE Corporation.
5. MITRE ENGAGE. https://engage.mitre.org/
6. MITRE DEFEND. https://d3fend.mitre.org/
Pre-Requisite: NIL

Course Objectives

- To provide a comprehensive understanding of Zero-Trust Architecture (ZTA).
- To teach principles and implementation strategies of ZTA in various environments.
- To design and deploy zero-trust solutions in enterprise and industrial environments.

Course Outcome

CO2: To gain knowledge about principles and implementation strategies of ZTA in various environments
CO3: To design and deploy zero-trust solutions in enterprise and industrial environments.

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Syllabus

Unit 1: Introduction to Zero Trust Architecture

Overview of zero trust principles - Importance and benefits of ZTA in modern cybersecurity

Unit 2: Components of Zero Trust Architecture

Core components: identity, devices, networks, applications, and data - Implementing zero trust in identity and access management

Unit 3: Implementing Zero Trust

Designing and engineering a zero trust network - Implementing zero trust access policies - Case studies on successful zero trust implementations.

Unit 4: Zero Trust in Cloud Environments
Cloud security challenges and engineering solutions - Applying zero trust principles to cloud infrastructure.

**Unit 5: Advanced Topics in Zero Trust**

Zero trust for remote workforces - Implementing zero trust in operational technology (OT) environments - Future trends and engineering advancements in zero trust architecture

**Text Books/References:**

ELECTIVES IN BUSINESS
SYSTEMS/MANAGEMENT ELECTIVE

24CYS431 SOFTWARE PROJECT MANAGEMENT L-T-P-C:3-0-0-3

Pre-requisite: Nil

Course Objectives

- This course describes the key aspects of a software project.
- It introduces the basic principles of Engineering Software Projects. Most, if not all, students’ complete projects as part of assignments in various courses undertaken. These projects range in size, subject and complexity but there are basic project essentials that need to be understood and practiced for successful team project outcomes.
- The course provides an understanding of the purpose, methods and benefits of process management by exposing the student to the concepts, practices, processes, tools and techniques used in process management for software development.

Course Outcomes

CO1: To understand the basic concepts, terminologies and issues of software project management.
CO2: To apply appropriate methods and models for the development of solutions.
CO3: To analyze the cost-benefits of calculations so as to optimize the selection strategy.
CO4: To evaluate methods, models and technologies towards achieving project success.
CO5: To design and evaluate network planning models with criticality.

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Syllabus

Unit 1

Unit 2


Unit 3

Monitoring and control – Visualizing Progress, earned value analysis, managing people and organizing teams- organizational structures- Planning for small projects. Case Study: PMBOK, Agile Development

Text Book


Reference(s)

Pre-Requisite(s): Nil

Course Objectives

- This course serves as an introduction to financial engineering including cash flows, financial decision making etc.
- It gives a thorough yet highly accessible mathematical coverage of standard and recent topics of introductory investments: fixed-income securities, modern portfolio theory, optimal portfolio growth and valuation of multi-period risky investments.

Course Outcomes

CO1: Apply basic concepts to understand and evaluate cash flows.

CO2: Evaluate and arrive at a financial investment decision employing the underlying knowledge of stocks and derivatives.

CO3: Analyse and design Portfolio selection methods.

CO4: Understand capital market theory for stock performance evaluation

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Syllabus

Unit 1


Unit 2

Unit 3


Text Book(s)


Reference(s)

Course Objectives

- The course would prepare engineering students to understand the overview of financial management; inculcate methods and concepts on valuation and familiarize with working capital management, financial analysis and planning.

Course Outcomes

CO1: Understand the overview of financial management.
CO2: Apply methods and concepts on valuation.
CO3: Understand with working capital management, financial analysis and planning.

CO-PO Mapping

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Syllabus

Unit 1


Unit 2


Unit 3


Text Book(s)


Reference(s)

Course Objectives

- Understand context of information security management, Identify and value information assets
- Identify and prioritize threats to information assets
- Define an information security strategy and architecture
- Understand the risk management surrounding information systems and learn how security and management are interrelated

Course Outcome

CO1: Able to identify threats and vulnerabilities to Information Systems.
CO2: Understand risk management, risk analysis and how to mitigate risks.
CO3: Able to perform testing and vulnerability assessment.
CO4: Able to manage information security and evaluate and design information architecture using secure coding practices.

CO-PO Mapping

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Syllabus

Unit 1


Unit 2
Disaster Recovery & Business Continuity Management, Business impact analysis, Business Continuity and DR Plan development, Exercising, Maintenance and revision of plan, importance of training, Objectives and methods for risk assessment, Natural disaster, Technological hazards and terrorist threats, implications for emergency response, Vulnerability of critical infrastructures. Privacy Management, Privacy regulations and laws, GDPR, HIPAA and PDPA

Unit 3


Textbooks:


References:

FREE ELECTIVES OFFERED UNDER HUMANITIES / SOCIAL SCIENCE STREAMS COMMON TO ALL PROGRAMS

Course Objectives:

The course offers to explore the seminal thoughts that influenced the Indian Mind on the study of human possibilities for manifesting excellence in life. This course presents to the students, an opportunity to study the Indian perspective of Personality Enrichment through pragmatic approach of self analysis and application.

Syllabus

Unit 1

Goals of Life – Purusharthas
What are Purusharthas (Dharma, Artha, Kama, Moksha); Their relevance to Personal life; Family life; Social life & Professional life; Followed by a Goal setting workshop;
Yogic way of Achieving Life Goals – (Stress Free & Focused Life)
Introduction to Yoga and main schools of Yoga; Yogic style of Life & Time Management (workshop); Experiencing life through its Various Stages
Ashrama Dharma; Attitude towards life through its various stages (Teachings of Amma);

Unit 2

Personality Development
What is Personality – Five Dimensions – Pancha Kosas (Physical / Energy / Mental / Intellectual / Bliss); Stress Management & Personality; Self Control & personality; Fundamental Indian Values & Personality;
Learning Skills (Teachings of Amma)
Art of Relaxed Learning; Art of Listening; Developing ‘Shraddha’ – a basic qualification for obtaining Knowledge; Communication Skills - An Indian Perspective;

Unit 3

Developing Positive Attitude & Friendliness - (Vedic Perspective);
Achieving Work Excellence (Karma Yoga by Swami Vivekananda & teachings based on Amma);
Leadership Qualities – (A few Indian Role models & Indian Philosophy of Leadership);

REFERENCE BOOKS:

1. Awaken Children (Dialogues with Sri Mata Amritanandamayi) Volumes 1 to 9
2. Complete works of Swami Vivekananda (Volumes 1 to 9)
3. Mahabharata by M. N Dutt published by Parimal publications – New Delhi (Volumes 1 to 9)
4. Universal message of Bhagavad-Gita (An exposition of Gita in the light of modern thought and Modern needs) by Swami Ranganathananda. (Vols.1 to 3)
7. **Art of Man Making** - Swami Chinmayananda published by Chinmaya Mission, Bombay
10. **Yoga In Daily Life** - Swami Sivananda – published by Divine Life Society
12. **All about Hinduism** – Swami Sivananda - Published by Divine Life Society
15. **Valmiki Ramayana** – Four volumes- published by Parimal Publications, Delhi
17. **Mind Sound Resonance Technique (MSRT)** Published by Swami Vivekananda Yoga Prakashana, Bangalore.
18. **Yoga & Memory** - Dr H R Nagendra & Dr. Shirley Telles, published by Swami Vivekananda Yoga Prakashana, Bangalore.

**Evaluation Pattern**

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*CA – Can be Quizzes, Assignment, Projects, and Reports.
Syllabus

Unit 1
1. The anatomy of ‘Excellence’. What is ‘excellence’? Is it judged by external factors like wealth?
2. The Great Flaw. The subject-object relationship between individual and world. Promote subject enhanceexcellence.
3. To work towards excellence, one must know where he is. Our present state... An introspective analysis. Our faculties within.

Unit 2
4. The play of the mind. Emotions – convert weakness into strength.
5. The indispensible role of the intellect. How to achieve and apply clear thinking?
7. Increase Productivity, reduce stress, work patterning.

Unit 3
8. The art of right contact with the world. assessment, expectations.
9. Myths and Realities on key issues like richness, wisdom, spirituality.
10. Collect yourself, there is no time to waste. The blue-print of perfect action.

REFERENCES:
The Bhaja Govindam and the Bhagavad Gita.

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*CA – Can be Quizzes, Assignment, Projects, and Reports.
OBJECTIVES:

This course offers a journey of exploration through the early developments in India of astronomy, mathematics, technologies and perspectives of the physical world. With the help of many case studies, the students will be equipped to understand concepts as well as as actual techniques.

Syllabus

Unit 1

1. General introduction: principles followed and sources;
2. Astronomy & mathematics from the Neolithic to the Indus civilization;
3. Astronomy & mathematics in Vedic literature;
4. Vedanga Jyotisha and the first Indian calendars;
5. Shulba Sutras and the foundations of Indian geometry;

Unit 2

1. Astronomy & mathematics in Jain and Buddhist literature;
2. The transition to the Siddhantic period: Aryabhata and his time;
3. The Aryabhatiya: concepts, content, commentaries;
4. Brahmagupta and his advances;
5. Other great Siddhantic savants;
6. Bhaskara II and his advances;

Unit 3

1. The Kerala school of mathematics;
2. The Kerala school of astronomy;
3. Did Indian science die out?;
4. Overview of recent Indian scientists, from S. Ramanujan onward;
5. Conclusion: assessment and discussion;

TEXTBOOK:

*Indian Mathematics and Astronomy: Some Landmarks, by S. Balachandra Rao*

REFERENCE:

*IFIH’s interactive multimedia DVD on Science & Technology in Ancient India.*

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*CA – Can be Quizzes, Assignment, Projects, and Reports.*
OBJECTIVES:

This course offers the foundation necessary to understand Eastern approaches to psychology and spirituality. The course includes experiential components centering on meditation and spiritual practice.

Syllabus

Unit 1

Introduction to Modern Psychology
A short history of Modern Psychology - Major Schools of Modern Psychology - The three major forces in Western Psychology - Freudian Psychoanalysis; Behaviourism; Humanistic Psychology.

Introduction to Indian Psychology
What is Yoga? - Rise of Yoga Psychology tradition - Various schools of Yoga Psychology - Universal Goal of all Yoga-schools.

Patanjali Yoga Sutra – 1

Patanjali Yoga Sutra – 2

Unit 2

Patanjali Yoga Sutra – 3
Two formulae - Necessity of Abhyasah and Vairagyah - Foundation of Abhyasah - Foundation of Vairagyah.

Patanjali Yoga Sutra – 4

Patanjali Yoga Sutra – 5
Main obstacles in the path of Yoga - other obstructions - removal of obstacles by one – pointedness; by controlling Prana - by observing sense experience - by inner illumination - by detachment from matter - by knowledge of dream and sleep - by meditation as desired.

Patanjali Yoga Sutra – 6
Patanjali Yoga Sutra – 7
- abhinivesha – clinging to life.

Unit 3

Patanjali Yoga Sutra – 8
Necessity of Yoga practice - eight parts of Yoga practice - five Yamas: ahimsa – satya – asteya – brahmacharyam
– aparigraha.

Patanjali Yoga Sutra – 9

Patanjali Yoga Sutra – 10
Asanam – Pranayamah - various kinds of Pranayamah - Pratyaharah - Mastery over the senses. Report review Conclusion

REFERENCES:
1. The course book will be “The four chapters of Freedom” written by Swami Satyananda Saraswati of Bihar School of Yoga, Munger, India.
3. Eight Upanishads with the commentary of Sankaracharya, Translated by Swami Gambhirananda, Published by Advaita Ashram, Uttaranjal.
4. ‘Hatha Yoga Pradipika’ Swami Muktibodhananda, Yoga Publications Trust, Munger, Bihar, India

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*CA – Can be Quizzes, Assignment, Projects, and Reports.
OBJECTIVES:

To introduce business vocabulary; to introduce business style in writing and speaking; to expose students to the cross-cultural aspects in a globalised world; to introduce the students to the art of persuasion and negotiation in business contexts.

Course Outcomes

CO1: Familiarize and use appropriate business vocabulary and etiquettes in verbal communication in the professional context
CO2: Understand organizational structures, pay structures and performance assessments
CO3: Apply language skills in drafting various business documents and other necessary communications in the business context
CO4: Understand and address cross cultural differences in the corporate environment
CO5: Participate in planned and extempore enactments of various business situations

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Syllabus

Unit 1


Unit 2

Writing: Style and vocabulary - Business Memorandum, letters, Press Releases, reports – proposals – Speaking: Conversational practice, telephonic conversations, addressing a gathering, conducting meetings.

Unit 3

Active Listening: Pronunciation – information gathering and reporting - Speaking: Cross-Cultural Issues, Group Dynamics, negotiation & persuasion techniques.

Activities
Case studies & role-plays.
BOOKS RECOMMENDED:


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*CA – Can be Quizzes, Assignment, Projects, and Reports.
OBJECTIVES:
To expose the students to the greatness of Indian Thought in English; to develop a sense of appreciation for the lofty Indian Thought; to develop an understanding of the eclectic Indian psyche; to develop an understanding about the societal changes in the recent past.

Syllabus

Unit 1
Poems
Rabindranath Tagore’s Gitanjali (1-10); Nizzim Ezekiel’s Enterprise; A.K. Ramanujam’s Small-Scale Reflections on a Great House.

Unit 2
Prose
Khushwant Singh’s The Portrait of a Lady; Jhumpa Lahiri’s Short Story - Interpreter of Maladies.

Unit 3
Drama and Speech
Vijay Tendulkar’s Silence, the Court is in Session; Motivational speeches by Jawaharlal Nehru/ S. Radhakrishnan
/ A. P. J. Abdul Kalam’s My Vision for India etc. (any speech).

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*CA – Can be Quizzes, Assignment, Projects, and Reports.
OBJECTIVES:

To expose the students to different genres of Literature; to hone reading skills; to provide deeper critical and literary insights; to enhance creative thinking; to promote aesthetic sense.

Syllabus

Unit 1

Poems

Unit 2

Short Stories

Unit 3

Prose
A G Gardiner: On The Philosophy of Hats; 2. Robert Lynd: Mispronunciation

Practicals:

Role plays: The Proposal, Chekov / Remember Ceezer, Gordon Daviot / Final Solutions, Mahesh Dattani, Bookreviews, Movie reviews.

SUGGESTED READING:
The Old Man and the Sea, Hemingway / Any one of the novels of R.K. Narayan, etc.

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*CA – Can be Quizzes, Assignment, Projects, and Reports.
OBJECTIVES:

To introduce the students to the elements of technical style; to introduce the basic elements of formal correspondence; to introduce technical paper writing skills and methods of documentation; to improve oral presentation skills in formal contexts.

Course Outcomes:

After the completion of the course the student will be able to:

CO1: Understand and use the basic elements of formal correspondence and methods of documentation
CO2: Learn to edit technical content for grammatical accuracy and appropriate tone and style
CO3: Use the library and internet recourses for research purposes
CO4: Demonstrate the ability to communicate effectively through group mock-technical presentations and other activities

Mapping of course outcomes with program outcomes:

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Syllabus:

Unit 1

Unit 2
Different kinds of written documents: Definitions – descriptions – instructions – recommendations - manuals - reports – proposals; Formal Correspondence: Letter Writing including job applications with Resume.

Unit 3

Practice in oral communication and Technical presentations
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*CA – Can be Quizzes, Assignment, Projects, and Reports.
OBJECTIVES:

To help the students learn the fine art of story writing; to help them learn the techniques of story telling; to help them study fiction relating it to the socio-cultural aspects of the age; to familiarize them with different strategies of reading short stories; to make them familiar with the morals and values held in high esteem by the ideals of Indianness.

Syllabus

Unit 1


Unit 2


Unit 3

Masti Venkatesha Iyengar: The Curds-Seller; Manohar Malgonkar: Upper Division Love; Romila Thapar: The Spell; Premchand: The Voice of God.

TEXT:


REFERENCE:


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*CA – Can be Quizzes, Assignment, Projects, and Reports.
Syllabus

Unit 1

Population - Identity
How to introduce yourself (name, age, address, profession, nationality); Numbers; How to ask questions; Grammar – Pronouns - subjects; Regular verbs of 1st group (er) in the present; Être (to be) and avoir (to have) in the present; Interrogative sentence; Gender of adjectives.

Unit 2

The suburbs - At the train station
Introduce someone; Buy a train ticket or a cinema ticket; Ask for information; Official time; Ask for a price; The city (church, town hall, post office…) Grammar – Pronouns - subjects (continuation); Gender of adjectives (continuation); Plural of nouns and adjectives; Definite and indefinite articles; Interrogative adjectives; I would like (Je voudrais).

Unit 3

Paris and the districts - Looking for a room
Locate a room and indicate the way; Make an appointment; Give a price; Ordinal numbers; Usual time; Ask for the time.
Grammar - Imperative mode; Contracted articles (au, du, des); negation.

TEXTBOOK:
Metro St Michel - Publisher: CLE international

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Syllabus

Unit 1

The first room of a student
A party to celebrate the 1st room; Description of a room; furniture; Locate objects: prepositions (devant, derrière, dans...), Read advertisement; Appreciation (I like, I prefer.).

Grammar - Perfect past tense with avoir; Possessive adjectives (mon, ton, son...); Demonstrative adjectives (ce, cet, cette); Yes (oui, si).

Unit 2 Small jobs

Conversation on the phone; Give Time indications; Answer a job offer; Describe a job; Suggest a meeting time.Grammar - Perfect past tense with être and avoir (continuation); Possessive adjectives (notre, votre, leur); Prepositions (à, pour, avec ...); Pronoun as direct object (le, la, l’, les).

Unit 3

University Restaurant

Inquiry; Express an opinion; Ask questions (continuation); Food, meals, taste, preferences; Nutrition, diet, choose a menu or diet, Expression of quantities (beaucoup, peu).

Grammar - Partitif (expressing quantity) (du, de la, pas de...); Comparison (plus...que, moins....que, autant ...que); Interrogation (continuation), inversion, Est-ce que, qu’est-ce que?.

TEXTBOOK:
Metro St Michel - Publisher: CLE International

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Syllabus

Unit 1

Greetings; Introducing one-self (formal and informal context), saying their name, origin, living place, occupation. Numbers 1-100; Saying the telephone number. Countries and Languages. Grammar: Structure – W - Questions and Yes/No questions and statements, personal pronouns, verb conjugations. Articles. Vocabulary: Professions.

Unit 2

Giving the personal details. Name, age, marital status, year of birth, place of birth, etc. Numbers till 1000. Saying a year. Alphabets – spelling a word. Filling up an application form; In the restaurant – making an order. Grammar: Definite, indefinite and negative article in nominative. Accusative: indefinite and negative Article. Vocabulary: Food items.

Unit 3


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*CA – Can be Quizzes, Assignment, Projects, and Reports.
Syllabus

Unit 1

Shopping and orientation in supermarket; Conversation between the customer and salesman; Where one finds what in supermarket; Asking for requests and suggestions.

Grammar: Dative of personal pronouns. Imperative form. Vocabulary: Consumables and measurements;

Unit 2

Appointments; Work and leisure time activities; Time, weekdays, months and seasons; saying the date; fixing up an appointment.

Grammar: Model verbs; Prepositions with time and place; Ordinal numbers. Vocabulary: Leisure activities, weekdays, months and seasons.

Unit 3

Family and household; Family and relations; household and daily routine. Grammar: Possessive articles; Divisible and indivisible verbs. Vocabulary: Family circle; Household articles.

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Syllabus

To have an elementary exposure to German language; specifically

1. to have some ability to understand simple spoken German, and to be able to speak it so as to be able to carry on life in Germany without much difficulty (to be able to do shopping, etc.);
2. to be able to understand simple texts, and simple forms of written communication;
3. to have a basic knowledge of German grammar;
4. to acquire a basic vocabulary of 500 words;
5. to be able to translate simple letters with the use of a dictionary; and
6. to have some familiarity with the German life and culture.

(This will not be covered as part of the regular classroom teaching; this is to be acquired by self-study.) Some useful websites will be given.

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Syllabus

The basic vocabulary and grammar learned in the earlier course is mostly still passive knowledge. The endeavour of this course is to activate this knowledge and develop the skill of communication.

Topics are: Airport, railway station, travelling; shopping; invitations, meals, meeting people; around the house; the human body; colours; professions.

Past and future tenses will be introduced. Applying genitive, dative and accusative. Some German culture. Films.

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*CA – Can be Quizzes, Assignment, Projects, and Reports.
OBJECTIVES:

To teach Hindi for effective communication in different spheres of life - Social context, Education, governance, Media, Business, Profession and Mass communication.

Course Outcomes:

After the completion of the course the student will be able to:

CO1: Gain knowledge about the nature and culture of Hindi language
CO2: Understand the structural aspects of Hindi language
CO3: Apply the knowledge of the grammatical structures to communicate in Hindi
CO4: Analyse the social significance of modern literature.
CO5: Develop the ability to translate a given text to Hindi

CO-PO Mapping:

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Syllabus

Unit 1

Introduction to Hindi Language, National Language, Official Language, link Language etc. Introduction to Hindilanguage, Devanagari script and Hindi alphabet.

Unit 2

Common errors and error corrections in Parts of Speech with emphasis on use of pronouns, Adjective and verb in different tenses – Special usage of adverbs, changing voice and conjunctions in sentences, gender& number - General vocabulary for conversations in given context –understanding proper pronunciation - Conversations, Interviews, Short speeches.

Unit 3

Poems – Kabir 1st 8 Dohas, Surdas 1st 1 Pada; Tulsidas 1st 1 Pada; Meera 1st 1 Pada
Unit 4


Unit 5

Kahani – Premchand: Kafan, Abhilasha, Vidroh, Poos ki rath, Juloos.

BOOKS:
1. Prem Chand Ki Srvashrestha Kahaniyam: Prem Chand; Diamond Pub Ltd. New Delhi
2. Vyavaharik Hindi Vyakaran, Anuvad thaha Rachana : Dr. H. Parameswaran, Radhakrishna publishing House, New Delhi

Evaluation Pattern

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*CA – Can be Quizzes, Assignment, Projects, and Reports.
OBJECTIVES:

Appreciation and assimilation of Hindi Literature both drisya & shravya using the best specimens provided as anthology.

Course Outcomes:

After the completion of the course the student will be able to:

**CO1**: Understand the grammatical structures of Hindi  
**CO2**: Understand the post modern trends of literature  
**CO3**: Enhance critical thinking and writing skills  
**CO4**: Identify and analyse different literary and audio-visual material  
**CO5**: Apply fundamental knowledge of Hindi in formal and informal writing

**CO-PO Mapping:**

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Syllabus:

**Unit 1**

Kavya Tarang; Dhumil ke Anthim Kavitha [Poet-Dhumil]; Dhabba [Poet-Kedarnath Singh]; Proxy [Poet-Venugopal]; Vakth [Poet-Arun Kamal]; Maachis [Poet-Suneeta Jain].

**Unit 2**

Communicative Hindi - Moukhik Abhivyakthi

**Unit 3**

Audio-Visual Media in Hindi – Movies like Tare Zameen par, Paa, Black etc., appreciation and evaluation. Newsreading and presentations in Radio and TV channels in Hindi.

**Unit 4**

Gadya Manjusha – Budhapa, Kheesa, Sadachar ka Thavis
Unit 5


BOOKS:
2. *Gadya Manjusha:* Editor: Govind, Jawahar Pusthakalay, Mathura

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Syllabus

Unit 1
Emotional Intelligence: Concept of Emotional Intelligence, Understanding the history and origin of Emotional Intelligence, Contributors to Emotional Intelligence, Science of Emotional Intelligence, EQ and IQ, Scope of Emotional Intelligence.

Unit 2

Unit 3
Emotional Intelligence at Work place: Importance of Emotional Intelligence at Work place? Cost–savings of Emotional Intelligence, Emotionally Intelligent Leaders, Case Studies Measuring Emotional Intelligence: Emotionally Intelligence Tests, Research on Emotional Intelligence, Developing Emotional Intelligence.

REFERENCES:

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Syllabus

Unit 1

Introduction
General Introduction; ‘His + Story’ or ‘History’ ?; The concepts of ‘nation’, ‘national identity’ and ‘nationalism’; Texts and Textualities: Comparative Perspectives.

Unit 2

Selected writings / selections from the complete works of the following authors will be taken up for study in a chronological order:
Raja Ram Mohan Roy; Dayananda Saraswati; Bal Gangadhar Tilak; Rabindranath Tagore;

Unit 3

Selected writings / selections from the complete works of the following authors will be taken up for study in a chronological order:
Swami Vivekananda; Sri Aurobindo; Ananda K. Coomaraswamy; Sister Nivedita; Mahatma Gandhi; Jawaharlal Nehru; B.R. Ambedkar; Sri Chandrasekharendra Saraswati, the Paramacharya of Kanchi; Dharampal; Raja Rao; V.S. Naipaul.

Conclusion.

REFERENCES:
1. Tilak, Bal Gangadhar. *The Orion / Arctic Home in the Vedas.*
8. Nehru, Jawaharlal. “The Quest” from *Discovery of India.*

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*CA – Can be Quizzes, Assignment, Projects, and Reports.*
Syllabus

Unit 1

Introduction
A peep into India’s glorious past
Ancient India – the vedas, the vedic society and the Sanatana Dharma – rajasmandala and the Cakravartins – Ramarajya – Yudhisthira’s ramarajya; Sarasvati - Sindhu Civilization and the myth of the Aryan Invasion; Classical India – Dharma as the bedrock of Indian society – Vaidika Brahmanya Dharma and the rise of Jainism and Buddhism – the sixteen Mahajanapadas and the beginning of Magadhan paramountcy - Kautilya and his Arthasastra – Chandragupta Maurya and the rise of the Mauryan empire – Gupta dynasty Indian art and architecture – classical sanskrit literature – Harsavardhana; Trade and commerce in classical and medieval India and the story of Indian supremacy in the Indian ocean region; The coming of Islam – dismantling of the traditional Indian polity – the Mughal empire – Vijayanagara samrajya and days of Maratha supremacy.

Unit 2

India’s contribution to the world: spirituality, philosophy and sciences
Indian Philosophy – the orthodox (Vaidika) and the heterodox (atheistic) schools; Ramayana and Mahabharata; Bhagavad Gita; Saints and sages of India; Ancient Indian medicine: towards an unbiased perspective; Ancient Indian mathematics; Ancient Indian astronomy; Ancient Indian science and technology.
The arrival of Europeans, British paramountcy and colonization
What attracted the rest of the world to India?; India on the eve of the arrival of European merchants; The story of colonization and the havoc it wrecked on Indian culture and civilization; Macaulay and the start of the distortion of Indian education and history; Indian economy – before and after colonization: a brief survey; The emergence of modern India.

Unit 3

Women in Indian society
The role and position of women in Hindu civilization; Gleanings from the Vedas, Brihadaryaka Upanishad, Saptasati Devi Mahatmyam, Ramayana, Mahabharata, Manusmriti, Kautilya’s Arthasastra and Mrichchhakatikam of Sudraka; The role and position of Indian women vis-a-vis Islam and European cultures; The great women of India.

Modern India
The national movement for freedom and social emancipation; Swami Vivekananda, Sri Aurobindo, Rabindranath Tagore; Understanding Mahatma Gandhi; A new nation is born as a republic – the pangs of birth and growth; India since Independence – the saga of socio-political movements; Problems facing the nation today; Globalization and Indian Economy; Bharatavarsha today and the way ahead: Regeneration of Indian National Resources.

Conclusion
The Wonder that was India; The ‘politics’ and ‘purpose’ of studying India.
REFERENCES:

17. Aurobindo, Sri. The Indian Renaissance / India’s Rebirth / On Nationalism.
25. Danino, Michel. The Invasion That Never Was.
34. Dharampal. Archival Compilations (unpublished)

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*CA – Can be Quizzes, Assignment, Projects, and Reports.
Syllabus

Unit 1

Introduction
General Introduction; Primitive man and his modes of exchange – barter system; Prehistoric and proto-historic polity and social organization.
Ancient India – up to 600 B.C.
Early India – the vedic society – the varnashramadharma – socio-political structure of the various institutions based on the four purusarthas; The structure of ancient Indian polity – Rajamandala and Cakravartins – Prajamandala; Socio-economic elements from the two great Epics – Ramayana and Mahabharata – the concept of the ideal King (Sri Rama) and the ideal state (Ramarajya) – Yudhisthira’s ramarajya; Sarasvati - Sindhu civilization and India’s trade links with other ancient civilizations; Towards chiefdoms and kingdoms – transformation of the polity: kingship – from gopati to bhupati; The mahajanapadas and the emergence of the srenis – states and cities of the Indo-Gangetic plain.

Unit 2

Classical India: 600B.C. – 1200 A.D.
The rise of Magadha, emergence of new religions – Buddhism and Jainism – and the resultant socio-economic impact; The emergence of the empire – the Mauryan Economy and Kautilya’s Arthasastra; of Politics and trade – the rise of the Mercantile Community; Elements from the age of the Kushanas and the Great Guptas; India’s maritime trade; Dharma at the bedrock of Indian polity – the concept of Digvijaya: dharma-vijaya, lobha-vijaya and asura-vijaya; Glimpses into the south Indian economies: political economies of the peninsula – Chalukyas, Rashtrakutas and Cholas

Medieval India: 1200 A.D. – 1720 A.D.
Advent of Islam – changes in the social institutions; Medieval India – agrarian economy, non-agricultural production and urban economy, currency system; Vijayanagara samrajya and maritime trade – the story of Indian supremacy in the Indian Ocean region; Aspects of Mughal administration and economy; The Maratha and other provincial economies.

Unit 3

Modern India: 1720 - 1947
the Indian market and economy before the arrival of the European traders; Colonisation and British supremacy (dismantling of everything that was ‘traditional’ or ‘Indian’) – British attitude towards Indian trade, commerce and economy and the resultant ruining of Indian economy and business – man-made famines – the signs of renaissance: banking and other business undertakings by the natives (the members of the early Tagore family, the merchants of Surat and Porbander, businessmen of Bombay, etc. may be referred to here) – the evolution of the modern banking system; Glimpses into British administration of India and administrative models; The National movement and nationalist undertakings in business and industry: the Tatas and the Birlas; Modern India: the growth of large-scale industry – irrigation and railways – money and credit – foreign trade; Towards partition – birth of two new nations – division of property; The writing of the Indian Constitution – India becomes a democratic republic – a new polity is in place.
Independent India – from 1947
India since Independence – the saga of socio-political movements; Indian economy since Independence – the fiscal system – the five year plans – liberalisation – the GATT and after; Globalisation and Indian economy; Impact of science and (new/emerging) technology on Indian economy; Histories of select Indian business houses and business entrepreneurship.

Conclusion

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*CA – Can be Quizzes, Assignment, Projects, and Reports.*
Syllabus

Unit 1

Introduction to Health
Health is wealth; Role of lifestyle habits on health; Importance of adolescence; Stages, Characteristics and changes during adolescence; Nutritional needs during adolescence why healthy lifestyle is important for adolescence. Eating Habits - eating disorders, skipping breakfast, junk food consumption.

Practicals - Therapeutic Diets

Unit 2

Food and Nutritional Requirements during Adolescence
Fluid intake; nutrition related problems; lifestyle related problems, Role of physical activity; resting pattern and postures, Personal habits – alcoholism, and other tobacco products, electronic addiction etc

Practicals - Ethnic Foods

Unit 3

Need for a Positive Life Style Change
Peer pressure & procrastination, Stress, depression, suicidal tendency, Mini project review and viva, Whole portions revision.

Practical - Cooking without Fire or Wire-healthy Snacks

TEXTBOOKS:

REFERENCE BOOKS:
2. WHO Report on Adolescent Health: 2010

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*CA – Can be Quizzes, Assignment, Projects, and Reports.
Syllabus

Unit 1

Introductory study of the Bhagavad Gita and the Upanishads.

Unit 2

The relevance of these classics in a modern age.

Unit 3

Goals of human life - existential problems and their solutions in the light of these classics etc.

REFERENCE:
*The Bhagavad Gita, Commentary by Swami Chinmayananda*

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PREAMBLE:

This paper will introduce the students to the multiple dimensions of the contribution of India to the fields of philosophy, art, literature, physical and social sciences. The paper intends to give an insight to the students about the far-reaching contributions of India to world culture and thought during the course of its long journey from the hoary antiquity to the present times. Every nation takes pride in its achievements and it is this sense of pride and reverence towards the achievements that lays the foundation for its all-round progress.

Syllabus

Unit 1

A brief outline of Indian history from prehistoric times to the present times.

Contributions of India to world culture and civilization: Indian Philosophy and Religion; Art and Literature; Physical and Social Sciences.

Unit 2

Modern India: Challenges and Possibilities.

Scientific and technological progress in post-independence era; Socio-cultural and political movements after independence; Challenges before the nation today - unemployment – corruption – degradation of cultural and moral values - creation of a new system of education; Creation of a modern and vibrant society rooted in traditional values.

Unit 3

Modern Indian Writing in English: Trends in Contemporary Indian Literature in English.

TEXTBOOK:

Material given by the Faculty

BACKGROUND LITERATURE:

1. Selections from The Cultural Heritage of India, 6 volumes, Ramakrishna Mission Institute of Culture (Kolkata) publication.
2. Selections from the Complete Works of Swami Vivekananda, Advaita Ashrama publication.
3. Invitations to Indian Philosophy, T. M. P. Mahadevan, University of Madras, Chennai.
4. Outlines of Indian Philosophy, M. Hiriyanna, MLBD.
5. An Advanced History of India, R. C. Majumdar et al, Macmillan.
6. India Since 1526, V. D. Mahajan, S. Chand & Company
7. The Indian Renaissance, Sri Aurobindo.
8. India’s Rebirth, Sri Aurobindo.
13. Awaken Children: Conversations with Mata Amritanandamayi
15. Indian Philosophy of Beauty, T. P. Ramachandran, University of Madras, Chennai.
16. Web of Indian Thought, Sister Nivedita
17. Essays on Indian Nationalism, Anand Kumaraswamy
18. Comparative Aesthetics, Volume 2, Kanti Chandra Pandey, Chowkhamba, Varanasi
19. The Invasion That Never Was, Michel Danino
20. Samskara, U. R. Ananthamurthy, OUP.
21. Hayavadana, Girish Karnard, OUP
22. Naga-Mandala, Girish Karnard, OUP.

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*CA – Can be Quizzes, Assignment, Projects, and Reports.
OBJECTIVES:

To familiarize students with Sanskrit language; to introduce students to various knowledge traditions in Sanskrit; to help students appreciate and imbibe India’s ancient culture and values.

Syllabus

Unit 1


Unit 2

Language Studies - Role of Sanskrit in Indian & World Languages.

Unit 3


Unit 4


Unit 5

Indology Studies – Perspectives and Innovations.

TEXTBOOKS AND REFERENCE BOOKS:

1. Vakya Vyavahara- Prof. Vempaty Kutumba Sastri, Rashtriya Sanskrit Sansthan, New Delhi
2. The Wonder that is Sanskrit - Dr.Sampadananda Mishra, New Delhi

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Syllabus

Unit 1

Introduction to Basic Concepts of NSS: History, philosophy, aims and objectives of NSS, Emblem, flag, motto, song, badge etc., Organisational structure, roles and responsibilities of various NSS functionaries.

NSS Programmes and Activities: Concept of regular activities, special campaigning, Day Camps, Basis of adoption of village / slums, methodology of conducting survey, financial pattern of the scheme, other youth programme/schemes of GOI, Coordination with different agencies, Maintenance of the Diary.

Unit 2

Volunteerism and Shramdan: Indian Tradition of volunteerism, Needs and importance of volunteerism, Motivation and Constraints of volunteerism, Shramdan as part of volunteerism, Amalabharatam Campaign, Swatch Bharath.

Unit 3

Understanding youth: Definition, profile and categories of youth, Issues, challenges and opportunities for youth, Youth as an agent of social change.

Youth and Yoga: History, philosophy and concept of Yoga, Myths and misconceptions about Yoga, Different Yoga traditions and their impacts, Yoga as a preventive and curative method, Yoga as a tool for healthy life style

Unit 4

Youth Development Programmes in India: National Youth Policy, Youth development programmes at the national level, state level and voluntary sector, youth-focused and youth-led organizations.


Unit 5

Environmental Issues: Environment conservation, enrichment and sustainability, climate change, waste management, rain water harvesting, energy conservation, waste land development.

Project Work / Practical

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*CA – Can be Quizzes, Assignment, Projects, and Reports.
Course Objectives

1. To help students acquire the basic knowledge of behavior and effective living
2. To create an awareness of the hazards of health compromising behaviours
3. To develop and strengthen the tools required to handle the adversities of life

Course Outcome

CO 1: Understand the basic concepts of Behavioral Psychology
CO 2: Demonstrate self reflective skills through activities
CO 3: Apply the knowledge of psychology to relieve stress
CO 4: Analyse the adverse effects of health compromising behaviours.
CO 5: Evaluate and use guided techniques to overcome and cope with stress related problems.

CO-PO Mapping

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Syllabus

Unit 1

Self-Awareness & Self-Motivation
Self analysis through SWOT, Johari Window, Maslow’s hierarchy of motivation, importance of self esteem and enhancement of self esteem.

Unit 2

The Nature and Coping of Stress

Unit 3

Application of Health Psychology
Health compromising behaviours, substance abuse and addiction.

TEXTBOOKS:
1. V. D. Swaminathan & K. V. Kaliappan “Psychology for effective living - An introduction to Health
REFERENCE BOOKS:

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*CA – Can be Quizzes, Assignment, Projects, and Reports.
Course Objectives:

1. To strengthen the fundamental knowledge of human behavior
2. To strengthen the ability to understand the basic nature and behavior of humans in organizations as a whole
3. To connect the concepts of psychology to personal and professional life

Course Outcome

CO 1: Understand the fundamental processes underlying human behavior such as learning, motivation, individual differences, intelligence and personality.
CO 2: Apply the principles of psychology in day-to-day life for a better understanding of oneself and others.
CO 3: Apply the knowledge of Psychology to improve study skills and learning methods
CO 4: Apply the concepts of defense mechanisms to safeguard against abusive relationships and to nurture healthy relationships.

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Unit 1

Psychology of Adolescents: Adolescence and its characteristics.

Unit 2

Learning, Memory & Study Skills: Definitions, types, principles of reinforcement, techniques for improving study skills, Mnemonics.

Unit 3

Attention & Perception: Definition, types of attention, perception.

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Syllabus

Unit 1

Introduction
Western and Indian views of science and technology
Introduction; Francis Bacon: the first philosopher of modern science; The Indian tradition in science and technology: an overview.

Unit 2

Indian sciences
Introduction; Ancient Indian medicine: towards an unbiased perspective; Indian approach to logic; The methodology of Indian mathematics; Revision of the traditional Indian planetary model by Nilakantha Somasutvan in circa 1500 AD

Science and technology under the British rule
Introduction; Indian agriculture before modernization; The story of modern forestry in India; The building of New Delhi

Unit 3

Science and technology in Independent India
Introduction; An assessment of traditional and modern energy resources; Green revolution: a historical perspective; Impact of modernisation on milk and oilseeds economy; Planning without the spirit and the determination.

Building upon the Indian tradition
Introduction; Regeneration of Indian national resources; Annamahatmyam and Annam Bahu Kurvita: recollecting the classical Indian discipline of growing and sharing food in plenty and regeneration of Indian agriculture to ensure food for all in plenty.

Conclusion

REFERENCES:
18. The Cultural Heritage of India. Kolkata: Ramakrishna Mission Institute of Culture.

*The syllabus and the study material in use herein has been developed out of a ‘summer programme’ offered by the Centre for Policy Studies (CPS), Chennai at the Indian Institute of Advanced Study (IIAS), Rashtrapati Nivas, Shimla, sometime ago. The same has been very kindly made available to us by Professors Dr M.D. Srinivas (Chairman) and Dr J.K. Bajaj (Director) of the CPS.

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Syllabus

Unit 1


Unit 2

Karma Yoga: Yoga of Action – Living in the Present – Dedicated Action without Anxiety over Results - Concept of Swadharma.

Dhyana Yoga: Tuning the Mind – Quantity, Quality and Direction of Thoughts – Reaching Inner Silence.

Unit 3


TEXTBOOKS / REFERENCES:

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OBJECTIVES:

To give students an introduction to the basic ideas contained in the Upanishads; and explores how their message can be applied in daily life for achieving excellence.

Syllabus

Unit 1

An Introduction to the Principal Upanishads and the Bhagavad Gita - Inquiry into the mystery of nature - Sruti versus Smrti - Sanatana Dharma: its uniqueness - The Upanishads and Indian Culture - Upanishads and Modern Science.

Unit 2

The challenge of human experience & problems discussed in the Upanishads — the True nature of Man – the Moving power of the Spirit – The Message of Fearlessness – Universal Man - The central problems of the Upanishads – Ultimate reality – the nature of Atman - the different manifestations of consciousness.

Unit 3

Upanishad Personalities - episodes from their lives and essential teachings: Yajnavalkya, Aruni, Uddalaka, Pippalada, Satyakama Jabala, Svetaketu, Nachiketas, Upakosala, Chakrayana Ushasti, Raikva, Kapila and Janaka. Important verses from Upanishads - Discussion of Sage Pippalada’s answers to the six questions in Prasnopanishad.

REFERENCES:

1. *The Message of the Upanishads* by Swami Ranganathananda, Bharatiya Vidya Bhavan
2. Eight Upanishads with the commentary of Sankaracharya, Advaita Ashrama
3. *Indian Philosophy* by Dr. S. Radhakrishnan, Oxford University Press
4. *Essentials of Upanishads* by R L Kashyap, SAKSI, Bangalore
7. *Upanishad Ganga series* – Chinmaya Creations

Evaluation Pattern

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*CA – Can be Quizzes, Assignment, Projects, and Reports.*
Course Objectives:
- To introduce the significance of food, nutrients, locally available food resources, synergic food combinations, good cooking methods and importance of diversity in foods.
- To understand nutritional imbalances and chronic diseases associated with the quality of food.
- To gain awareness about the quality of food - Organic food, genetically modified food, adulterated food, allergic food, food poisoning and food safety.
- To understand food preservation processing, packaging and the use of additives.

Course Outcome:
**CO1**: Acquire knowledge about the various food and food groups
**CO2**: Understand nutritional imbalances and chronic diseases prevailing among different age groups.
**CO3**: Understand the significance of safe food and apply the food safety standards.
**CO4**: Demonstrate skills of food processing, preservation and packaging methods with or without additives.
**CO5**: Evaluate the quality of food based on the theoretical knowledge of Food and Nutrition.

**CO-PO Mapping:**

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Syllabus

**Unit 1**

**Food and Food Groups**
Introduction to foods, food groups, locally available foods, Nutrients, Cooking methods, Synergy between foods, Science behind foods, Food allergies, food poisoning, food safety standards.

**Cookery Practicals - Balanced Diet**

**Unit 2**

**Nutrients and Nutrition**
Nutrition through life cycle, RDA, Nutrition in disease, Adulteration of foods & Food additives, Packaging and labeling of foods.

**Practicals - Traditional Foods**
Unit 3

Introduction to Food Biotechnology
Future foods - Organic foods and genetically modified foods, Fortification of foods value addition of foods, functional foods, Nutraceuticals, supplementary foods, Processing and preservation of foods, applications of food technology in daily life, and your prospects associated with food industry – Nanoparticles, biosensors, advanced research.

Practicals - Value added foods

TEXTBOOKS:

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Evaluation Pattern

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*CA – Can be Quizzes, Assignment, Projects, and Reports.
This paper will introduce the basics of Japanese language. Students will be taught the language through various activities like writing, reading, singing songs, showing Japanese movies etc. Moreover this paper intends to give a thorough knowledge on Japanese scripts that is Hiragana and Katakana. Classes will be conducted throughout in Japanese class only. Students will be able to make conversations with each other in Japanese. Students can make self-introduction and will be able to write letters in Japanese. All the students will be given a text on Japanese verbs and tenses.

Students can know about the Japanese culture and the lifestyle. Calligraphy is also a part of this paper. Informal sessions will be conducted occasionally, in which students can sing Japanese songs, watch Japanese movies, do Origami – pattern making using paper.

### Evaluation Pattern

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*CA – Can be Quizzes, Assignment, Projects, and Reports.
Syllabus

Students will be taught the third and the most commonly used Japanese script, Kanji. Students will be taught to write as well as speak.

Students will be given detailed lectures on Calligraphy.

This version of the course includes a new project where the students should make a short movie in Japanese language selecting their own topics.

By the end of the semester they the students will master the subject in all means. They will be able to speak Japanese as fluently as they speak English. Students will be encouraged to write stories and songs in Japanese language themselves.

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*CA – Can be Quizzes, Assignment, Projects, and Reports.
OBJECTIVES:

To enable the students to acquire basic skills in functional language; to develop independent reading skills and reading for appreciating literary works; to analyse language in context to gain an understanding of vocabulary, spelling, punctuation and speech.

Syllabus

Unit 1
Adalitha Kannada: bhashe, swaroopa, belavanigeya kiru parichaya Paaribhaashika padagalu
Vocabulary Building

Unit 2
Prabhandha – Vyaaghra Geethe - A. N. Murthy Rao

Unit 3
Mochi – Bharateepriya
Mosarina Mangamma – Maasti Venkatesh Iyengar Kamalaapurada Hotelnalli – Panje Mangesh Rao
Kaanihe – B.
M. Shree
Geleyanobbanige bareda Kaagada – Dr. G. S. Shivarudrappa Moodala Mane – Da.
Ra. BendreSwathantryada Hanate – K. S. Nissaar Ahmed

Unit 4
Letter Writing - Personal: Congratulation, thanks giving, invitation, condolence

Unit 5
Reading Comprehension; nudigattu, gaadegalu Speaking Skills: Prepared speech, pick and speak

REFERENCES:

1. H. S. Krishna Swami Iyangar – Adalitha Kannada – Chetana Publication, Mysuru
2. N. Murthy Rao – Aleyuva Mana – Kuvempu Kannada Adyayana Samste
3. Nemi Chandra – Badhuku Badalisabahudu – Navakarnataka Publication
4. Sanna Kathegalu – Prasaranga, Mysuru University, Mysuru
5. B. M. Shree – Kannadada Bavuta – Kannada Sahitya Parishattu
6. K. S. Nissar Ahmed – 75 Bhaavageetegalu – Sapna Book House (P) Ltd.
7. Dr. G. S. Shivarudrappa – Samagra Kavya – Kamadhenu Pustaka Bhavana
**Evaluation Pattern**

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*CA – Can be Quizzes, Assignment, Projects, and Reports.
OBJECTIVES:

To enable the students to acquire basic skills in functional language; to develop independent reading skills and reading for appreciating literary works; to develop functional and creative skills in language; to enable the students to plan, draft, edit & present a piece of writing.

Syllabus

Unit 1

Official Correspondence: Adhikrutha patra, prakatane, manavi patra, vanijya patra

Unit 2

Nanna Hanate - Dr. G. S. Shivarudrappa


Ella Marethiruvaga - K. S. Nissaar Ahmed Saviraru Nadigalu – S Siddalingayya

Unit 3


Unit 4

Sarva Sollegala turtu Maha Samelana - Beechi Swarthakkaagi Tyaga - Beechi

Unit 5

Essay writing: Argumentative & Analytical Précis writing

REFERENCES:

1. H. S. Krishnaswami Iyanger – Adalitha Kannada – Chetan Publication, Mysuru
2. Dr. G. S. Shivarudrappa – Samagra Kavya. - Kamadhenu Pustaka Bhavana
4. K. S. Nissar Ahmed – 75 Bhaavageetegalu – Sapna book house
5. Dr. Da. Ra. Bendre – Saayo Aata – Shri Maata Publication

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*CA – Can be Quizzes, Assignment, Projects, and Reports.
Course Objectives:

To appreciate the aesthetics & cultural implications; to enhance creative thinking in mother tongue; to learn our culture & values; to equip students read & write correct Malayalam; to correct the mistakes in pronunciation; to create awareness that good language is the sign of complete personality

Course Outcome:

After the completion of the course the student will be able to:

CO1: Understand and inculcate philosophical thoughts and practices
CO2: Understand and appreciate the post modern trends of literature.
CO3: Analyse the literary texts and comprehend the cultural diversity of Kerala
CO4: Distinguish the different genres in Malayalam literature
CO5: Demonstrate the ability to effectively communicate in Malayalam

CO-PO Mapping:

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Syllabus

Unit 1
Ancient poet trio: Adhyatmaramayanam,
Lakshmana Swanthanam (valsa soumitre… mungikidakayal), Ezhuthachan - Medieval period classics –Jnanappana (kalaminnu… vilasangalingane), Poonthanam

Unit 2

Unit 3
Short stories from period 1/2/3, Poovanpazham - Vaikaom Muhammed Basheer - Literary & Cultural figures of Kerala and about their literary contributions.

Unit 4
Literary Criticism: Itihasa studies - Bharatha Paryadanam - Vyasante Chiri - Kuttikrishna Mararu - Outline of literary Criticism in Malayalam Literature - Introduction to Kutti Krishna Mararu & his outlook towards literature & life.
Unit 5


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*CA – Can be Quizzes, Assignment, Projects, and Reports.
OBJECTIVES:

To appreciate the aesthetics & cultural implications; to enhance creative thinking in mother-tongue; to learn our culture & values; to equip students read & write correct Malayalam; to correct the mistakes in pronunciation; to create awareness that good language is the sign of complete personality.

Course Outcome:

After the completion of the course the student will be able to:

CO1: Understand the different cultural influences in linguistic translation
CO2: Identify and appreciate the Romantic elements of modern literature
CO3: Analyze the genre of autobiographical writing
CO4: Critically evaluate the significance of historical, political and socio-cultural aspects in literature
CO5: Demonstrate good writing skills in Malayalam

CO-PO Mapping:

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Syllabus

Unit 1

Ancient poet trio: Kalayanasougandhikam, (kallum marangalun… namukkennarika vrikodara)
Kunjan Nambiar - Critical analysis of his poetry - Ancient Drama: Kerala Sakunthalam (Act 1),
Kalidasan (Translated by Attor Krishna Pisharody).

Unit 2

Modern / romantic / contemporary poetry: Manaswini, Changampuzha Krishna Pillai –
Romanticism – modernism.

Unit 3

Anthology of short stories from period 3/4/5: Ninte Ormmayku, M. T. Vasudevan Nair - literary
contributions of his time
Unit 4

Part of an autobiography / travelogue: Kannerum Kinavum, V. T. Bhattathirippadu - Socio-cultural literature - historical importance.

Unit 5

Error-free Malayalam - 1. Language; 2. Clarity of expression; 3. Punctuation - Thettillatha Malayalam Writing - a. Expansion of ideas; b. Précis Writing; c. Essay Writing; d. Letter writing; e. Radio Speech; f. Script / Feature / Script Writing; g. News Editing; h. Advertising; i. Editing; j. Editorial Writing; k. Critical appreciation of literary works (Any one or two as an assignment).

REFERENCES:


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*CA – Can be Quizzes, Assignment, Projects, and Reports.
OBJECTIVES:

To familiarize students with Sanskrit language and literature; to enable them to read and understand Sanskrit verses and sentences; to help them acquire expertise for self-study of Sanskrit texts and communication in Sanskrit; to help the students imbibe values of life and Indian culture as propounded in scriptures.

Syllabus

Unit 1

Introduction to Sanskrit language, Devanagari script - Vowels and consonants, pronunciation, classification of consonants, conjunct consonants, words – nouns and verbs, cases – introduction, numbers, Pronouns, communicating time in Sanskrit. Practical classes in spoken Sanskrit

Unit 2

Verbs- Singular, Dual and plural – First person, Second person, Third person. Tenses – Past, Present and Future – Atmanepadi and Parasmaipadi-karthariprayoga

Unit 3

Words for communication, slokas, moral stories, subhashithas, riddles (from the books prescribed)

Unit 4

Selected slokas from Valmiki Ramayana, Kalidasa’s works and Bhagavad Gita. Ramayana – chapter VIII - verse 5, Mahabharata - chapter 174, verse -16, Bhagavad Gita – chapter - IV verse 8, Kalidasa’s Sakuntalam Act IV – verse 4

Unit 5

Translation of simple sentences from Sanskrit to English and vice versa.

ESSENTIAL READING:

1. Praveshaha; Publisher: Samskrita bharati, Aksharam, 8th cross, 2nd phase, girinagar, Bangalore - 560085
2. Sanskrit Reader I, II and III, R. S. Vadhyar and Sons, Kalpathi, Palakkad
3. Prakriya Bhashyam written and published by Fr. John Kunnappally
4. Sanskrit Primer by Edward Delavan Perry, published by Ginn and Company Boston
5. Sabdamanjari, R. S. Vadyar and Sons, Kalpathi, Palakkad
6. Namalinganusasanam by Amarasisimha published by Travancore Sanskrit series
7. Subhashita Ratna Bhandakara by Kashinath Sharma, published by Nirnayasagar press

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*CA – Can be Quizzes, Assignment, Projects, and Reports.
OBJECTIVES:

To familiarize students with Sanskrit language and literature; to enable them to read and understand Sanskrit verses and sentences; to help them acquire expertise for self-study of Sanskrit texts and communication in Sanskrit; to help the students imbibe values of life and Indian culture as propounded in scriptures.

Syllabus

Unit 1
Seven cases, indeclinables, sentence making with indeclinables, Saptha karakas.

Unit 2

Unit 3
Words and sentences for advanced communication. Slokas, moral stories (Pancatantra) Subhashitas, riddles.

Unit 4
Introduction to classical literature, classification of Kavyas, classification of Dramas - The five Mahakavyas, selected slokas from devotional kavyas- Bhagavad Gita – chapter - II verse 47, chapter - IV verse 7, chapter - VI verse 5, chapter - VIII verse 6, chapter - XVI verse 21, Kalidasa’s Sakuntala act IV – verse 4, Isavasyopanishat 1st Mantra, Mahabharata chapter 149 verses 14 - 120, Neetisara chapter - III

Unit 5
Translation of paragraphs from Sanskrit to English and vice versa.

ESSENTIAL READING:
1. Praveshaha; Publisher: Samskrita bharati, Aksharam, 8th cross, 2nd phase, girinagar, Bangalore -560085
2. Sanskrit Reader I, II and III, R.S. Vadhyar and Sons, Kalpathi, Palakkad
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Syllabus

Unit 1

Understanding CSR - Evolution, importance, relevance and justification. CSR in the Indian context, corporate strategy. CSR and Indian corporate. Structure of CSR - In the Companies Act 2013 (Section 135); Rules under Section 13; CSR activities, CSR committees, CSR policy, CSR expenditure CSR reporting.

Unit 2

CSR Practices & Policies - CSR practices in domestic and international area; Role and contributions of voluntary organizations to CSR initiatives. Policies; Preparation of CSR policy and process of policy formulation; Government expectations, roles and responsibilities. Role of implementation agency in Section 135 of the Companies Act, 2013. Effective CSR implementation.

Unit 3

Project Management in CSR initiatives - Project and programme; Monitoring and evaluation of CSR Interventions. Reporting - CSR Documentation and report writing. Reporting framework, format and procedure.

REFERENCES:


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Syllabus

Unit 1


Unit 2


Unit 3

Strategies of Help and Care: Positive impact of work on health, Characteristics of mentally healthy workplace, Employee and employer obligations, Promoting mental health and well being, corporate social responsibility (CSR), an inclusive work environment, Training and awareness raising, managing performance, inclusive recruitment, Supporting individuals-talking about mental health, making reasonable adjustments, Resources and support for employees - Employee Assistance Programme / Provider (EAP), in house counsellor, medical practitioners, online resources and telephone support, 24 hour crisis support, assistance for colleagues and care givers, Legislations. Case Study, Activity.

REFERENCES:

3. Canadian Mental Health Association, Ontario “Workplace mental health promotion, A how to guide” wmhp.cmhaontario.ca/
6. Mental Health Act 1987 (India) www.tnhealth.org/mha.htm
7. Persons with disabilities Act 1995 (India) socialjustice.nic.in
8. The Factories Act 1948 (India) www.caaa.in/Image/19ulabourlawshb.pdf
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Course Objectives:
- To introduce the students to different literature- Sangam literature, Epics, Bhakthi literature and modern literature.
- To improve their ability to communicate with creative concepts, and also to introduce them to the usefulness of basic grammatical components in Tamil.

Course Outcomes

CO 1: To understand the Sangam literature
CO 2: To understand the creative literature
CO 3: To understand the literary work on religious scriptures
CO 4: To improve the communication and memory skills
CO 5: To understand the basic grammar components of Tamil language and their usage and applications.
CO 6: Understand creative writing aspects and apply them.

CO-PO Mapping

Syllabus

Unit 1
The history of Tamil literature: Nāṭṭupuṟṟap pāṭalkal, kataikkaḷ, paḷamolikāḷ - ciruṇakai kal tōṟṟamum varakkciyum, cirjilakiyankaḷ: Kālinkuttup parañi (pōṟpāṭiyatu) - mukkuṭar pāḷḷu 35.
Kāppiyaṅkaḷ: Cilappatikāram – maṇimēkalai naṭaiyiyal āyyu māṟṟum aippum – aiṅciṅuṅ kāppiyaṅkaḷ toṭarpāṅa ceytaṅkaḷ.

Unit 2
tiṇai ilakkiyamum nītiyilakkiyamum - patiṅkēḷkkāṅkku nūlkaḷ toṭarpāṅa piṟa ceytaṅkaḷ - tirukkuṟṟaḷ (aṟṟu, paṇṇu, kalvi, oḷukkaṁ, nāṭṟu, vāymai, kēḷvi, ceṇṇaṅgī, periyāṟṟaitṭumakkōṭal, vilippuṇarvu pēṅra atikāṟṟittul uḷḷa ceytaṅkaḷ).
Aṟṇūḷkaḷ: Ulakaniṅṭu (1-5) – ēḷāṭi (1,3,6). - Cittarkaḷ: Kaṭuvelḵi cittar pāṭalkal (āṇṭantak kalippu –1, 4, 6, 7., māṟṟum akappēy cittar pāṭalkal (1-5).

Unit 3
tamiḻ ilakkaṅam: Vākkiya vakaikaḷ – taṅṆiṅai piṟaṁnaṅi – nērkūṟṟu ayarkūṟṟu

Unit 4

Unit 5
tamiḻ moḻi āyivul kaṇiṅi payanṟṟuṭu. - Karuttu parimāṟṟam - vilampaṟṟa moḷiyamaippu – pecco - nāṭakam paṭaippu -ciruṇakai, katai, putiṅam paṭaippu.
Textbooks:
6. poṉ maṇimāṟaṉ “aṭōṉ tamiḻ ilakkanam “aṭōṉ papliṅṣin kurūp, vaṉciyūr,

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Course Objectives

- To learn the history of Tamil literature.
- To analyze different styles of Tamil Language.
- To strengthen the creativity in communication, Tamil basic grammar and use of computer on Tamil Language.

Course Outcomes

CO 1: Understand the history of Tamil literature.
CO 2: Apply practical and comparative analyses on literature.
CO 3: Understand thinai literature, literature on justice, Pathinenkeelkanaku literature
CO 4: Understand the tamil scholars’ service to Tamil language and society.
CO 5: Understand components of Tamil grammar and its usage
CO 6: Understand creative writing aspects and apply them

CO-PO Mapping

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Syllabus

Unit 1


Unit 2

tiṅai ilakkiyamum nītiyilakkiyamum - patigenkīḷ[kkanakku nūlkaḷ toṭarpāṇa piṟa ceytikaḷ - tirukkuṟaḷ (aṟpu, paṉpu, kalvi, oḷukkam, naṭpu, vāymai, kēḻvi, ceynaṟṟi,
Unit 3

tamil ilakkaṇam: Vākkiya vakaikal – taṇṣiṇai pigaviṇai – nērkkūṟṟu ayarkūṟṟu

Unit 4


Unit 5


Text Books / References


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