**COURSE STRUCTURE**

**For I - IV Years**

**AND**

**DETAILED SYLLABI**

**of III and IV Year**

**CSE (Cyber Security) Board Courses**

**B.Tech. Computer Science and Engineering (CYBER SECURITY)**

**A22 Regulation**

(Applicable for the Batches admitted from 2022-23)

****

**DEPARTMENT OF CSE - CYBER SECURITY**

SREENIDHI INSTITUTE OF SCIENCE AND TECHNOLOGY

(An Autonomous Institution approved by UGC and affiliated to JNTUH)

Yamnampet, Ghatkesar, Hyderabad - 501 301

**November 2023**

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**Department of Computer Science and Engineering - Cyber Security**

**B.Tech. CSE (Cyber Security) - A22 Regulation**

## **B.Tech. CSE (Cyber Security) - I Year I Semester**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SNo.** | **Course Category** | **M/N/S \*** | **Dept Course** | **Course Code** | **Course** | **L** | **T** | **P/D** | **C** | **Max. Marks** | |
| **CIE** | **SEE** |
|  | BS |  | S&H | 9HC04 | Engineering Chemistry | 2 | 1 | 0 | 3 | 40 | 60 |
|  | ES | S | IT | 9FC01 | Problem Solving using C | 3 | 0 | 0 | 3 | 40 | 60 |
|  | BS | S | S&H | 9HC11 | Matrix Algebra and Calculus | 2 | 1 | 0 | 3 | 40 | 60 |
|  | HS | S | S&H | 9HC01 | Essential English Language Skills | 2 | 0 | 0 | 2 | 40 | 60 |
|  | HS | S | S&H | 9HC61 | Oral Communication Lab – I | 0 | 0 | 2 | 1 | 40 | 60 |
|  | BS | S | S&H | 9HC64 | Engineering Chemistry Lab | 0 | 0 | 3 | 1.5 | 40 | 60 |
|  | ES | S | IT | 9FC61 | Problem Solving using C Lab | 0 | 0 | 3 | 1.5 | 40 | 60 |
|  | ES | S | S&H | 9BC61 | Workshop/Manufacturing Processes Lab | 0 | 1 | 3 | 2.5 | 40 | 60 |
|  | HS |  | S&H | 9HC18 | Induction Program | - | - | - | - | Satisfactory/ Unsatisfactory | |
|  |  | **-/-/7** |  |  | **Total** | **9** | **3** | **11** | **17.5** | **320** | **480** |

**M/N/S\* : Employability / Entrepreneurship / Skill Development**

## **B.Tech. CSE (Cyber Security) - I Year II Semester**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SNo.** | **Course Category** | **M/N/S** | **Dept Course** | **Course Code** | **Course** | **L** | **T** | **P/D** | **C** | **Max. Marks** | |
| **CIE** | **SEE** |
| 1 | BS |  | S&H | 9HC07 | Engineering Physics | 2 | 1 | 0 | 3 | 40 | 60 |
| 2 | ES | M | CSE | 9EC01 | Data Structures | 3 | 0 | 0 | 3 | 40 | 60 |
| 3 | BS | S | S&H | 9HC12 | Advanced Calculus | 2 | 1 | 0 | 3 | 40 | 60 |
| 4 | ES | S | ME | 9BC01 | Engineering Graphics | 1 | 0 | 4 | 3 | 40 | 60 |
| 5 | ES |  | EEE and ECE | 9AC48 | Basic Electrical and Electronics Engineering | 3 | 0 | 0 | 3 | 40 | 60 |
| 6 | HS | S | S&H | 9HC62 | Oral Communication Lab-II | 0 | 0 | 3 | 1.5 | 40 | 60 |
| 7 | BS | S | S&H | 9HC66 | Engineering Physics Lab | 0 | 0 | 3 | 1.5 | 40 | 60 |
| 8 | ES | S | CSE | 9EC61 | Data Structures using C Lab | 0 | 0 | 3 | 1.5 | 40 | 60 |
|  |  | **1/-/5** |  |  | **Total :** | **11** | **2** | **13** | **19.5** | **320** | **480** |

## **B.Tech. CSE (Cyber Security) - II Year I Semester**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SNo** | **Course Category** | **M/N/S** | **Dept Course** | **Course Code** | **Course** | **L** | **T** | **P/D** | **C** | **Max. Marks** | |
| **CIE** | **SEE** |
|  | BS | M | CSE-CS | 9J301 | Statistical Methods and Number Theory | 3 | 0 | 0 | 3 | 40 | 60 |
|  | PC | M | CSE | 9EC02 | Object Oriented Programming through Java | 2 | 1 | 0 | 3 | 40 | 60 |
|  | BS | S | IT | 9F303 | Discrete Mathematics | 2 | 1 | 0 | 3 | 40 | 60 |
|  | ES | M | ECE | 9CC56 | Computer Organization & Architecture | 2 | 0 | 0 | 2 | 40 | 60 |
|  | HS |  | S&H | 9HC03 | Universal Human Values | 3 | 0 | 0 | 3 | 40 | 60 |
|  | PC | M | CSE-CS | 9JC01 | Fundamentals of Computer Networks | 2 | 0 | 0 | 2 | 40 | 60 |
|  | BS | M | S&H | 9HC16 | Quantitative Aptitude and Logical Reasoning | 3 | 0 | 0 | 3 | 40 | 60 |
|  | PC | S | CSE | 9EC62 | Object Oriented Programming through Java Lab | 0 | 0 | 4 | 2 | 40 | 60 |
|  | ES | S | EEE | 9AC96 | Basic Electrical and Electronics Lab | 0 | 0 | 3 | 1.5 | 40 | 60 |
|  | ES | S | ECE and CS | 9J361 | Computer Organization and Computer Networks Lab | 0 | 0 | 2 | 1 | 40 | 60 |
|  |  | **5/-/4** |  |  | **Total** | **17** | **2** | **9** | **23.5** | **400** | **600** |

## **B.Tech. CSE (Cyber Security) - II Year II Semester**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SNo** | **Course Category** | **M/N/S** | **Dept Course** | **Course Code** | **Course** | **L** | **T** | **P/D** | **C** | **Max. Marks** | |
| **CIE** | **SEE** |
|  | PC | M | IT | 9FC02 | Python Programming | 2 | 1 | 0 | 3 | 40 | 60 |
|  | PC | M | CSE-CS | 9JC02 | Information Security | 2 | 0 | 0 | 2 | 40 | 60 |
|  | PC | M | IT | 9FC04 | Database Management Systems | 3 | 0 | 0 | 3 | 40 | 60 |
|  | PC | M | CSE | 9EC03 | Software Engineering | 2 | 0 | 0 | 2 | 40 | 60 |
|  | HS | N | MBA | 9ZC01 | Business Economics and Financial Analysis | 3 | 0 | 0 | 3 | 40 | 60 |
|  | HS |  | H&S | 9HC05 | Environmental Science | 3 | 0 | 0 | - | Pass/Fail | |
|  | PC | S | IT | 9FC63 | Database Management Systems Lab | 0 | 0 | 3 | 1.5 | 40 | 60 |
|  | PC | S | CSE-CS | 9J462 | Python and Information Security Lab | 0 | 0 | 3 | 1.5 | 40 | 60 |
|  | PC | S | CSE | 9EC63 | Software Engineering lab | 0 | 0 | 3 | 1.5 | 40 | 60 |
|  | HS | S | H&S | 9HC63 | Soft Skills Lab | 0 | 1 | 2 | 2 | 40 | 60 |
|  | PS | S | CSE-CS | 9J485 | Technical Seminar | 0 | 1 | 0 | 1 | 100 | -- |
|  |  | **4/1/5** |  |  | **Total** | **15** | **3** | **11** | **20.5** | **460** | **540** |

Note: Summer Industry Internship – I is to be carried out during the summer vacation between 4th and 5th semesters

## **B.Tech. CSE (Cyber Security) - III Year I Semester**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SNo** | **Course Category** | **M/N/S** | **Dept Course** | **Course Code** | **Course** | **L** | **T** | **P/D** | **C** | **Max. Marks** | |
| **CIE** | **SEE** |
|  | PE | M |  |  | Professional Elective - I | 3 | 0 | 0 | 3 | 40 | 60 |
|  | ES | M | IT | 9FC07 | Cyber Security and Cyber laws | 2 | 0 | 0 | 2 | 40 | 60 |
|  | PC | M | IT | 9FC83 | Data Warehousing and Mining | 2 | 0 | 0 | 2 | 40 | 60 |
|  | PC | M | CSE | 9EC04 | Design and Analysis of Algorithms | 2 | 1 | 0 | 3 | 40 | 60 |
|  | PC | M | CSE | 9EC06 | Operating Systems | 3 | 0 | 0 | 3 | 40 | 60 |
|  | PC | M | CSE | 9FC06 | Web Technologies | 2 | 1 | 0 | 3 | 40 | 60 |
|  | PC | S | CSE-CS | 9JC63 | Data Warehousing and Mining Lab and Operating Systems Lab | 0 | 0 | 3 | 1.5 | 40 | 60 |
|  | PC | S | CSE-CS | 9JC64 | Cyber Security and Web Technologies Lab | 0 | 0 | 3 | 1.5 | 40 | 60 |
|  | PC | S | CSE | 9EC47 | Design and Analysis of Algorithms Lab | 0 | 0 | 2 | 1 | 40 | 60 |
|  | PS | S | CS | 9J591 | Summer Industry Internship - I | - | - | - | 1 | 40 | 60 |
|  |  | **6/-/4** |  |  | **Total** | **14** | **2** | **8** | **21** | **400** | **600** |

## **B.Tech. CSE (Cyber Security) - III Year II Semester**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sl. No** | **Course Category** | **M/N/S** | **Dept Course** | **Course Code** | **Course** | **L** | **T** | **P/D** | **C** | **Max. Marks** | |
|  |  |  |  |  |  |  |  |  |  | **CIE** | **SEE** |
|  | OE | N |  |  | Open Elective - I | 3 | 0 | 0 | 3 | 40 | 60 |
|  | PE | M |  |  | Professional Elective – II | 3 | 0 | 0 | 3 | 40 | 60 |
|  | PE | M |  |  | Professional Elective – III | 3 | 0 | 0 | 3 | 40 | 60 |
|  | PC | M | CSE-CS | 9JC03 | Vulnerability Assessment & Penetration Testing | 2 | 1 | 0 | 3 | 40 | 60 |
|  | PC | M | CSE-CS | 9JC04 | Ethical Hacking | 3 | 0 | 0 | 3 | 40 | 60 |
|  | PC | M | CSE | 9EC07 | Automata Theory and Compiler Design | 2 | 1 | 0 | 3 | 40 | 60 |
|  | PC | S | CSE-CS | 9JC65 | Vulnerability Assessment & Penetration Testing Lab | 0 | 0 | 2 | 1 | 40 | 60 |
|  | PC | S | CSE-CS | 9JC66 | Ethical hacking and Compiler Design Lab | 0 | 0 | 2 | 1 | 40 | 60 |
|  | ES | M | CSE-CS | 9J686 | Comprehensive Viva Voce | - | - | - | 1 | 100 | - |
|  |  | **6/1/2** |  |  | **Total :** | **16** | **2** | **4** | **21** | **420** | **480** |

Note: Summer Industry Internship – II is to be carried out during the summer vacation between 6th and 7th semesters

## **B.Tech. CSE (Cyber Security) - IV Year I Semester**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sl. No** | **Course Category** | **M/N/S** | **Dept Course** | **Course Code** | **Course** | **L** | **T** | **P/D** | **C** | **Max. Marks** | |
|  |  |  |  |  |  |  |  |  |  | **CIE** | **SEE** |
|  | OE | N |  |  | Open Elective - II | 3 | 0 | 0 | 3 | 40 | 60 |
|  | PE | M |  |  | Professional Elective – IV | 3 | 0 | 0 | 3 | 40 | 60 |
|  | PE | M |  |  | Professional Elective-V | 3 | 0 | 0 | 3 | 40 | 60 |
|  | PC | M | CSE-CS | 9JC05 | Blockchain Technologies | 3 | 0 | 0 | 3 | 40 | 60 |
|  | ES | M | CSE-AI&ML | 9LC01 | Introduction to Artificial Intelligence | 2 | 1 | 0 | 3 | 40 | 60 |
|  | PC | M | CSE-CS | 9JC06 | Cyber Crime Investigation and Digital Forensics | 2 | 1 | 0 | 3 | 40 | 60 |
|  | HS | N | CSE-IoT | 9IC04 | Intellectual Property Rights | 2 | 0 | 0 | - | Pass/Fail | |
|  | PC | S | CSE-CS | 9JC67 | Blockchain Technologies Lab and Artificial Intelligence Lab | 0 | 0 | 3 | 1.5 | 40 | 60 |
|  | PC | S | CSE-CS | 9JC68 | Digital Forensics Lab | 0 | 0 | 3 | 1.5 | 40 | 60 |
|  | PS | S | CSE-CS | 9J792 | Summer Industry Internship -II | - | - | - | 1 | 40 | 60 |
|  |  | **5/2/3** |  |  | **Total** | **18** | **2** | **6** | **22** | **360** | **540** |

## **B.Tech. CSE (Cyber Security) - IV Year II Semester**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SNo** | **Course Cate gory** | **M/N/S** | **Dept Course** | **Course Code** | **Course** | **L** | **T** | **P/ D** | **C** | **Max. Marks** | |
|  |  |  |  |  |  |  |  |  |  | **CIE** | **SEE** |
| 1 | OE | N |  |  | Open Elective- III | 3 | 0 | 0 | 3 | 40 | 60 |
| 2 | PC | M | CSE-CS | 9JC07 | Web and Database Security | 2 | 0 | 0 | 2 | 40 | 60 |
| 3 | PS | S | CSE-CS | 9J893 | Project | - | - | 20 | 10 | 40 | 60 |
|  |  | **1/1/1** |  |  | **Total** | **5** | **0** | **20** | **15** | **120** | **180** |

Note: All End Examinations (Theory and Practical) are of Three hours duration.

**T – Tutorial L - Theory P/D – Practical/Drawing**

**C - Credits Int. - Internal Exam Ext. - External Exam**

**Course code Definitions**

BS- Basic Science Courses

ES- Engineering Science Courses

HS- Humanities and Social Sciences including Management course

PC- CS Professional core courses

PE - CS Professional Elective courses

OE- CS Open Elective courses

**CIE: Continuous Internal Evaluation**

## **Professional Electives**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CC\*** | **PE– I (3-1)** | **CC\*** | **PE – II (3-2)** | **CC\*** | **PE – III (3-2)** | **CC\*** | **PE – IV  (4-1)** | **CC\*** | **PE – V  (4-1)** |
| 9FC08 | Information Retrieval Systems | 9JC11 | Computer Security and Audit Assurance | 9FC14 | Mobile Application Development | 9JC12 | Mobile Application Security | 9JC13 | Cloud Security |
| 9FC17 | Cloud Computing | 9EC08 | Linux Programming | 9FC77 | Scripting Languages | 9LC17 | DevOps | 9I717 | Adhoc Wireless Sensor Networks |
| 9FC75 | Software Architecture and Design Patterns | 9EC12 | Software Requirements and Estimation | 9FC16 | Agile Software Development | 9EC40 | Software Automation and Testing | 9FC13 | Software Project Management |
| 9EC10 | Introduction to Data Science | 9LC03 | Machine Learning | 9FC84 | Business Intelligence | 9FC15 | Big Data Analytics | 9LC18 | Natural Language Processing |
| 9IC45 | Introduction to Internet of Things | 9FC12 | Computer Graphics | 9EC22 | Computer Vision | 9EC19 | Full Stack Development | 9IC10 | IoT Security |

**\*: Course Code/ Board**

## **Open Electives**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Open Elective Streams** | **Code** | **OE – I (3-2)** | **C0de** | **OE – II (4-1)** |  | **OE – III (4-2)** |
| **Entrepreneurship Stream** | 9ZC22 | Basics of Entrepreneurship | 9ZC23 | Advanced Entrepreneurship | 9ZC24 | Product and Services |
| **Finance Stream** | 9ZC05 | Banking Operations and Insurance | 9ZC15 | Financial Markets and Services | 9ZC19 | Project and Risk Management |
| **Mechanical** | 9BC56 | Smart Materials | 9BC52 | Principles of Operations Research | 9BC51 | Introduction to Additive Manufacturing Processes |
| **Electrical** | 9AC44 | Fundamentals of  Measurements and  Instrumentation | 9AC45 | Fundamentals of Renewable  energy sources | 9AC47 | Power Electronic  Devices and  Converters |
| **Electronics** | 9CC36 | Fundamentals of Digital Circuits and Microprocessors | 9CC37 | Fundamentals of Communication | 9CC38 | Embedded Systems |
| **Innovation and Design Thinking** | 9ZC08 | Design Literacy and Design Thinking | 9ZC09 | Co-Creation and Product Design | 9ZC10 | Entrepreneurship and Business Design |

**Credit Analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **SNo.** | **Cat.** | | **AICTE Credits** | **SNIST, B.Tech. (CSE)-CS Credits** |
|  | Humanities and social sciences including Management courses | **HSSM** | 12\* | 12.5 |
|  | Basic Sciences including Mathematics courses | **BSM** | 24\* | 24 |
|  | Engineering Science courses including workshop, drawing, basic electrical/electronics, mechanical engineering course as well as various computer courses offered for non-IT branches | **ES** | 29\* | 28 |
|  | Professional Core Courses | **PCC** | 49\* | 58.5 |
|  | Professional Elective courses (five courses) relevant to chosen specialization/branch | **PEC** | 18\* | 15 |
|  | Open Electives (3 courses) offered by any other engineering departments/MBA department\*\* | **OE** | 12\* | 9 |
|  | Project work, seminar and internship in industry or elsewhere | **PSI** | 15\* | 13 |
|  | Mandatory courses (Environmental Sciences, Induction training, Indian constitution, Essence of Indian Traditional Knowledge) | **MC** | NC | NC |
|  |  | **Total** | 159\* | **160** |

**Syllabus for B. Tech III year I Semester**

1. **Tech. (CSE) - Cyber Security**

# **Information Retrieval Systems**

**(Professional Elective –I)**

|  |  |  |  |
| --- | --- | --- | --- |
| **L** | **T** | **P** | **C** |
| **3** | **0** | **0** | **3** |

**Code:9FC08**

**Prerequisites :** Data Structures

**Course Objectives:**

* + To learn the important concepts and algorithms in IRS
  + To understand the data/file structures that are necessary to design, and implement information retrieval (IR) systems.

Course Outcomes:

* + Ability to apply IR principles to locate relevant information large collections of data
  + Ability to design different document clustering algorithms
  + Implement retrieval systems for web search tasks.
  + Design an Information Retrieval System for web search tasks.

## UNIT - I

**Introduction to Information Retrieval Systems**: Definition of Information Retrieval System, Objectives of Information Retrieval Systems, Functional Overview, Relationship to Database Management Systems, Digital Libraries and Data Warehouses Information Retrieval System **Capabilities**: Search Capabilities, Browse Capabilities, Miscellaneous Capabilities

## UNIT - II

**Cataloguing and Indexing**: History and Objectives of Indexing, Indexing Process, Automatic Indexing, Information Extraction

**Data Structure**: Introduction to Data Structure, Stemming Algorithms, Inverted File Structure, N- Gram Data Structures, PAT Data Structure, Signature File Structure, Hypertext and XML Data Structures, Hidden Markov Models

## UNIT - III

**Automatic Indexing**: Classes of Automatic Indexing, Statistical Indexing, Natural Language, Concept Indexing, Hypertext Linkages Document and Term Clustering: Introduction to Clustering, Thesaurus Generation, Item Clustering, Hierarchy of Clusters

## UNIT - IV

**User Search Techniques**: Search Statements and Binding, Similarity Measures and Ranking, Relevance Feedback, Selective Dissemination of Information Search, Weighted Searches of Boolean Systems, Searching the INTERNET and Hypertext Information Visualization: Introduction to Information Visualization, Cognition and Perception, Information Visualization Technologies

## UNIT V

**Text Search Algorithms:** Introduction, Software text search algorithms, Hardware text search systems. Integrating Structured Data and Text Historical progression, Information retrieval as a relational application, semi structured search using a relational schema.

## UNIT VI

**Multimedia Information Retrieval –** Models and Languages – Data Modeling, Query Languages, Indexing and Searching.

Distributed Information Retrieval: A Theoretical model of distributed retrieval, web search

## TEXT BOOK:

1. Information Storage and Retrieval Systems – Theory and Implementation, Second Edition, Gerald J. Kowalski, Mark T. Maybury, Springer

## REFERENCE BOOKS:

1. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall, 1992.
2. Information Storage & Retrieval By Robert Korfhage – John Wiley & Sons.
3. Modern Information Retrieval By Yates and Neto Pearson Education.

**Syllabus for B. Tech III year I Semester**

1. **Tech. (CSE) - Cyber Security**

|  |  |  |  |
| --- | --- | --- | --- |
| **L** | **T** | **P** | **C** |
| **3** | **0** | **0** | **3** |

# Cloud Computing

**(Professional Elective –I)**

**Code : : 9FC17**

**Prerequisite: NIL**

### COURSE OBJECTIVES :

Understand the basic characteristics of cloud computing and technologies that support to implement cloud computing. Analyze the basic cloud computing models that are used to implement cloud technology and available cloud resources in the market. Analyzing the security issues in cloud computing environment and understanding different case studies in cloud computing and IOT platform.

**COURSE OUTCOMES :**

At the end of this course, the students will be able to

1. Summarize the characteristics of cloud and differentiate the cloud service and deployment models.
2. Demonstrate the different kinds of cloud services.
3. Analyze different architectures for cloud applications, Create and run Amazon ec2 instance through python programs
4. Assess the performance of cloud services and summarize the innovative applications of IOT on cloud.
5. Design architecture of an Apps such as map reduce, image processing app etc. on cloud.
6. Understand various security aspects in cloud.

## UNIT - I

Introduction to Cloud Computing: Introduction, characteristics, Cloud Models and examples, Applications of Cloud Services. Cloud Concepts and Technologies.

## UNIT - II

Cloud Services and Platforms: Compute Services, Storage Services, Database Services, Application Services, Content Delivery Services, Analytics Services, Deployment and Management Services, Identity and Access Management Services, Open-Source Private Cloud Software.

## UNIT - III

Cloud Application Design: Design Considerations for Cloud Application, Reference Architectures for Cloud Applications. Cloud Application Design Methodologies, Data Storage Approaches. Python For Cloud: Python for Amazon Web Services, Map Reduce

## UNIT - IV

**book 2.** Cloud and the Internet of Things:  Performance of Distributed Systems and the Cloud- Enabling Technologies for the Internet of Things- Innovative Applications of the Internet of Things- Online Social and Professional Networking

## UNIT - V

Cloud Application Development in Python: Design Approaches, Image Processing App, Document Storage App, Map Reduce App, Social Media Analytics App.

## UNIT - VI

Cloud Security: Introduction, Cloud Security Architecture (CSA), Authentication, Authorization, Identity Access Management (IAM), Data Security, Key Management, Auditing.

Cloud for Industry, Healthcare and Education.

**TEXT BOOKS:**

1.Cloud Computing –A Hands on Approach, Arshdeep, VijayMedisetti, University Press.

2. Distributed and Cloud Computing,1stEdition, From Parallel Processing to the Internet of Things, Authors: Kai Hwang Jack Dongarra Geoffrey Fox (Unit4)

3. Cloud Computing: Raj Kumar Buyya, JamesBroberg, AndrzejGOscinski, Wiley.

**REFERENCES:**

1. Cloud Computing: Dr. Kumar Saurab Wiley India 2011.

2. Code in the cloud computing: K Chandrasekharan CRC Press.

3. Cloud Computing: John W. Rittinghouse, James Ransome, CRC press.

4. Virtualization Security: Dave Shackleford2013, SYBEX a Willy Brand.

5. Cloud Computing and Software Service: Ahson, iiyas.2011.

6. Cloud Computing Bible: Sosinsky 2012 Wiley India.

Syllabus **for B.Tech III year I Semester**

**B.Tech. (CSE) - Cyber Security**

# Software Architecture and Design Pattern

**(Professional Elective –I)**

|  |  |  |  |
| --- | --- | --- | --- |
| **L** | **T** | **P** | **C** |
| **3** | **0** | **0** | **3** |

**Code: 9FC75**

**Prerequisites:** Software Engineering and OOAD

**Course Objectives:**

The main objective is to introduce the student to architecture of software and design Patterns. Upon completion of this course the student will get an idea on envisioning architecture, creating architecture, analyzing architecture.

1. Understand the creational and structural patterns.
2. Be capable of applying his knowledge to create an architecture for given application.
3. Be able to explain the role of analyzing architectures.
4. Be able to identify different structural patterns.

**Course Outcomes:**

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

1. Explain Architecture Business Cycle, Architectural patterns, reference models, reference architectures, and architecture structures.
2. Describe architecture, Quality Attributes, styles, patterns and design of Architecture along with the Documentation of architecture.
3. Discuss Software Architecture evaluation, Architecture design decision making, SAAM, ATAM and CBAM. And plan software architecture in future.
4. Plan and use Creational patterns and Structural patterns application development.
5. Solving problems using Induction learning, Decision Tree, Statistical learning methods, learning with hidden variables, EM algorithm, Instance based learning and Neural Networks.
6. Explain Behavioral patterns using Command, Interpreter, Iterator, Mediator, Memento, Observer, State, Strategy, Template method and Visitor.

## UNIT - I

**Envisioning Architecture**

The Architecture Business Cycle, What is Software Architecture? , Architectural patterns, reference models, reference architectures, architecture structures and views.

## UNIT - II

**Creating an Architecture**

Quality Attributes, Architectural styles and patterns, designing the Architecture, Documenting the architecture, Reconstructing Software Architecture.

## UNIT - III

**Analyzing Software Architecture**

Architecture evaluation, SAAM, ATAM, CBAM.

**Moving from Architecture to Systems**

Software Product Lines, Building systems from off the shelf components, Software architecture in future.

## UNIT - IV

**Design Patterns**

What is pattern? Pattern Description, organizing catalogs, Role in solving problems, Selection, usage.

## UNIT - V

**Creational patterns**: Abstract factory, Builder, Factory method, prototype, singleton.

**Structural patterns:** Adapter, Bridge, Composite, Decorator, Façade, Flyweight, Proxy.

## UNIT - VI

**Behavioral patterns:** Chain of responsibility, Command, Interpreter, Iterator, Mediator, Memento, Observer, State, Strategy, Template method, Visitor.

**Case Studies**

The World Wide Web - a case study in interoperability, Flight Simulation- A Case Study in an Architecture for Integrability.

**Text Books:**

1 Software Architecture in Practice, 2nd Edition by Len Bass, Paul Clements, Rick Kazman, published by Pearson Edition

2. Design Patterns, by Erich Gamma, Pearson Education

**ReferenceS:**

1. Beyond Software Architecture, Luke Hohmann, Addison Wesley, 2003.
2. Software Architecture, David M Dikel, David kane and James R Wilson, Prentice Hall PTR, 2001.
3. Pattern Oriented Software Architecture, F Buschmann&others, John Wiley&Sons.
4. Head First Design patterns, Erec Freeman & Elisabeth Freeman, O’REILLY, 2007.
5. Design pattern in java, Steven John Metsker&William C. Wake, Pearson Education, 2006.
6. Design patterns in C#, Steven John Metsker, Pearson Education, 2004.
7. J2EE Pattens, Deepak Alur, John Crupi&DanMalks, Pearson Education, 2003.
8. Software Design, David Budgen, Second edition, Pearson Education, 2003.

Syllabus for B. Tech III year I Semester

**B.Tech. (CSE) - Cyber Security**

# Introduction to Data Science

**Code: 9EC10** **CSE/IT**

**Prerequisite:** Python Programming, Probability and Statistics

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**COURSE OBJECTIVES**:

1. Learn concepts, techniques, and tools they need to deal with various facets of data science practice, including data collection and integration
2. Exploring data analysis, predictive modeling, descriptive modeling, data product creation, evaluation, and effective communication
3. Understand the basic knowledge of algorithms and reasonable programming experience and some familiarity with basic linear algebra and basic probability and statistics
4. Identify the importance of recommendation systems and data visualization techniques

## **COURSE OUTCOMES**:

After completion of the course, the student should be able to

1. Develop in depth understanding of the key technologies in data science and business analytics: visualization techniques and statistics.
2. Practice problem analysis and decision-making.
3. Gain practical, hands-on experience on Advanced statistics through coursework and applied research experiences.
4. Students will apply data science concepts and methods to solve problems in real-world contexts and will communicate these solutions effectively

### Unit I:

**Data science:** Basic terminology - Example – Sigma Technologies -

**Types of Data:** Structured versus unstructured data - Quantitative versus qualitative data - The four levels of data – Nominal – Ordinal – Interval – Ratio

### Unit II:

**Basic Mathematics** - Basic symbols and terminology - Vectors and matrices - Arithmetic symbols

- Summation - Proportional - Dot product - Graphs - Logarithms/exponents - Set theory - Linear algebra - Matrix multiplication

**Basic Statistics:** Obtaining data - Observational - Experimental - Sampling data - Probability sampling - Random sampling - Unequal probability sampling - Measuring statistics - Measures of centre - Measures of variation - Measures of relative standing - The Empirical rule

### Unit III

**Advanced Statistics:** Point estimates - Sampling distributions - Confidence intervals - Hypothesis tests - Conducting a hypothesis test - One sample t-tests - Example of a one sample t-tests - Assumptions of the one sample t-tests - Type I and type II errors - Hypothesis test for categorical variables - Chi-square goodness of fit test - Chi-square test for association/independence

### Unit IV

**The Basics of NumPy Arrays** - The Basics of NumPy Arrays - Aggregations: Min, Max, and Everything in Between - Computation on Arrays: Broadcasting - Fancy Indexing

**Data Manipulation with Pandas** - Introducing Pandas Objects - Data Indexing and Selection - Handling Missing Data - Combining Datasets: Concat and Append - Aggregation and Grouping

### Unit V

**Visualization with Matplotlib** - Importing matplotlib - Simple Line Plots - Simple Scatter Plots - Histograms, Binning’s, and Density – case study: Effect of Holidays on US Births

### Unit VI

**Basic Machine Learning:** Introduction to machine learning, types of machine learning: Supervised and unsupervised

**Types of Supervised learning:** Classification and regression, Classifiers – Decision tree and k- Nearest Neighbors (k-NN),

**Types of unsupervised:** Clustering k-means, Association Rule mining

## **TEXT BOOKS**:

1. Principles of Data Science, Sinan Ozdemir, Packt, (2016)
2. Python Data Science handbook, Essential Tools for Working with Data, Jake Vanderplas, O ‘Reilly, (2017)

## **REFERENCE BOOKS**:

* 1. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Introduction to Data Mining, Pearson

Laura Igual and Santi Segui, Introduction to Data Science, S

Syllabus **for B. Tech III year I Semester**

**B.Tech. (CSE) - Cyber Security**

# Introduction to Internet of Things

**(Professional Elective –I)**

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**Code: 9IC45**

**Course Outcome: On completion of the course, the student will be able to:**

•Summarize the fundamental blocks of Internet of Things (L2)

•Compare and apply protocols in wireless sensor network (L2, L3)

• Design IoT applications in different domains and analyze their performance (L4, L6)

•Develop and assess basic IoT applications on embedded platform using python (L6, L5)

## **UNIT - I**

**Introduction to IoT:** Defining IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Communication models & APIs

## **UNIT - II**

**IoT& M2M:** Machine to Machine, Difference between IoT and M2M, Software define Network

## **UNIT - III**

**Network & Communication aspects:** Wireless medium access issues, MAC protocol survey, Survey routing protocols, Sensor deployment & Node discovery, Data aggregation & dissemination

## **UNIT - IV**

**Challenges in IoT:** Design challenges, Development challenges, Security challenges, Other challenges

## **UNIT - V**

**Domain specific applications of IoT:** Home automation, Industry applications, Surveillance applications, Other IoT applications.

**Human Body and IoT**: Human Sensors, Human sensors with signal transmission, Case

study on Working of human sensors, Mapping of human sensors with IOT sensors

## **UNIT - VI**

**Developing IoT’s:** Introduction to Python, Introduction to different IoT tools, developing applications through IoT tools, developing sensor-based application through embedded system platform, Implementing IoT concepts with python

**Reference Books:**

**1.** Vijay Madisetti, ArshdeepBahga, “Internet of Things: A Hands-On Approach”

**2.**WaltenegusDargie, ChristianPoellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice

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**B.Tech. (CSE) - Cyber Security**

# Cyber Security and Cyber laws

**Code: 9FC07**

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**Prerequisite: Nil**

**Course Objectives:**

1. To learn fundamentals of cryptography and its application to network security.
2. To understand network security threats, security services, and countermeasures.
3. To learn computer security, Internet, E-commerce and E-governance with reference to Free
4. Market Economy
5. To learn International Efforts relating to Cyberspace laws and Cyber crimes
6. To learn Law relating to electronic records and intellectual property rights in India
7. To understand ethical laws of computer for different countries.
8. To learn Penalties, Compensation and Offences under the Cyberspace and Internet in India
9. To learn Miscellaneous provisions of IT Act and Conclusions

**Course Outcomes:**

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

1. Familiarize the cryptographic procedures and Understand its primitives
2. Outline Security policy in Legislation and Comprehend E-Commerce frame work, models and its associated threats
3. Justify the role of electronic signatures in E-Commerce and summarize the various laws relating to it.
4. Categorize international cyber laws and cyber crimes.
5. Explore Penalties, Compensation and Adjunction of violations of provisions of IT Act 2000 and Outline theoffences under the Cyberspace law and the Internet in India

## UNIT - I

**Introduction to cyber Security, cryptography, Types of Attacks, Secrete Key Cryptography**

Introduction: Cyber attacks, Defense Strategies and Techniques Mathematical background for Cryptography: Modulo arithmetic, The greatest common divisor, Useful Algebraic Structures, Chinese Remainder Theorem Basics of Cryptography: Secret versus Public key Cryptography, Types of attacks, Elementary substitution Ciphers, Elementary Transposition Ciphers, Other Cipher Properties Secrete Key Cryptography: Product Ciphers, DES Construction, Modes of Operation, MAC and other Applications, Attacks, Linear Crypt analysis.

## UNIT - II

**Introduction to Computer Security, Internet, E-commerce and E-governance with reference to Free Market Economy**

Definition, Threats to security, Government requirements, Information Protection and Access Controls, Computer security efforts, Standards, Computer Security mandates and legislation, Privacy considerations, International security activity, Conceptual Framework of E-commerce: governance, the role of Electronic Signatures in E-commerce with Reference to Free Market Economy in India.

## UNIT - III

**Law relating to electronic records and intellectual property rights in India**

Legal aspects of Electronic records / Digital signatures, Cyber laws, the roles and regulations of Certifying Authorities in India, Protection of Intellectual Property Rights in Cyberspace in India.

## UNIT - IV

**International Efforts relating to Cyberspace laws and Cyber crimes**

International efforts related to Cyber laws, Council of Europe (COE) convention on Cyber Crimes.

## UNIT - V

**Penalties, Compensation**

Penalties, Compensation and Adjunction of violations of provisions of IT Act 2000 and judicial review.

## UNIT -VI

**Offences under the Cyberspace, Internet in India and Miscellaneous provisions of IT Act and Conclusions**

Some important offences under the Cyberspace law and the Internet in India, Other offences under the Information Technology Act in India, The role of Electronic Evidence and miscellaneous provisions of the IT Act.

**TEXT BOOK:**

1. Network security and Cryptography by Bernard Menezes CENGAGE Learning Publications, 2010.

2. Cyber Laws and IT Protection, Harish Chander, PHI, 2012.

**REFERENCE BOOKS:**

**1.** Debby Russell and Sr. G.T Gangemi, "Computer Security Basics (Paperback)”, 2ndEdition, O’ Reilly Media, 2006.

**2.** Wenbo Mao, “Modern Cryptography – Theory and Practice”, Pearson Education, New Delhi, 2006.

3. Cyberspace and Cybersecurity, George Kostopoulos, Auerbach Publications, 2012.

4. Cyber Forensics: A Field Manual for Collecting, Examining, and Preserving Evidence of Computer Crimes, Second Edition, Albert Marcella, Jr., Doug Menendez, Auerbach Publications, 2007

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**B.Tech. (CSE) - Cyber Security**

# **Data Warehousing and Mining**

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**Code: 9FC83**

**Prerequisite:** Database Management Systems

**Course Objectives:**

1. To understand the principles of Data Mining and methods improve the quality of data.
2. To be familiar with the Data warehouse architecture.
3. To understand applications of Association Rule Mining and algorithms to find them.
4. To perform classification and prediction of data.
5. To understand applications and algorithms for Clustering and to introduce advanced topics in Data Mining.

**Course Outcomes:**

At the end of this course the student will be able to.

1. Understand the functionality of the various data mining functions.
2. Apply preprocessing techniques on various datasets.
3. Build a Data warehouse system and perform business analysis with OLAP tools.
4. Characterize the kinds of patterns that can be discovered by association rule mining.
5. Compare and contrast between different classification and clustering algorithms.

## UNIT - I

**Introduction:** Fundamentals of data mining, KDD process, Architectures of Data Mining Systems ,Data Mining Functionalities, Classification of Data Mining systems, Data Mining Task primitives, Integration of a Data mining System with a Database or a Data warehouse systems, Major issues in Data Mining.

## UNIT - II

**Data Preprocessing:** Needs for Preprocessing the Data, Descriptive Data Summarization, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

## UNIT - III

**Data Warehouse and OLAP Technology for Data Mining:** Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation.

## UNIT - IV

**Mining Frequent, Associations and Correlations:** Basic concepts, Frequent Itemset mining methods, Mining multilevel association rules from Transaction Databases, Mining Multidimensional association rules from Relational databases and Data Warehouses.

## UNIT - V

**Classification and Prediction:** Issues regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Support Vector Machines (SVMs), k-nearest neighbor classifier, Prediction, Classifier Accuracy

## UNIT - VI

**Cluster Analysis Introduction**: Types of Data in Cluster Analysis, Major Clustering methods, Partitioning Methods, Density-Based methods, Model-Based Clustering methods, Outlier Analysis, Hierarchical Clustering Method.

**Advanced Concepts:** Text Mining, Web Mining.

**TEXT BOOKS:**

**1.** Data mining: Concepts and Techniques, Jiawei Han and Micheline Kamber, 2nd Edition, Elsevier, 2006.

2. Data Mining Techniques – ARUN K PUJARI, University Press.

**REFERENCE BOOKS:**

1. Data Mining Introductory and advanced topics –MARGARET H DUNHAM, PEARSON EDUCATION

2. Data Mining Techniques – ARUN K PUJARI, University Press.

3. Data Warehousing in the Real World – SAM ANAHORY & DENNIS MURRAY. Pearson Edn Asia.

4. Data Warehousing Fundamentals – PAULRAJ PONNAIAH WILEY STUDENT EDITION.

5. The Data Warehouse Lifecycle Toolkit – RALPH KIMBALL WILEY STUDENT EDITION

6. Introduction to Data Mining - First Edition, by Pang-Ning Tan, Michael Steinbach and Vipin Kumar, ISBN-13: 978-0321321367

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# **Design and Analysis of Algorithms**

**Code:** 9EC04

**Prerequisite:** Data Structures and C++

**Prerequisite:** Data structures

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Course Objectives:

* 1. To provide a solid foundation in algorithm design and analysis, specifically, the student learning outcomes include: Basic knowledge of graph and matching algorithms.
  2. Ability to understand and design algorithms using greedy strategy, divide and conquer approach, dynamic programming, backtracking and branch and bound.

Course Outcomes:

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

1. Analyze worst-case running times of algorithms using asymptotic analysis.
2. Synthesize divide and-conquer algorithms. Derive and solve recurrences describing the performance of divide-and-conquer algorithms.
3. Describe the greedy paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize greedy algorithms, and analyze them.
4. Comprehend the concept of dynamic programming algorithms, their applications and analyze them.
5. AnalyzetheBacktrackingandBranchandBoundalgorithmsandalsoidentifythescenariosforits applicability. Comprehend the concept of P and NP Problems and its usage in the applications.

**UNIT I**

**Introduction:** Algorithm, Pseudo code for expressing algorithms, Performance Analysis-Space complexity, Time complexity, **Asymptotic Notation-** Big oh notation, Omega notation, Theta notation and Little oh notation, Probabilistic Analysis, Connected and Bi-connected Components.. Applications: Designing optimal solution with respect to time for a problem.

**UNIT II**

**Divide and conquer:** General method, **Applications-**Binary search, Quick sort, Merge sort, Strassen ‘s matrix multiplication.

Applications: PNR number Search, sorting the google search results.

**UNIT III**

**Greedy method:** General method, **Applications-**Job sequencing with deadlines, 0/1 knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

Applications: Allocation of funds/resources based on the priority in the computer systems.

**UNIT IV**

**Dynamic Programming:** General method, **Applications-**Matrix chain multiplication, Optimal binary search trees, 0/1 knapsack problem, all pairs shortest path problem, Travelling sales person problem.

Applications: Routing Algorithms in the computer networking

**UNIT V**

**Backtracking:** General method, **Applications-**n-queen ‘s problem, sum of subsets problem, graph coloring, Hamiltonian cycles, Maze generation Problem

Applications: Undo in MS-Word, Games

**UNIT VI**

**Branch and Bound:** General method, **Applications -** Travelling sales person problem,0/1 knapsack problem- LC Branch and Bound solution, FIFO Branch and Bound solution.

**Introduction to NP-Hard and NP-Complete problems:** Basic concepts of non-deterministic algorithms, Definitions of NP-Hard and NP-Complete classes. Modular Arithmetic

Applications: Performance evaluation in the dynamic systems.

**TEXT BOOKS:**

1. Fundamentals of Computer Algorithms, Ellis Horowitz, Sartaj Sahni and Rajasekharam, Galgotia publications pvt.Ltd.
2. Algorithm Design: Foundations, Analysis and Internet examples, M.T. Goodrich and R. Tomassia, Johnwiley and sons.

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**B.Tech. (CSE) - Cyber Security**

## **Operating Systems**

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Code:9EC06

Prerequisite: Computer Organization

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**COURSE OBJECTIVES:**

Learn basics of operating Systems. Understand the process management, inter process Communication and synchronization that take place in the operating system. Learn the principles of memory, I/O and file management in a secured environment.

**COURSE OUTCOMES:**

At the end of this course, the students will be able to

1. Understand the functional architecture of an Operating System with usage of system calls.
2. Analyze various process scheduling algorithms & pragmatics of scheduling algorithms used by various Operating Systems.
3. Solve issues related to process synchronization and Interposes Communication (IPC) in the Operating System.
4. Comprehend the concepts of Deadlock and illustrate the concepts of Memory Management.
5. Explain the concepts of File System with regard to Directory and Disk Management Algorithms, summarize the aspects of I/O Systems, Protection and Security.

## **UNIT - I**

**: Introduction to Operating System:** Definition, Functions of Operating Systems, **Types of Operating Systems:** Batch Operating System, Multiprogramming Operating System, Multiprocessing Operating System, Multitasking Operating System, Network Operating System, Real Time Operating System, Time-Sharing Operating System and Distributed Operating System.

**Computer System Architecture:** Four Components of a Computer System, Operating System Services,

**System Calls**: Definition, Types of System Calls,

**Operating System Structure:** Simple Structure, Layered Approach,

**Threads:** Definition**,** Need of threads, types of threads.

## **UNIT - II**

**: Process Management:** Process concept: Definition of Process, Process State Diagram, PCB (Process Control Block), CPU Switch from process to process, Context Switching, Process Vs Thread.

**Process Scheduling:** Process Queues: Job Queue, Ready Queue, I/O/Device/Waiting Queue, Representation of Process Scheduling, **Types of Process Schedulers:** Long-term, Short-term and Medium-Term Scheduler.

**CPU Scheduling:** Preemptive Scheduling, Non-Preemptive Scheduling, Scheduling Criteria, **Scheduling Algorithms (Preemptive and Non-Preemptive with Arrival Time):** First Come First Serve (FCFS), Shortest-Job-First (SJF), Shortest Remaining Time First (SRTF), Priority Scheduling, Round Robin (RR), Multilevel Queue Scheduling, Multilevel Feedback Queue Scheduling.

## **UNIT - III**

**: Process Synchronization** - The Critical Section Problem: Solution to Critical Section Problem (Software and Hardware), Synchronization Hardware, Classical Problems of Synchronization, Semaphores, Monitors.

**Interprocess Communication Mechanisms:**

IPC between processes on a single computer system, IPC between processes on different systems,

using pipes, FIFOs, message queues, shared memory.

## **UNIT - IV**

: **Deadlocks:** Definition, Necessary Conditions for Deadlock, **Methods for Handling Deadlocks**: Deadlock Prevention, Avoidance (Bankers Algorithm), Detection and Deadlock recovery.

**Memory Management:** Logical versus Physical Address Space, Swapping, Contiguous memory allocation, Paging and Segmentation techniques, Segmentation with paging, **Virtual Memory:** Demand Paging, **Page-Replacement Algorithms**: FIFO, LRU and Optimal, Thrashing.

## **UNIT - V**

**: File System:** Different types of files and their access methods, **Directory Structures:** Various file allocation methods - Contiguous, Linked with FAT and Indexed, **Disk Scheduling Algorithms**: FCFS, SSTF, SCAN, C-SCAN, LOOK, C-LOOK.

## **UNIT - VI**

**I/O Systems:** I/O Hardware: Polling, Interrupts and DMA, **Protection:** Goals of Protection, Principles of Protection, Access Matrix, Implementation of Access Matrix, Access Control List, Capability List, Program threats.

**TEXT BOOKS:**

1. Operating System Concepts by Silberschatz Galvin, 8th edition.
2. Modern Operating Systems by A. Tanenbaum, 1992, Prentice-Hall.
3. Operating Systems Internals and Design Principles by William Stallings,4th edition, 2001, Prentice-Hall

**REFERENCES**

1. Operating System By Peterson, 1985, AW.
2. Operating System ByMilankovic, 1990, TMH.
3. Operating System Incorporating with Unix& Windows by Colin Ritche, 1974, TMH.
4. Operating Systems by Mandrik& Donovan, TMH
5. Operating Systems by Deitel, 1990, AWL.
6. Operating Systems – Advanced Concepts By Mukesh Singhal, N.G. Shivaratri, 2003, T.M.H

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**B.Tech. (CSE) - Cyber Security**

## **Web Technologies**

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**Code: 9FC06**

**Prerequisite:** Computer Networks, Object-Oriented Programming concepts

**Objectives:**

1. To impart the basics knowledge of HTML5, CSS3 and Tailwind CSS
2. To develop proficiency in JavaScript programming.
3. To comprehend the fundamentals of MERN stack development
4. To design and implement RESTful APIs:
5. To build interactive and user-friendly web applications with ReactJS.

**Course Outcomes:**

Upon completing the course, a student will be able to

CO 1: **Web Technologies Foundations:** Students will master HTML5, including semantic elements, Web Storage API usage, and comprehension of HTTP status codes.

CO 2: **CSS and Responsive Design Proficiency:** Graduates will demonstrate expertise in CSS3, covering syntax, types, box model, Grid, Flexbox, Responsive Web Design, and practical knowledge of the Tailwind CSS framework.

CO 3: **JavaScript Mastery and Advanced Concepts:** Participants will achieve proficiency in JavaScript, understanding data types, functions, arrays, objects, along with advanced concepts like let, const, arrow functions, and promises.

CO 4: **Full Stack Development Essentials:** Students will have acquired foundational knowledge in web servers, REST API principles, Express framework usage, MongoDB integration, and an introduction to the MERN stack.

**UNIT I**

HTML 5**:** Semantic Elements, Web storage API, HTTP status codes.

CSS 3**:** Syntax structure, types, box model, Grid, Flexbox. Responsive Web Design using Media Queries, use of viewport, Transition, Animation.

CSS Framework**:** Tailwind CSS

**UNIT II**

JavaScript:Introduction to JavaScript, data types, functions, Arrays, Objects, Regular expressions

Advanced JavaScript concepts**:** let, const, arrow functions, destructuring, spread, rest, Prototypal Inheritance, Closure, understanding callbacks, Promise, Async/await.

**Unit III**

Introduction to MERN:What is MERN? MERN components, Server-Less Hello World, Server setup.

Node JS**:** Introduction to Node.js, REPL, Node Modules: events, OS, HTTP, file I/o, environment variables, dotenv

**Unit IV**

Web Servers**:** client-server architecture**,** request-response objects, creating a basic HTTP server

**Rest API:** Introduction to RESTAPIs, HTTP verbs

**Unit V**

Express Framework**:** Introduction to Express, Installation of Express, create first Express application, application, request, and response objects, configuring an Express application, Rendering views, sessions, forms, file upload. Connecting to an SQL database

MongoDB: Introduction to MongoDB, connecting to a MongoDB instance with Node, reading from MongoDB, Writing to MongoDB.

**Unit VI**

Introduction to ReactJS**:** History of Front – end libraries, Motivation for using React, Key differentiators (Virtual DOM, one – way binding), React Components, JSX, props hooks, state, events, effects, fetching data from API using fetch, form validations, React Router, building and deploying react application.

**TEXTBOOKS:**

1. Beginning HTML, XHTML, CSS, and JavaScript, Jon Duckett, Wrox Publications, 2010
2. Pro MERN Stack, Full Stack Web App Development with Mongo, Express, React, and Node, Vasan Subramanian, 2nd Edition, A Press.

**REFERENCES:**

1. E – resource: <https://nodejs.org/en/docs/>
2. E – resource: https://reactjs.org/
3. E – resource: <https://tailwindcss.com/>
4. E – resource: <https://expressjs.com/>
5. E – resource : <https://web.dev/learn/css>

E – resource : <https://web.dev/learn/html>

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### Data Warehousing and Mining Lab and Operating Systems Lab

**L T P/D C**

**0 0 3 1.5**

**Code: 9JC63**

**Prerequisite:** Database Management Systems, Problem Solving Course, Data Structures

**Course Objectives:**

Learn to perform data mining tasks using a data mining toolkit. Understand the data sets and data preprocessing. Demonstrate the working of algorithms for data mining tasks such association rule mining, classification, clustering and regression. Emphasize hands-on experience working with all real data sets. Learn to implement programs using Prolog

**Course outcomes:** At the end of this course the student will be able to

1. Demonstrate the classification, clustering techniques on the data sets.
2. Comprehend the results obtained in the clustering, Association and Classification techniques applied on the data sets with varied input parameters.
3. Simulate and implement operating system concepts such as scheduling, deadlock management, page replacement techniques, file management and memory management

### Data Warehousing and Mining Lab Exercises

1. Compare the GRI and A priori usage (Prepare a sample data set in Spread Sheet).
2. Determine the Drugs importance w.r.t. Age, Cholesterol and BP using C 5.0.
3. Predict the accuracy of the test data set using Neural Net model using a Case Study of Botanical data set.
4. Compare the C 5.0 and Neural Net using the sample data.
5. Using the BASKETS1n dataset, select the data as given below.

a) Customer age < 35 and count the customers who buy dairy and VEG products

b) Find the AVG income of customers who buy at least 5 products

1. Using the BASKETS1n dataset, select the data as given below.

a) Derive the field whose home own is 'YES' and Age > 30 and sort data w.r.t. income in

Ascending order, and output only the item fields.

b) Find the mean value of salary w.r.t age = {Young, Middle, Senior}.

7. Demonstrate the WEKA machine learning toolkit and perform the following exercises

1. Determine the numbers of instances of each class are present in the data
2. Load the weather dataset and remove all instances where the attribute ‘humidity’ has the value ‘high’?
3. Load the iris dataset and view the Visualizer panel.

### Operating Systems Lab Exercises

1. Simulate the following CPU scheduling algorithms

a) Round Robin b) SJF c) FCFS d) Priority

2. Simulate all file allocation strategies

a) Sequential b) Indexed c) Linked

3. Simulate MVT and MFT

4. Simulate Bankers Algorithm for Dead Lock Avoidance

5. Simulate Bankers Algorithm for Dead Lock Prevention

6. Simulate all page replacement algorithms

a) FIFO b) LRU c) LFU

7. Simulate Paging Technique of memory management.

8. Simulate Segmentation concepts.

9. Simulate disk scheduling algorithms

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**B.Tech. (CSE) - Cyber Security**

# **Cyber Security and Web Technologies Lab**

**L T P/D C**

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**Code: 9JC64**

**Course Objective:**

1. To understand principles of web security and to guarantee a secure network by monitoring and analyzing the nature of attacks through cyber/computer forensics software/tools.
2. Exhibit knowledge to secure corrupted systems, protect personal data, and secure computer networks in an organization. To have the ability to compare merits and demerits of different Cryptographic techniques and take decisions while securing a network. Apply HTML5 and CSS3 skills to create functional and visually appealing web pages.
3. Develop interactive web applications using JavaScript and DOM manipulation. Build and deploy full-stack web applications using the MERN stack. Design and implement RESTful APIs using Node.js and Express.js. Create interactive and user-friendly web interfaces with ReactJS.

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

1. Determine and analyze software vulnerabilities and security solutions to reduce the riskof exploitation using cyber security tools.
2. Master HTML5, applying semantic elements, utilizing the Web Storage API, and demonstrating proficiency in CSS3, encompassing syntax, types, box model, Grid, Flexbox, Responsive Web Design, and practical application of the Tailwind CSS framework.
3. Achieve proficiency in JavaScript, understanding data types, functions, arrays, objects, and mastering advanced concepts like let, const, arrow functions, and promises through practical coding scenarios.
4. **A**cquire foundational knowledge in web servers, REST API principles, and Express framework usage for rendering views, handling sessions, forms, file uploads, and connecting to an SQL database.
5. **G**ain hands-on experience connecting to MongoDB with Node, reading and writing data, while also receiving an introduction to the MERN stack, covering MERN components, serverless architecture, Node.js fundamentals, and basic server setup.

### Cyber Security Lab- List of Programs

1. Perform an Experiment for port scanning with NMAP
2. Install Jscript/Crypto tool (or any other equivalent) and demonstrate Asymmetric, Symmetric crypto algorithm, Hash and Digital/PKI signatures.
3. Perform practical approach to implement Footprinting-Gathering target information using Dmitry-Dmagic, UA tester
4. Monitor the network communication with sniffers (like Wireshark).
5. Using Snort, perform real time traffic analysis and packet logging.
6. Perform email analysis, Filetype detection using the Autopsy tool.
7. Perform Registry analysis and get boot time logging using process monitor tool
8. Perform Memory capture and analysis using FTK imager tool
9. Perform Network analysis using the Network Miner tool

### Web Technologies Lab – List of Programs with Problem Statements

1. Responsive Personal Portfolio Website (2 hours)

Create a responsive personal portfolio website using HTML5 and CSS3. The website should include sections for your profile, skills, experience, projects, and contact information. Use Tailwind CSS to style the website and ensure it is responsive across different screen sizes.

1. Regular Expression-Based Text Manipulation (3 hours)

Build a web application that performs text manipulation using regular expressions. The application should allow users to enter a text string and provide options for search, replace, and formatting. Implement regular expression patterns to identify and modify specific text elements.

1. Asynchronous Data Fetching and Display with JavaScript Promises and Async/await (2 hours)

Create a web page that fetches data from an API asynchronously using JavaScript promises and Async/await. The page should display a loading indicator while the data is being fetched and then render the data in a list or table. Demonstrate the use of promises to handle asynchronous operations and improve code readability.

1. Working with Environment Variables and Dotenv in Node.js Applications (2 hours)

Create a Node.js application that utilizes environment variables and dotenv to manage sensitive configuration data. Implement dotenv to load environment variables from a .env file and use them throughout the application. Demonstrate how to access and update environment variables securely.

1. Designing and Implementing a REST API for Resource Management (2 hours)

Design a REST API for managing a collection of resources, such as books or products. Define the API endpoints for each resource operation (Create, Read, Update, Delete) and map them to HTTP verbs (POST, GET, PUT, DELETE). Implement the API using Node.js and Express.js, including error handling and validation checks.

1. Developing a Full-Stack Web Application with Express and MongoDB (2 hours)

Create a full-stack web application using Express.js and MongoDB. The application should allow users to create, read, update, and delete (CRUD) data stored in a MongoDB database. Implement the Express framework to handle routing, request processing, and templating. Utilize MongoDB to store and retrieve data using the Node.js MongoDB driver.

1. Creating a User Interface with React Router for Navigation (2 hours)

Develop a user interface with React Router for navigation between different components and routes. The application should have multiple pages, such as a home page, a contact page, and an about page. Implement React Router components to handle routing and provide smooth transitions between pages. Utilize nested routes to organize complex navigation structures.

**REFERENCES:**

1. E – resource: <https://nodejs.org/en/docs/>

2. E – resource : https://reactjs.org/

3. E – resource : <https://tailwindcss.com/>

4. E – resource : <https://expressjs.com/>

5. E – resource : <https://web.dev/learn/css>

6. E – resource : <https://web.dev/learn/html>

**Syllabus for B. Tech III year I Semester**

**B.Tech. (CSE) - Cyber Security**

# Design and Analysis of Algorithms Lab

**L T P/D C**

**0 0 2 1**

**Code: 9JC64**

**Course Objective:**

Introduce various designing techniques and methods for algorithms. Demonstrate a familiarity with major algorithms and data structures. To give clear idea on algorithmic design paradigms like Divide-and-Conquer, Dynamic Programming, Greedy, Branch and Bound.

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

1. Execute and analyze the performance of sorting algorithms using divide and conquer approach.
2. Apply greedy and dynamic programming to solve the real-world problems.
3. Execute graph related and combinatorial algorithm using high level language
4. Use backtracking, branch & bound approaches to solve the problems.

## **List of Programs**

1. Implement Merge sort algorithm for sorting a list of integers in ascending order.
2. Implement Quick Sort algorithm for sorting a list of integers.
3. Write a program to implement Strassen’s matrix multiplication algorithm.
4. Implement Dijkstra’s algorithm for the single source shortest path problem.
5. Implement Prim’s algorithm to generate minimum cost Spanning tree.
6. Implement Kruskal’s algorithm to generate minimum cost Spanning tree.
7. Design and implement the algorithm for job sequencing with deadlines using greedy approach.
8. Implement 0/1 Knapsack problem using greedy method.
9. Implement the solution to 0/1 Knapsack problem using Dynamic Programming approach.
10. Implement Optimal Binary Search Tree algorithm using dynamic programming technique
11. Implement backtracking algorithm for n-queens’ problems.
12. Design and implement travelling salesperson problem using branch and bound technique.

**Syllabus for B. Tech III year I Semester**

**B.Tech. (CSE) - Cyber Security**

Summer Industry Internship-I

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**Code: 9J591**

**Prerequisite:** All Courses till this semester

**Course Objectives:**

To enhance the knowledge on selecting a project, learn related tools and enhance programming and communication skills for employability.

**Course Outcomes:** At the end of this course the student will be able to

1. Use the concepts learned in the courses, so far, in conceptualizing, designing and executing the modules of the projects.
2. Exhibit the interest in learning the modern tools and technologies through the bridge courses arranged in the college, beyond the curriculum, and hence developing the software.
3. Inculcate an enthusiasm to use the creative ideas to build the innovative projects and prototypes which are meeting the current needs of the market and society as a whole.
4. Improve their communicative skills and team skills.

A summer industry internship project shall be carried out by a group of students consisting of 2 to 3 in number during summer third year first semester at industries. This work shall be carried out under the guidance of the faculty assigned as internal guide as well as external guide at industry where students are carrying out summer industry internship projects. Project shall consist of design, fabrication, software development or building of prototype or application a pp. This can be of interdisciplinary nature also.

There will be 100 marks in total with 40 marks of internal evaluation and 60 marks of external

The **internal evaluation** shall consist of:

1. Abstract, Design, Implementation and Presentation: 15 marks

in font of Project review Committee consisting of

HoD, Senior faculty and Internal Guides. (Average)

1. Internal evaluation : 15 marks
2. Report : 10 marks --------------

Total 40 marks

Semester End examination : 60 Marks.

Syllabus for B. Tech III year II Semester

**B.Tech. (CSE) - Cyber Security**

# **Basics of Entrepreneurship**

Code:9ZC22

**Course Objective:** The objective of the course is to make students understand the nature of Entrepreneurship, and its importance to business to the engineering students, which will allow them to get the required intuition and interest in starting their own start-up’s

**Course Outcomes:**

C01 Demonstrate the basic knowledge and skill set required for entrepreneurship. [L2]

C02 Distinguish business models and their validation in entrepreneurship. [L4]

C03 Examine cost and financial structures and decide suitable pricing strategies. [L4]

C04 Relate team building and project management styles to project management and               entrepreneurship. [L2]

C05.Identify different marketing strategies and understand business regulations for startups. [L3]

## **UNIT - I**

**Introduction to Entrepreneurship & Self Discovery: -** Define Entrepreneurship, Entrepreneurship as a Career option, Find your Flow, Stock of Your Means, Characteristics, Qualities and Skills of Entrepreneurship, Effectuation, Principles of Effectuation, Life as an Entrepreneur, Stories of Successful Entrepreneurs.

## **UNIT - II**

**Opportunity & Customer Analysis: -** Identify your Entrepreneurial Style, Methods of finding and understanding Customer Problems, Run Problem Interview, Process of Design Thinking, Identify Potential Problems worth Solving, Customer Segmentation, Niche Marketing and Targeting, Craft your Values Proportions, Customer-driven Innovation.

## **UNIT - III**

**Business Model & Validation: -** Introduction to Business Models, Lean approach to Business Model Canvas, Blue and Red Ocean Strategies, the Problem-Solution Fit, build your Solution Demo, Solution Interview Method, Identify Minimum Viable Product (MVP), Product-Market fit test.

## **UNIT - IV**

**Economics & Financial Analysis: -** Revenue Analysis, identify different Revenue Streams and Costs Analysis – Startup Cost, Fixed Cost and Variable Cost, Break Even Analysis, Profit Analysis, Introduction to Pricing, different Pricing Strategies, Sources of Finance, Bootstrapping and Initial Financing, Practice pitching to Investors and Corporate.

## **UNIT - V**

**Team Building & Project Management: -** Leadership Styles, Shared Leadership Model, Team Building in Venture, Roles and Responsibilities of team in venture, explore collaboration tools and techniques, Brainstorming, Introduction to Project Management, Project Life Cycle, Create a Project Plan.

## **UNIT - VI**

**Marketing & Business Regulations: -** Positioning, Positioning Strategies, Branding, Branding Strategies, Selecting and Measuring Channels, Customer Acquisition, Selling Process, Selling Skills, Sales Plans. Business regulations – List of Required Registrations, Compliance Check List, Business Structures and Legal Entities.

**Essential Readings:**

* Robert D Hisrich, Michael P Peters, Dean A Shepherd, Entrepreneurship, Sixth Edition, New Delhi, 2006.
* Thomas W. Zimmerer, Norman M. Scarborough, Essentials of Entrepreneurship And Small Business Management, Fourth Edition, Pearson, New Delhi, 2006
* Alfred E. Osborne, Entrepreneur’s Toolkit, Harvard Business Essentials, HBS Press, USA, 2005.
* Madhurima Lall, Shikha Sahai, Entrepreneurship, Excel Books, First Edition, New Delhi, 2006.

**References:**

* S.S. Khanka, Entrepreneurial Development, S. Chand and Company Limited, New Delhi, 2007.
* H. Nandan, Fundamentals of Entrepreneurship, Prentice Hall of India, First Edition, New Delhi, 2007.

• S.R. Bhowmik, M. Bhowmik, Entrepreneurship-A tool for Economic Growth   And A   
 key to Business Success, New Age International Publishers, First Edition, (formerly   
 Wiley Eastern Limited), New Delhi, 2007.

* *https://www.wfglobal.org/*
* [*https://www.learnwise.org/#/IN/en/home/login*](https://www.learnwise.org/#/IN/en/home/login)*,*

**Syllabus for B. Tech (CSE) III YEAR II SEM**

**B.Tech. (CSE) - Cyber Security**

# **BANKING OPERATIONS, INSURANCE AND RISK MANAGEMENT**

**(Open Elective –I)**

**Code: 9ZC05**

**Course Objectives:**

To make the students understand the concepts and principles of Indian Banking and Insurance Business and the role of RBI in regulating the Indian Financial System.

1. Describe the Indian Banking System in detail
2. Gain awareness about the prudential norms and capital requirements of banks in India
3. Understand the role of RBI as a regulator of Indian Banking
4. Describe the new dimensions and products served by the banking system in INDIA
5. Provide awareness on Insurance industry and its principles
6. Recognize the importance of regulatory and legal frame work of IRDA

## **UNIT - I**

Introduction to banking business:Introduction to banking services - History of banking business in India, Structure of Indian banking system: Types of accounts, advances and deposits in a bank, KYC norms.

## **UNIT - II**

Banking regulations**:** Banking Sector Reforms with special reference to Prudential Norms, Capital Adequacy Norms, Classification of Assets and NPA’s, Functions of RBI, Role of RBI in regulating Indian Banking, Banking Ombudsman scheme

## **UNIT - III**

Credit control by rbi**:** Definition, Objectives of Credit Control, Quantitative methods of Credit Control by RBI: Bank Rate Policy, Open Market Operations, Variation of Reserve Ratio, Qualitative methods of Credit Control by RBI: Fixation of Margin Requirements, Regulation of consumer Credit, Rationing of Credit, Direct Action, Moral Suasion and Publicity

## **UNIT - IV**

New dimensions in banking**:** Financial Inclusion – Micro finance, E-Banking: Mobile-Banking, Net Banking, Digital Banking, Artificial Intelligence in Banking, CIBIL Score, Negotiable Instruments: Cheque Truncation system.

## **UNIT - V**

Introduction to insurance:Introduction to insurance, Need and importance of Insurance, principles of Insurance, characteristics of insurance contract, types of insurance: Life insurance and its products, General Insurance and its variants.

## **UNIT - VI**

Insurance business environment**:** Procedure for issuing an insurance policy –Nomination - Surrender Value - Policy Loans – Assignment - Revivals and Claim Settlement; Insurance as a tax mitigation tool, Role of IRDA in Insurance Regulation.

**Essential Readings:**

1. Varshney, P.N., Banking Law and Practice, Sultan Chand & Sons, New Delhi.
2. General Principles of Insurance Harding and Evenly
3. Mark S. Dorfman: Risk Management and Insurance, Pearson, 2009.

**References:**

1. Scott E. Harringam Gregory R. Nichanus: Risk Management & Insurance, TMH, 2009.
2. Geroge E. Rejda: Principles of risk Management & Insurance, 9/e, pearson Education. 2009.
3. G. Koteshwar: Risk Management Insurance and Derivatives, Himalaya, 2008.

**Syllabus for B. Tech III year II Semester**

**B.Tech. (CSE) - Cyber Security**

# **Smart Materials**

CODE: 9BC56

**L T P/D C**

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**Course Objectives:**

To provide the knowledge on principles of smart materials, their functions and applications.

**Course Outcomes:**

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| --- | --- |
|  | After studying this course, the student will be able to: |
| 1 | Apply the knowledge for developing/producing sensors, devices based on the assimilated know-how of composites, ceramics, electro-magnetic materials, shape memory alloys, and their properties. |
| 2 | Develop/process new sensing and actuating smart devices based on the assimilated knowledge on the principles of phase transformations. |
| 3 | Evaluate shape memory materials, electro rheological fluids and develop newer applications. |
| 4 | Comprehend the principles of operation of optical fibers, actuators, and methods of analyses employed in smart materials. |
| 5 | To apply the principles for developing smart skins for aerospace and transportation vehicles. |
| 6 | To develop or process sensors and actuators for MEMS using shape memory alloys, PZT actuators. |

## **UNIT - I**

**Introduction:** Characteristics of composites and ceramics materials, Dynamics and controls, concepts, Electro-magnetic materials and shape memory alloys-processing and characteristics

## **UNIT - II**

**Sensing And Actuation:** Principles of electromagnetic, acoustics, chemical and mechanical sensing and actuation, Types of sensors and their applications, their compatibility conventional and advanced materials, signal processing, principles and characterization.

**UNIT - III**

**Control Design:** Design of shape memory alloys, Types of MR fluids, Characteristics and application, principles of MR fluid value designs, Magnetic circuit design, MR Dampers, Design issues.

## **UNIT - IV**

**Optics And Electromagnetic:** Principles of optical fiber technology, characteristics of active and adaptive optical system and components, design and manufacturing principles.

## **UNIT - V**

**Structures:** Principles of drag and turbulence control through smart skins, applications in environment such as aerospace and transportation vehicles, manufacturing, repair and maintainability aspects.

**Controls:** Principles of structural acoustic control, distributed, analog and digital feed back controls, Dimensional implications for structural control.

## **UNIT - VI**

**Principles Of Vibration and Modal Analysis:** PZT Actuators, MEMS, Magnetic shape Memory Alloys, Characteristics and Applications.

**Information Processing:** Neural Network, Data Processing, Data Visualization and Reliability – Principles and Application domains.

**06 Hours**

**TEXT BOOKS:**

1. **Analysis and Design’,** A. V. Srinivasan, ‘Smart Structures –Cambridge Universities Press, New York, 2001, (ISBN:

0521650267)

2. **‘Smart Materials and Structures’,** M V Gandhi and B S Thompson Chapmen & Hall, London, 1992 (ISBN: 0412370107)

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**REFERENCE BOOKS:**

1. **‘Smart Materials and Structures’,** Banks HT, RC Smith, Y Wang,Massow S A, Paris 1996

2. **G P Gibss’Adaptive Structures’,** Clark R L, W R Saunolers, JhonWiles and Sons, New York, 1998

3. **An introduction for scientists and Engineers’,** Esic Udd, OpticSensors : Jhon Wiley & Sons, New York, 1991 (ISBN :0471830070)

**Syllabus for B. Tech III year II Semester**

**B.Tech. (CSE) - Cyber Security**

# **Control System Engineering**

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| **L** | **T** | **P** | **C** |
| **2** | **0** | **0** | **2** |

**Code : 8AC46**

**Prerequisite: NIL**

**COURSE OBJECTIVES :**

Study the principles of system modeling, system analysis and feedback control and use them to design and evaluate feedback control systems with desired performance;

**COURSE OUTCOMES :**

At the end of this course, the students will be able to

1. Understand basic concepts of control systems.
2. Study about time response analysis.
3. Understand basic concepts of stability and root locus method.
4. Study about frequency response analysis.
5. Learn basic concepts stability analysis in frequency domain.
6. Outline fundamentals of state space analysis.

## **UNIT - I**

**Introduction:** Concepts of Control Systems- Open Loop and closed loop control systems and their differences- Classification of control systems, Feed-Back Characteristics, Effects of feedback. Mathematical models – Differential equations, Impulse Response and transfer functions – Translational and Rotational mechanical systems

**Transfer function representation:** Transfer Function of Synchro transmitter and Receiver, Block diagram representation of systems considering electrical systems as examples -Block diagram algebra – Representation by Signal flow graph - Reduction using Mason’s gain formula.

## **UNIT - II**

**Time response analysis:** Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems, PID controllers.

## **UNIT - III**

**Stability analysis in s-domain:** The concept of stability – Routh’s stability criterion – qualitative stability and conditional stability – limitations of Routh’s stability.

Root Locus Technique: The root locus concept - construction of root loci-effects of adding poles and zeros to G(s)H(s) on the root loci.

## **UNIT - IV**

Frequency response analysis**:** Introduction, Frequency domain specifications-Bode Diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Phase margin and Gain Margin-Stability Analysis from Bode Plots.

## **UNIT - V**

Stability analysis in frequency domain: Polar Plots-Nyquist Plots-Stability Analysis.

Classical control design techniques**:** Compensation techniques – Lag, Lead, Lead-Lag Controllers design in frequency Domain.

## **UNIT -VI**

State space analysis of continuous systems**:** Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and its Properties.

**TEXT BOOKS:**

1. Automatic Control Systems 8th edition –B. C. Kuo 2003– John Wiley and sons.
2. Control Systems Engineering – I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers, 2nd edition.

**REFERENCES:**

1. Modern Control Engineering – Katsuhiko Ogata – Prentice Hall of India Pvt. Ltd., 3rd edition, 1998.

2. Control Systems – N.K.Sinha, New Age International (P) Limited Publishers, 3rd Edition, 1998.

3. Control Systems Engg. – NISE 3rd Edition – John wiley.

**Syllabus for B. Tech III year II Semester**

**B.Tech. (CSE) - Cyber Security**

## **Embedded Systems**

## (Open Elective –I)

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| **L** | **T** | **P** | **C** |
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**Code : 8DC52**

**Prerequisite: Computer Organisation**

**COURSE OBJECTIVES :**

The constraints and challenges of an Embedded System design The 8051 Architecture, Assembly Language Programming , Interfacing and Interrupt handling mechanism Modern Embedded System Design case studies

**COURSE OUTCOMES :**

At the end of this course, the students will be able to

1. Classify embedded systems and their applications
2. Write ALP for 8051 architecture
3. Implement interfaces for Embedded System using various protocols and hardware modules.
4. Understand the principles of Communication Interface, Wireless and Mobile Systems Protocols
5. Design the interrupt routines for variois OS concepts and Memory Management techniques in an RTOS Environment
6. Recognize the issues and design of basic Real-Time Operating System principles, Semaphores and Queues, Hard Real-Time Scheduling Considerations.

## **UNIT - I**

Introduction to Embedded Systems:Embedded Systems, Comparing Embedded and General Computing, Complex System Design and Processors, Classification of Embedded Systems, Embedded System Design Process, Formalization of System Design, Embedded SOC and VLSI Circuit Technology, Application examples of Embedded Systems.

## **UNIT - II**

8051 Architecture, Memory Organization and Programming**:** 8051 Architecture, features, addressing modes, Instruction set, Input/output Ports and Circuits, External Memory, Counter and Timers, Serial data, Input/Output, Interrupts; The Assembly Language programming Process, Programming the 8051, Data Transfer and Logical Instructions. Arithmetic Operations, Decimal Arithmetic. Jump and Call Instructions, use of C programming for 8051.

## **UNIT - III**

8051 Real World Interfacing:Part A - Real World Interfacing, Performance metrics, Memory map, Processor and Memory selection, Part B - IO Subsystem, Sensors and Actuators, LED and LCD Interfacing, Keyboard Interfacing, Stepper Motor Interfacing, DC motor Interfacing Using PWM

## **UNIT - IV**

Embedded Communication Interface: Serial and Parallel Communication, Timer and Counting Devices, Watchdog Timer, Real Time Clock, I2C, SPI protocol, ISA, PCI, Internet Enabled Systems, Wireless and Mobile Systems Protocols

## **UNIT - V**

Introduction to Real - Time Operating Systems:Tasks and Task States, Tasks and Data, Semaphores, and Shared Data; Message Queues, Mailboxes and Pipes, Timer Functions, Events, Memory Management, Interrupt Routines in an RTOS Environment. (Chapter 6 and 7 from Text Book 3, Simon).

## **UNIT - VI**

Basic Design Using a Real-Time Operating System: Principles, Semaphores and Queues, Hard Real-Time Scheduling Considerations, Saving Memory and Power, An example RTOS like uC-OS (Open Source); Embedded Software Development Tools: Host and Target machines, Linker! Locators for Embedded Software, Getting Embedded Software into the Target System; Debugging **Techniques:** Testing on Host Machine, Using Laboratory Tools, An Example System. (Chapter 8,9,10 & 11 from Text Book 3, Simon).

**TEXT BOOKS:**

1. Embedded Systems- Architecture, Programming and Design 2E, Raj Kamal, TMH
2. Introduction to Embedded Systems, K. Shibu, Tata McGraw-Hill
3. The 8051 Microcontroller and Embedded Systems Using Assembly and C – Mazidi, Pearson Education India, 2nd edition, 2008.
4. An Embedded Software Primer, David E. Simon, Pearson Education

**REFERENCES:**

1. An Embedded Software Primer, David E. Simon, Pearson Education.
2. Computers and Components: principles of embedded computing system design, Wayne Wolf, Elsevier.
3. 8051 Application Notes by Atmel.

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**B.Tech. (CSE) - Cyber Security**

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# **Design Literacy and Design Thinking**

**Code:** 9ZC08

**Course Objective:**

The objective of the course is to make students understand the fundamental concepts of design thinking, and to familiarize with product design process and to motivate the students to ideate new products and services.

**Course Outcomes:**

1. The students gain the knowledge on the inputs required for design thinking and also gain familiarity on concepts related to design thinking.
2. The students learn the techniques of idea generation
3. The students gain knowledge on different phases of design thinking
4. The students realize the product design process.
5. The students gain familiarity on design thinking for service design.
6. The students gain knowledge on various cases related to design thinking.

## **UNIT - I**

Design Thinking **–** Introduction to Design thinking, Principles of design thinking, Benefits of design thinking, Applications of Design thinking, Social Innovation, Impact of Design thinking, Design thinking tools and techniques. Innovation and Design thinking.

## **UNIT - II**

Idea Generation: New Idea generation methods - Principles of Idea Generation, Techniques, Creativity thinking techniques and tools, types of creative thinking, select ideas from ideation methods.

## **UNIT - III**

Design Thinking Foundations: The Design Double Diamond: Discover-Define-Develop-Deliver, User-centric design approaches: Importance of user-centricity for design, Empathisation, Empathy Maps, Data collection from users and for users, Data Validation Responsible Innovation and Ethical Design:

## **UNIT – IV**

Product Design Process: Identification of opportunities, Problem Statement, Product planning, Characteristics of Successful product Development, New product development process, Stanford design thinking iterative model

## **UNIT - V**

Design Thinking for Service Design: Attributes of a good service design, service design tools – blueprint, customer journey mapping Identifying the user needs in a service-driven economy; Process Flows and Customer Experience considerations for designing and improving services; 5 Whys; Service Delivery Pathways

## **UNIT - VI**

Case Studies on Design thinking:Case 1: Arcturus IV by John E. Arnold, Case – 2: How can we make AI to make things better for humans. Case – 3: User Centered Helmet Design by Prof. B.K. Chakravarthy- Part 1 and Part 2; Case – 4: Challenges of Reaching a Million Users by Prof. Chetan Solanki and Prof Jayendran V.

**Essential Readings:**

1. Brown, T. (2008). Design thinking. *Harvard business review*, *86*(6), 84.
2. “Innovation by Design", Gerald H. (Gus) Gaynor, AMACOM {American Management Association), NYC, 2002
3. Ansell, C., &Torfing, J. (2014). Collaboration and design: new tools for public innovation. In *Public innovation through collaboration and design* (pp. 19-36). Routledge.
4. Lewrick, M., & Link, P. (2015). Design thinking tools: Early insights accelerate marketers ‘success. *Marketing Review St. Gallen*, *32*(1), 40-51.

**References:**

1. Mæhlum, A. R. (2017). *Extending the TILES Toolkit-from Ideation to Prototyping* (Master's thesis, NTNU).
2. Norman, D. (2013). *The design of everyday things: Revised and expanded edition*. Basic books.
3. Design Thinking – A primer, Prof: Dr. BalaRamadurai, Indian Institute of Technology, Madras.

**Syllabus for B. Tech III year II Semester**

**Tech. (CSE) - Cyber Security**

# **Computer Security and Audit Assurance**

(Profession Elective – II)

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**Code: 9JC11**

**Prerequisite:**Information Security

**Course Objectives:**

1. State the basic concepts in information systems security, including security technology and principles, software security and trusted systems, and IT security management.

2. Explain concepts related to various cryptographic tools.

**Course Outcomes:**

1. State the requirements and mechanisms for identification and authentication.

2. Explain and compare the various access control policies and models as well as the assurance of these models.

3. Understand various standard practices and policies in conducting audits.

4. Understand and analyze the significance of Network Security and Control, Internet Banking Risks and Control.

## **UNIT - I**

System Audit and Assurance – Characteristics of Assurance services, Types of Assurances services, Certified Information system auditor, Benefits of Audits for Organization, COBIT.

## **UNIT - II**

Internal Control and Information system Audit - Internal Control, Detective control, Corrective Control, Computer Assisted Audit Tools and Techniques.

## **UNIT - III**

Conducting Audit – Standard practices, policies, Audit planning, Risk Assessment, Information gathering techniques,

## **UNIT - IV**

Vulnerabilities, System security testing, conducts Audits for Banks.

## **UNIT - V**

Network Security and Control, Internet Banking Risks and Control, Operating System Risks and Control, Operational Control Overview.

## **UNIT - VI**

Business Continuity and Disaster Recovery Planning Control – Data backup/storage, Developing appropriate Disaster recovering strategy, Business Impact analysis.

**TEXT BOOK:**

1. Information System Audit and Assurance; D. P. Dube, Ved Prakash Gulati; Tata McGraw- Hill Education, 01 Jan 2005.

**REFERENCE BOOKS:**

1. William Stallings and Lawrie Brown, Computer Security: Principles and Practice, Pearson education

2.  Martin Weiss and Michael G. Solomon, Auditing IT Infrastructures For Compliance (Information Systems Security & Assurance)**,**Jones and Bartlett Publishers, Inc.

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**Syllabus for B. Tech III year II Semester**

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# **Linux Programming**

**Code:** 9EC08

**Prerequisite:** Operating Systems

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## **Course Objectives**:

1. Induce working principles of Linux operating system, usage of File handling utilities, Security by file permissions, process utilities, Disk utilities, networking utilities.
2. Impart the shell responsibilities and meta-characters of it, control structures, shell interrupt processing, functions, debugging shell scripts.
3. Impart basics of file concepts kernel support for file, file structure and low-level I/O functions, system calls (file API ‘s). Induce knowledge regarding Directory management and its API.
4. Demonstrate basics of process creation, execution and synchronization mechanisms. Give knowledge regarding a signal, need for having them, usage of various signals.
5. Narrate the need for Inter Process Communication. Explore the possible mechanisms to implement System V APIs. To demonstrate the usage of Message queues.
6. Incorporate implementation for semaphore API and shared memory API. To explain the need for using a basic Client-Server model.

## **Course Outcomes**:

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

1. Command-Line Proficiency and Scripting Skills for different Shells.
2. Understanding File Systems and Process Management
3. Developing applications that leverage IPC mechanisms.
4. Design and Implementation Skills for Unix System V APIs

## **UNIT - I**

Linux Utilities-File handling utilities, Security by file permissions, Process utilities, Disk utilities, Networking commands, Filters, Text processing utilities and Backup utilities, sed – scripts, operation, addresses, commands, applications, awk – execution, fields and records, scripts, operation, patterns, using system commands in awk.

(Applications: Determining what types of files are present in a system, debugging issues with file accessibility, finding a process troubling for a task and discarding from its existing, Write and extract necessary information from huge test files.)

## **UNIT - II**

**:** Working with the Bourne again shell(bash): Introduction, shell responsibilities, pipes and input Redirection, output redirection, running a shell script, the shell as a programming language, shell meta characters, file name substitution, shell variables, command substitution, shell commands, the environment, quoting, test command, control structures, arithmetic in shell, shell script examples, interrupt processing, functions, debugging shell scripts.

(Applications: Writing shell scripts for automating most of the regular jobs, taking backup on regular basis and restoring the same)

## **UNIT - III**

Files: File Concept, File System Structure, I nodes, File Attributes, File types, Library functions, the standard I/O and formatted I/O in C, stream errors, kernel support for files, System calls, file descriptors, low level file access – File structure related system calls (File APIs), file and record locking, file and directory management – Directory file APIs, Symbolic links & hard links. (Applications: write some system programs to interact with file system, developing small system software ‘s to work with files and

## **UNIT - IV**

Process – Process concept, Kernel support for process, process attributes, process control - process creation, waiting for a process, process termination, zombie process, orphan process, Process APIs. Signals– Introduction to signals, Signal generation and handling, Kernel support for signals, Signal function, unreliable signals, reliable signals, kill, raise, alarm, pause, abort, sleep functions.

(Applications: Applications to find number of typical processes are under different context and controlling them in synchronous manner. Develop user defined modules for handling a signal and controlling several issues with signals.)

## **UNIT - V**

: Inter-process Communication: Introduction to IPC, Pipes, FIFOs, Introduction to three types of IPC-message queues, semaphores and shared memory. Message Queues Kernel support for messages, UNIX system V APIs for messages, client/server example.

(Applications: Developing applications complying with IPC mechanisms, developing an application that exchanges a set of messages among different processes. Write a client server application to go with any concurrent approach)

## **UNIT – VI**

**:** Semaphores-Kernel support for semaphores, UNIX system V APIs for semaphores. Shared Memory- Kernel support for shared memory, UNIX system V APIs for shared memory, semaphore and shared memory example.

(Applications: Develop critical section handling mechanisms to deal with any real problems. Building applications to share a piece of memory resource among processes concurrently)

**TEXT BOOKS:**

1. Unix System Programming using C++, T. Chan, PHI.
2. Unix Concepts and Applications, 4th Edition, Sumitabha Das, TMH, 2006.
3. Beginning Linux Programming, 4th Edition, N. Matthew, R. Stones, Wrox, Wiley India Edition, rp-2008

**REFERENCES:**

1. Linux System Programming, Robert Love, O ‘Reilly, SPD.
2. Advanced Programming in the Unix environment, 2nd Edition, W.R. Stevens, Pearson Education.
3. Unix Network Programming, W.R. Stevens, PHI.

Unix for programmers and users, 3rd Edition, Graham Glass, King Ables, Pearson Educatio devices, developing program ‘s on directory management system

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# **Software Requirements and Estimation**

**Code : 9EC12**

**Prerequisites** : Software Project Management

**Course Objectives:**

1. Demonstrate the knowledge of the distinction between critical and non- critical systems and should author a software requirements document.
2. Understand the proper contents of a software requirements document and distributed system architectures and application architectures.

**Course Outcomes:** At the end of this course the student will be able to

1. Explain need, practices and Risk issues in Software requirements.
2. Describe Software Requirements Engineering elements such as review, quality and priorities.
3. Explain software Modeling and Requirements Management.
4. Apply Estimation methods for size using Mark II FPA, Full Function Points, LOC Estimation.
5. Apply Cost and Schedule estimation factors during software development.
6. Apply tools for Requirements Management and Estimation.

## **UNIT - I**

Software Requirements: What and WhyEssential Software requirement, good practices for requirements engineering, Improving requirements processes, Software requirements and risk management

## **UNIT - II**

Software Requirements EngineeringRequirements elicitation, elicitation techniques, requirements analysis, documentation, review, Software quality attributes, risk reduction through prototyping, setting requirements priorities, verifying requirements quality.

## **UNIT - III**

Software Requirements Modeling, Analysis Models, Use Case Modeling, Dataflow diagram, state transition diagram, class diagrams.

Software Requirements ManagementRequirements Management Principles and practices, Requirements attributes, Change Management Process, Requirements Traceability Matrix, Links in requirements chain.

## **UNIT - IV**

Software EstimationComponents of Software Estimations, Estimation methods, Problems associated with estimation, Key project factors that influence estimation Size**Estimation**Two views of sizing, Function Point Analysis, Mark II FPA, Full Function Points, LOC Estimation, and Conversion between size measures.

## **UNIT - V**

Effort, Schedule and Cost EstimationWhat is Productivity? Estimation Factors, Approaches to Effort and Schedule Estimation, COCOMO II, Putnam Estimation Model, Cost Estimation.

## **UNIT - VI**

Tools for Requirements Management and EstimationRequirements Management Tools: Benefits of using a requirements management tool, commercial requirements management tool, Rational Requisite pro, Caliber – RM, implementing requirements management automation.

Software Estimation Tools**:** Desirable features in software estimation tools, IFPUG, USC’s COCOMO II, and SLIM (Software Life Cycle Management) Tools.

**TEXT BOOK:**

1. Software Requirements and Estimation by Rajesh Naik and Swapna Kishore, Tata Mc Graw Hill.

**REFERENCE BOOKS:**

1. Software Requirements by Karl E. Weigers, Microsoft Press.

2. Managing Software Requirements, Dean Leffingwell& Don Widrig, Pearson Education, 2003.

3. Mastering the requirements process, second edition, Suzanne Robertson & James Robertson, Pearson Education, 2006.

4. Estimating Software Costs, Second edition, Capers Jones, TMH, 2007.

5. Practical Software Estimation, M.A. Parthasarathy, Pearson Education, 2007.

6. Measuring the software process, William A. Florac& Anita D. Carleton, Pearson Education, 1999.

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# **Machine Learning**

## Code: 9LC03

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**Prerequisite:** Introduction to Data Science

**Course Objectives:**

1. To introduce students to the basic concepts and techniques of Machine Learning.
2. To have a thorough understanding of the Supervised and Unsupervised learning techniques
3. To study the various probability-based learning techniques
4. To understand graphical models of machine learning algorithms

## **Course Outcomes:**

At the end of this course, the student is able to

1. Understand the fundamental concepts of ML and Designing a Learning System.
2. Understand the basic concepts of MLP, RBF and SVM and their applications.
3. Understand the Probability models namely supervised, unsupervised, basic statistics analyze their analysis of algorithms along with their applications.
4. Understand various Dimensionality Reduction Techniques and Apply various Evolutionary Algorithms with models
5. Understand the Graphical models and their applications
6. Understanding Analytical Learning and Analyze KBANN Algorithm.

## **UNIT-I**

Introduction**:** Learning– Types of Machine Learning – Supervised Learning – The Brain and the Neuron – Linear Discriminants: Definitions of Perceptron, Linear separability, Linear Regression.

Design a Learning System– Perspectives and Issues in Machine Learning – Concept Learning Task – Concept Learning as Search – Finding a Maximally Specific Hypothesis – Version Spaces and the Candidate Elimination Algorithm. **(Textbook-1)**

## **UNIT-II**

Linear models:

Multi-layer Perceptron– Going Forwards – Going Backwards: Back Propagation Error – Multi- layer Perceptron in Practice – Examples of using the MLP – Overview – Deriving Back- Propagation – Radial Basis Functions and Splines – Concepts – RBF Network – Interpolations and Basis Functions – Support Vector Machines. **(Textbook-2)**

## **UNIT-III**

Tree and probabilistic models:

Learning with Trees– Decision Trees – Constructing Decision Trees – Classification and Regression Trees – Ensemble Learning – Boosting – Bagging – Different ways to Combine Classifiers – Basic Statistics – Gaussian Mixture Models – Nearest Neighbour Methods – Unsupervised Learning – K means Algorithms. **(Textbook-2)**

# **UNIT-IV**

Dimensionality reduction and evolutionary models:

Dimensionality Reduction– Linear Discriminant Analysis – Principal Component Analysis – Factor Analysis – Independent Component Analysis – Locally Linear Embedding – Isomap – Least Squares Optimization – Evolutionary Learning – Genetic algorithms – Genetic

Offspring: - Genetic Operat– Getting Lost Example. **(Textbook-1)**

## **UNIT-V**

Graphical models:

Markov Chain Monte Carlo Methods– Sampling – Proposal Distribution – Markov Chain Monte Carlo – Graphical Models – Bayesian Networks – Markov Random Fields – Hidden Markov Models – Tracking Methods. **(Textbook-1)**

## **UNIT – VI**

Analytical learning:

Learning with perfect domain theory– Explanation based Learning – Inductive analytical approach to learning – KBANN algorithm. **(Textbook-2)**

## **TEXT BOOKS:**

1. Stephen Marsland, ―Machine Learning – An Algorithmic Perspective, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.
2. Tom M Mitchell, ―Machine Learning, First Edition, McGraw Hill Education, 2013.

## REFERENCES:

1.Peter Flach, ―Machine Learning: The Art and Science of Algorithms that Make Sense of Data, First Edition, Cambridge University Press, 2012.

1. Jason Bell, ―Machine learning – Hands on for Developers and Technical Professionals‖, First Edition, Wiley, 2014.
2. Ethem Alpaydin, ―Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series), Third Edition, MIT Press, 2014.

ors – Using Genetic Algorithms – Reinforcement Learning – Overview

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### Computer Graphics

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**Code:9FC12**

**Course Objectives:**

* 1. Various Input and Out Put devices and various Out Put Primitive Algorithms
  2. Filled Area Primitive Algorithms and 2-D geometrical transformations
  3. 2-D Viewing and clipping Algorithms
  4. 3-D Object Representation and 3-D geometrical Transformations
  5. 3-D Viewing and visible surface detection methods
  6. Computer Animation languages

### Course Outcomes:

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

1. Understand fundamental terms in Computer Graphics, various visible surface determination algorithms and midpoint and line segment analysis.
2. Explore 2D graphics and algorithms including: line drawing, polygon filling, clipping, and transformations.
3. Apply functions 2D viewing and apply clipping algorithms.
4. Understand the concepts and techniques used in 3D computer graphics, including viewing transformations, hierarchical modeling, color, lighting and texture mapping.
5. Apply single and multiple 3-D viewing techniques like viewing coordinates etc and also back-face detection, depth-buffer, and scan-line methods.
6. Analyze the animation production pipeline and produce a short animation.

### Unit-I

Introduction, Application areas of Computer Graphics, overview of graphics systems, video- display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices. Output primitives : Points and lines, line drawing algorithms, mid-point circle and ellipse algorithms, Applications.

### Unit-II

Filled area primitives: Scan line polygon fill algorithm, boundary-fill and flood-fill algorithms 2-D geometrical transforms: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems.

### Unit- III

2-D viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland – Hodgeman polygon clipping algorithm

### UNIT-IV

3-D Object Representation: Polygon surfaces, quadric surfaces, spline representation, Bezier curve and B-Spline curves, polygon rendering methods. 3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations.

## **UNIT-V**

3-D viewing: Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping visible surface detection methods: Classification, back-face detection, depth-buffer, scan-line, depth sorting, BSP-tree methods, area sub-division and octree methods

## **UNIT-VI**

Computer animation: Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications. (p.nos 604- 16 of text book -1, chapter 21 of text book-2).

## **TEXT BOOKS**:

1. ―Computer Graphics C version‖, Donald Hearn and M. Pauline Baker, Pearson Education.
2. ―Computer Graphics Principles & practice‖, second edition in C, Foley, VanDam, Feiner and Hughes, Pearson Education.

## **REFERENCE BOOKS**:

1. ―Computer Graphics‖, second Edition, Donald Hearn and M. Pauline Baker, PHI/Pearson Education.
2. ―Computer Graphics Second edition‖, Zhigandxiang, Roy Plastic, Schaum ‘s outlines, Tata Mc- Graw hill edition.
3. Procedural elements for Computer Graphics, David F Rogers, Tata Mc Graw hill, 2nd edition.
4. ―Principles of Interactive Computer Graphics‖, Neuman and Sproul, TMH.
5. Principles of Computer Graphics, Shalini Govil, Pai, 2005, Springer.
6. Computer Graphics, Steven Harrington, TMH

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### Mobile Application Development

**Code: 9FC14**

**Prerequisite:** Java Programming

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### Course Objectives:

* To demonstrate their understanding of the fundamentals of Android operating systems
* To demonstrate their skills of using Android software development tools
* To demonstrate their ability to develop software with reasonable complexity on mobile platform
* To demonstrate their ability to deploy software to mobile devices
* To demonstrate their ability to debug programs running on mobile devices

### Course Outcomes:

CO1: Ability to understand the technical challenges posed by current mobile devices and wireless communications.

CO2: Understand to learn the Android Application lifecycle.

CO3: Select and evaluate suitable software tools and APIs for the Development of a particular mobile application and understand their strengths, scope and limitations.

CO4: Slove the need to keep up with rapid changes and new developments CO5: Ability to identify the SQLite database and files.

CO6: Design and development small interactive programs for mobile devices.

## **UNIT – I**

Introduction to Android Operating System**:** Android OS design and Features – Android development framework, SDK features, Installing and running applications on Android Studio, Creating AVDs, Types of Android applications, best practices in Android programming, Android tools

Android application components **–** Android Manifest file, Externalizing resources like values, themes, layouts, Menus etc, Resources for different devices and languages, Runtime Configuration Changes

# **UNIT - II**

Android Application Lifecycle **–** Activities, Activity lifecycle, activity states, monitoring state changes

Android User Interface**:** Measurements – Device and pixel density independent measuring units.

**Layouts –** Linear, Relative, Grid and Table Layouts.

# **UNIT - III**

User Interface (UI)Components **–** Editable and non-editable Text Views, Buttons, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and pickers.

Event Handling **–** Handling clicks or changes of various UI components.

**Fragments –** Creating fragments, Lifecycle of fragments, Fragment states, adding fragments to Activity, adding, removing and replacing fragments with fragment transactions, interfacing between fragments and Activities, Multi-screen Activities

## **UNIT – IV**

Intents and Broadcasts: Intent **–** Using intents to launch Activities, explicitly starting new Activity, Implicit Intents, passing data to Intents, Getting results from Activities, Native Actions, using Intent to dial a number or to send SMS

**Broadcast Receivers –** Using Intent filters to service implicit Intents, Resolving Intent filters, finding and using Intents received within an Activity

**Notifications –** Creating and Displaying notifications, Displaying Toasts

## **UNIT - V**

**Persistent Storage:** Files **–** Using application specific folders and files, creating files, reading data from files, listing contents of a directory Shared Preferences – Creating shared preferences, saving and retrieving data using Shared Preference

**Database –** Introduction to SQLite database, creating and opening a database, creating tables, inserting retrieving and deleting data, Registering Content Providers, Using content Providers (insert, delete, retrieve and update)

## **UNIT – VI**

**Advanced Topics: Alarms –** Creating and using alarms.

**Using Internet Resources –** Connecting to internet resource, using download manager

**Location Based Services –** Finding Current Location and showing location on the Map, updating location

## **TEXT BOOKS:**

1. Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox) , 2012 2. Android Application Development for Java Programmers, James C Sheusi, Cengage Learning, 2013

## REFERENCE:

* 1. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox).

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### Scripting Languages

**Code: Code: 9FC77**

**Prerequisites:** Computer Programming and Data Structures, Object Oriented Programming Concepts

**Course Objectives:**

1. This course introduces the script programming paradigm
2. Introduces scripting languages such as Perl, Ruby and TCL.

**Course Outcomes**: At the end of this course, the student is able to

1. Identify the between typical scripting languages and typical system and application programming languages.
2. Discuss the strengths and weakness of Perl, TCL and Ruby; and select an appropriate language for solving a given problem.
3. Demonstrate programming skills in scripting language

## **UNIT – I**

Introduction: Ruby, Rails, the structure and Execution of Ruby Programs, Package Management with RUBYGEMS, Ruby and web: Writing CGI scripts, cookies, Choice of Web servers, SOAP and web services Ruby Tk–Simple Tk Application, widgets, Binding events, Canvas, scrolling

## **UNIT – II**

Extending Ruby: Ruby Objects in C, the Jukebox extension, Memory allocation, Ruby Type System, Embedding Ruby to Other Languages, Embedding a Ruby Interpreter

## **UNIT – III**

Introduction to PERL and Scripting

Scripts and Programs, Origin of Scripting, Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages. PERL-Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines.

## **UNIT – IV**

Advanced Perl Finer points of looping, pack and unpack, file system, eval, data structures, packages, modules, objects, inter facing to the operating system, Creating Internet ware applications, Dirty Hands Internet Programming, security Issues.

## **UNIT – V**

TCL Structure, syntax, Variables and Data in TCL, Control Flow, Data Structures, input/output, procedures, strings, patterns, files, Advance TCL- eval, source, exec and uplevel commands, Namespaces, trapping errors, event driven programs, making applications internet aware, Nuts and Bolts Internet Programming, Security Issues, C Interface.

## **UNIT – VI**

Tk Tk-Visual Tool Kits, Fundamental Concepts of Tk, Tk by example, Events and Binding, Perl-Tk.

**TEXTBOOKS:**

1. The World of Scripting Languages, David Barron, Wiley Publications.
2. Ruby Programming language by David Flanagan and Yukihiro Matsumoto O’Reilly
3. “Programming Ruby” The Pragmatic Programmers guide by Dave Thomas Second edition

**REFERENCEBOOKS:**

1. Open Source Web Development with LAMP using Linux Apache, MySQL, Pearland PHP, J. Lee and Beware (Addison Wesley)Pearson Education.
2. Perl by Example, E. Quigley, Pearson Education.
3. Programming Perl, Larry Wall, T. Christiansen and J. Or want, O’Reilly’s.
4. TCL and the Tk Toolkit, Ouster Hout, Pearson Education.
5. Perl Power, J.P. Flynt, Cengage Learning.

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### Agile Software Development

**Code:9FC16**

**Prerequisite:** Software Engineering and OOAD

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### Course Objectives:

To understand how an iterative, incremental development process leads to faster delivery of more useful software

### Course Outcomes:

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

1. To understand the essence of agile development methods
2. To apply the principles and practices of extreme programming in real world problems.
3. To optimize an agile process by exploring the possible risks and threats in the software process and improve process by eliminating waste
4. To design an agile process for a business application and deal with appropriate trade off.

## **UNIT I**

Why Agile? Understanding Success, Beyond Deadlines, The Importance of Organizational Success, Enter Agility, How to Be Agile? Agile Methods, Don‘t Make Your Own Method, The Road to Mastery, Find a Mentor

## **UNIT II**

Understanding XP: The XP Lifecycle, The XP Team, XP Concepts, Adopting XP: Is XP Right for Us? Assess Your Agility

## **UNIT III**

Practicing XP: Thinking: Pair Programming, Energized Work, Informative Workspace, Root- Cause Analysis, Retrospectives, collaborating: Trust, Sit Together, Real Customer Involvement, Ubiquitous Language, Stand-Up Meetings, Coding Standards, Iteration Demo, Reporting, Releasing: ―Done Done, No Bugs, Version Control, Ten-Minute Build, Continuous Integration, Collective Code Ownership, Documentation.

## **UNIT IV**

Planning: Vision, Release Planning, The Planning Game, Risk Management, Iteration Planning, Slack, Stories, Estimating. Developing: Incremental requirements, Customer Tests, Test-Driven Development, Refactoring, Simple Design, Incremental Design and Architecture, Spike Solutions, Performance Optimization, Exploratory Testing

## **UNIT V**

Mastering Agility Values and Principles: Commonalities, About Values, Principles, and Practices, Further Reading, Improve the Process: Understand Your Project, Tune and Adapt, Break the Rules, Rely on People: Build Effective Relationships, Let the Right People Do the Right Things, Build the Process for the People, Eliminate Waste: Work in Small, Reversible Steps, Fail Fast, Maximize Work Not Done, Pursue Throughput

## **UNIT VI**

Deliver Value: Exploit Your Agility, Only Releasable Code Has Value, Deliver Business Results,

Deliver Frequently, Seek Technical Excellence: Software Doesn‘t Exist, Design Is for Understanding, Design Tradeoffs, Quality with a Name, Great Design, Universal Design Principles, Principles in Practice, Pursue Mastery

## **TEXT BOOKS:**

1. James Shore and Shane Warden, ―The Art of Agile Development‖, O‘REILLY, 2007.

## **REFERENCES:**

1. Robert C. Martin, ―Agile Software Development, Principles, Patterns, and Practices‖ , PHI, 2002.
2. Angel Medinilla, ―Agile Management: Leadership in an Agile Environment‖, Springer, 2012.
3. Bhuvan Un Holkar, ―The Art of Agile Practice: A Composite Approach for Projects and Organizations‖, CRC Press.
4. Jim Highsmith, ―Agile Project Management‖, Pearson education, 2004
5. Elisabeth Hendrickson, ―Agile Testing‖ Quality Tree Software Inc 2008.

oit Your Agility, Only Releasable Code Has Value, Deliver Business Results

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### Business Intelligence

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**(Professional Elective –III)**

**Code: 9FC84**

**Prerequisite: Nil**

**Course Objectives:**

1. Introduce the Business intelligence concepts, techniques and models

2. Understand the modeling process behind business analytics

3. To analyze different data analysis tools and techniques Expected

**Course Out comes: At** the end of this course the student will be able to

1. Understand the importance of business intelligence and its applications in

today’s world.

2. Illustrate the different form of analytics such as business analytics, predictive

analytics.

3. Compare in detail the various aspects of business intelligence.

4. Understand the technological components of operational intelligence.

5. Analyze and understand the broad concepts in prescriptive analytics with

Decision Tables.

6.Apply business intelligence process for web mining and web analytics.

## **UNIT – I**

Introduction to Business Intelligence, Business Intelligence, Mobile Business Intelligence, Real-

time Business Intelligence (Text Book-1)

## **UNIT – II**

Analytics: A Comprehensive Study, Business Analytics, Analytics, Software Analytics,

Embedded Analytics, Learning Analytics, Predictive Analytics, Prescriptive Analytics, Social

Media Analytics, Behavioral Analytics (Text Book-1)

## **UNIT – III**

Essential Aspects of Business Intelligence, Context Analysis, Business Performance

Management, Business Process Discovery, Information System, Organizational Intelligence,

Data Visualization, Data Profiling, Data Cleansing, Process Mining, Competitive Intelligence

**(Text Book-1)**

## **UNIT – IV**

Operational Intelligence: Technological Components, Operational Intelligence, Business

Activity Monitoring, Complex Event Processing, Business Process Management, Metadata, Root

Cause Analysis (Text Book-1)

## **UNIT – V**

Prescriptive Analytics Decision Support Systems Modeling - Mathematical Models for Decision Support - Certainty, Uncertainty, and Risk- Decision Modeling with Spreadsheets - Mathematical Programming

Optimization - Decision Analysis with Decision Tables and Decision Trees - Problem-Solving

Search Methods - Problem-Solving Search Methods (Text Book-2)

## **UNIT –VI**

Web Analytics and Web Mining Web Mining Overview - Web Content and Web Structure Mining - Search Engines – Search Engine Optimization - Web Analytics Technologies, metrics - Web Analytics Maturity Model and Web Analytics Tools (Text Book-2)

**TEXT BOOK**

1. Drew Bentley, Business Intelligence and Analytics, Published by Library Press

2. Efraim Turban, Ramesh Sharda, Dursun Delen, “Business Intelligence and Analytics”, 10th

Edition, Pearson, 2015

**REFERENCES:**

**1** S. Christian Albright, Wayne L. Winston, Business Analytics: Data Analysis &amp; Decision

Making, 6th Edition, CENGAGE INDIA, 2017

2 Dinabandhu Bag, Business Analytics, Routledge, 1st edition, 2016

3 Rick Sherman, Business Intelligence Guidebook: From Data Integration to Analytics, Morgan

Kaufmann, 1st edition 2014

4. Introduction to business Intelligence and data warehousing, IBM, PHI.

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# **COMPUTER VISION**

(Professional Elective – II)

### Code: 9EC22

### Prerequisite: Nil

### Course Objectives:

In this course students will learn basic principles of image formation, image processing algorithms and different algorithms for 3D reconstruction and recognition from single or multiple images (video). This course emphasizes the core vision tasks of scene understanding and recognition. Applications to 3D modelling, video analysis, video surveillance, object recognition and vision-based control will be discussed.

### Course Outcomes:

After learning the course, the students should be able to:

* 1. Understand the basic fundamentals of computer vision and diversity of computer vision applications
  2. Explore the various camera models, multi view geometry, structures and generate 3D model from images
  3. Analyze and apply image preprocessing, continuous and discrete representation methods and feature extraction techniques
  4. Apply regularization theory, optical communication, stereo vision, and motion estimation techniques to detect moving objects in a video
  5. Illustrate different image shape representations and understand Fourier and wavelet descriptors and segmentation methods
  6. Understand various object recognition methods, Hough transforms and illustrate shape matching

## UNIT I

Introduction: Computer Vision and Computer Graphics, what is Computer Vision - Low-level, Mid-level, High-level, Overview of Diverse Computer Vision Applications: Document Image Analysis, Biometrics, Object Recognition, Tracking, Medical Image Analysis, Content-Based Image Retrieval, Video Data Processing, Multimedia.

UNIT II

Image Formation Models: Monocular imaging system, Radiosity: The Physics ‘of Image Formation, Radiance, Irradiance, BRDF, colour etc, Orthographic & Perspective Projection, Camera model and Camera calibration, Binocular imaging systems, Multiple views geometry, Structure determination, shape from shading, Photometric Stereo, Depth from Defocus, Construction of 3D model from images

## UNIT III

Image Processing and Feature Extraction: Image preprocessing, Image representations (continuous and discrete), Edge detection

## UNIT IV:

Motion Estimation: Regularization theory, Optical computation, Stereo Vision, Motion estimation, Structure from motion

## UNIT V:

Shape Representation and Segmentation: Contour based representation, Region based representation, Deformable curves and surfaces, Snakes and active contours, Level set representations, Fourier and wavelet descriptors, Medial representations, Multire solution analysis

## UNIT VI:

Object recognition: Hough transforms and other simple object recognition methods, Shape correspondence and shape matching, Shape priors for recognition

### Text books:

1. Computer Vision - A modern approach, by D. Forsyth and J. Ponce, Prentice Hall Robot Vision, by B. K. P. Horn, McGraw-Hill.
2. Introductory Techniques for 3D Computer Vision, by E. Trucco and A. Verri, Publisher: Prentice Hall.

### Reference Books:

* 1. R. C. Gonzalez, R. E. Woods. Digital Image Processing. Addison Wesley Longman, Inc., 1992.
  2. D. H. Ballard, C. M. Brown. Computer Vision. Prentice-Hall, Englewood Cliffs, 1982.
  3. Richard Zaleski, Computer Vision: Algorithms and Applications (CVAA). Springer, 2010
  4. Image Processing, Analysis, and Machine Vision. Sonka, Hlavac, and Boyle. Thomson.

1. E. R. Davies, Computer & Machine Vision, Fourth Edition, Academic Press, 2012
2. Simon J. D. Prince, Computer Vision: Models, Learning, and Inference, Cambridge University Press, 2012
3. Mark Nixon and Alberto S. Aquado, Feature Extraction & Image
4. Processing for Computer Vision, Third Edition, Academic Press, 2012

**Syllabus for B. Tech III year II Semester**

**B.Tech. (CSE) - Cyber Security**

# **Vulnerability Assessment and Penetration Testing**

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**Code: 9JC03**

**Prerequisite:** Knowledge in information security, Web application

### Course Objectives:

1. Introduce Vulnerability Assessment and Penetration Testing.
2. To be familiar with the Penetration Testing and Tools.
3. To get an exposure to Metasploit: exploitation tool, Linux exploit and Windows exploit.
4. To gain knowledge on Web Application Security Vulnerabilities, Vulnerability analysis and Malware analysis.

**Course Outcomes:**

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

1. Comprehend social engineering attacks
2. Handle the vulnerabilities of a Web application.
3. Perform penetration testing
4. Analyze the malware type and impact.

#### UNIT-I

Introduction Ethics of Ethical Hacking: Why you need to understand your enemy’s tactics, recognizing the Gray are as in security, Vulnerability Assessment and Penetration Testing. Penetration Testing and Tools: Social Engineering Attacks: How a social engineering attack works, conducting a social engineering attack, common attacks used in penetration testing, preparing yourself for face-to-face attacks, defending against social engineering attacks.

#### UNIT-II

Physical Penetration Attacks: Why a physical penetration is important, conducting a physical penetration, Common ways into a building, Defending against physical penetrations. Insider Attacks: Conducting an insider attack, Defending against insider attacks.

#### UNIT-III

Metasploit: The Big Picture, Getting Metasploit, Using the Metasploit Console to Launch Exploits, Exploiting Client-Side Vulnerabilities with Metasploit, Penetration Testing with Metasploit’s Meterpreter, Automating and Scripting Metasploit, Going Further with Metasploit.

#### UNIT-IV

Managing a Penetration Test: planning a penetration test, structuring a penetration test, execution of a penetration test, information sharing during a penetration test, reporting the results of a Penetration Test. Basic Linux Exploits: Stack Operations, Buffer Overflows, Local Buffer Overflow Exploits, Exploit Development Process. Windows Exploits: Compiling and Debugging Windows Programs, Writing Windows Exploits, Understanding Structured Exception Handling (SEH), Understanding Windows Memory Protections (XPSP3, Vista, 7 and Server 2008), Bypassing Windows Memory Protections.

#### UNIT-V

Web Application Security Vulnerabilities: Overview of top web application security vulnerabilities, Injection vulnerabilities, cross-Site scripting vulnerabilities, the rest of the OWASP Top Ten SQL Injection vulnerabilities, Cross-site scripting vulnerabilities. Vulnerability Analysis: Passive Analysis, Source Code Analysis, Binary Analysis.

#### UNIT-VI

Client-Side Browser Exploits: Why client-side vulnerabilities are interesting, Internet explorer security concepts, history of client- side exploits and latest trends, finding new browser-based vulnerabilities heap spray to exploit, protecting yourself from client-side exploit. Malware Analysis: Collecting Malware and Initial Analysis: Malware, Latest Trends in Honeynet Technology, Catching Malware: Setting the Trap, Initial Analysis of Malware.

#### Textbooks

1. GrayHatHacking-TheEthicalHackersHandbook, Allen Harper, StephenSims,Michael Baucom, 3rd Edition, Tata Mc Graw-Hill.
2. The Web Application Hacker’s Handbook-Discovering and Exploiting Security flaws, DafyddSuttard, Marcus pinto, 1st Edition, Wiley Publishing.References
3. Penetration Testing: Hands-on Introduction to Hacking, Georgia Weidman, 1stEdition, No Starch Press.
4. The Pen Tester Blueprint-Starting a Career as an Ethical Hacke, L. Wylie, Kim Crawly, 1st Edition, Wiley Publications.

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# **Ethical Hacking**

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**Code: 9JC04**

**Prerequisite:** Knowledge in information security, Web application

### Course Objectives:

1. Introduce the methodologies and framework of ethical hacking for enhancing the security.
2. The course includes-Impacts of Hacking; Types of Hackers; Information Security Models; Information Security Program; Business Perspective; Planning a Controlled Attack.

### Course Outcomes:

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

1. Gain the knowledge of the use and availability of tools to support an ethical hack.
2. Interpret the results of a controlled attack.
3. Explain the role of inherent and imposed limitations and metrics for planning of a test.
4. Comprehend the dangers associated with penetration testing.

### UNIT- I

Introduction: Hacking Impacts, The Hacker Framework: Planning the test, Sound Operations, Reconnaissance, Enumeration, Vulnerability Analysis, Exploitation, Final Analysis, Deliverable, Integration

Information Security Models: Computer Security, Network Security, Service Security, Application Security, Security Architecture

### UNIT- II

Information Security Program: The Process of Information Security, Component Parts of Information Security Program, Risk Analysis and Ethical Hacking

The Business Perspective: Business Objectives, Security Policy, Previous Test Results, Business Challenges

### UNIT- III

Planning for a Controlled Attack: Inherent Limitations, Imposed Limitations, timing is Everything, Attack Type, Source Point, Required Knowledge, Multi-Phased Attacks, Teaming and Attack Structure, Engagement Planner, The Right Security Consultant, The Tester, Logistics, Intermediates, Law Enforcement

### UNIT- IV

Preparing for a Hack: Technical Preparation, Managing the Engagement

Reconnaissance: Social Engineering, Physical Security, Internet Reconnaissance

### UNIT- V:

Enumeration: Enumeration Techniques, Soft Objective, Looking Around or Attack, Elements of Enumeration, Preparing for the Next Phase

Exploitation: Intuitive Testing, Evasion, Threads and Groups, Operating Systems, Password Crackers, Rootkits, applications, War dialing, Network, Services and Areas of Concern

### UNIT- VI:

Deliverable: The Deliverable, The Document, Overall Structure, Aligning Findings, Presentation Integration: Integrating the Results, Integration Summary, Mitigation, Defense Planning, Incident Management, Security Policy, Conclusion

#### Text books:

1.James S. Tiller, “The Ethical Hack: A Framework for Business Value Penetration Testing”, Auerbach Publications, CRC Press

#### Reference books:

1.EC-Council, “Ethical Hacking and Countermeasures Attack Phases”, Cengage Learning

2. Michael Simpson, Kent Backman, James Corley, “Hands-On Ethical Hacking and Network Defense”, Cengage Learning

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# **Automata Theory and Compiler Design**

**Code:9EC07**

## Course Outcomes:

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

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| 1. Construct finite Automata for a given regular expression, and derive strings with suitable examples. Conceptualize context free grammars and normal forms. |
| 2. Design the push down automata and Turing Machine for complex languages. |
| 3. Understand LEX tool and relate parsing techniques, |
| 4. Demonstrate and solve problems on SLR, CLR, LALR, operator precedence parser, LR (0) grammar and use YACC tool. |
| 5. Understand Semantic Analysis concepts to design compiler: and describe Intermediate code generation such as 3-address code form. |

### UNIT- I

**Introduction:** Strings, Alphabet, Language, Operations, finite automaton model, acceptance of strings and languages, Chomsky hierarchy of languages. Deterministic finite automaton and non- deterministic finite automaton, NFA to DFA conversion, equivalence of DFA ‘s

## **UNIT-II**:

**Regular Languages**, Regular sets, regular expressions, constructing finite Automata for a given regular expression, Conversion of Finite Automata to Regular expressions. Closure properties of regular sets (proofs not required).

**Context Free Grammars:** Context free grammar, derivation trees, right most and leftmost derivation, ambiguity in context free grammars, simplification of Context Free Grammars (removal of [Ɛ](https://zh-min-nan.wikipedia.org/wiki/%C6%90)-productions, UNIT productions and useless symbols). Chomsky normal form (CNF), Greibach normal form (GNF).

## **UNIT-III**:

**Push down automata:** Definition, model, acceptance of CFL, introduction to Deterministic PDA and Non-Deterministic PDA, design of PDA.

**Turing Machine:** Turing Machine, definition, model, design of TM, recursively enumerable languages.

## **UNIT IV**:

Overview of compiler– En**Top Down Parsing:** Top-down parsing technique, Recursive decent parsing with back tracking, Ambiguous grammar, Elimination of left recursion, Left factoring, LL (1) Parser.

## **UNIT V**:

Bottom-up parsing**:** shift reduce parser, LR (0), SLR, CLR, LALR, operator precedence parser, YACC tool.

## **UNIT – VI**

Semantic Analysis: Syntax directed translation, S- Attributed, L Attributed definition, Symbol table format.

Intermediate Code Generation**:** 3-address code form, DAG.

Code Optimization**:** Local Optimization, loop optimization, peep-hole optimization.

## **TEXTBOOKS**:

* 1. Introduction to Automata Theory Languages and Computation. Hopcroft H.E. and Ullman

J. D. Pearson Education

* 1. Introduction to Theory of Computation? Sipser 2nd edition Thomson
  2. Compilers Principles, Techniques and Tools Aho, Ullman, Ravisethi, Pearson Education

## **REFERENCES**:

1. Introduction to Computer Theory, Daniel I.A. Cohen, John Wiley.
2. Introduction to languages and the Theory of Computation, John C Martin, TMH
3. Elements of Theory of Computation? Lewis H.P. &amp; Papadimition C.H. Pearson /PHI.
4. Theory of Computer Science Automata languages and computation -Mishra and Chandrasekaran, 2nd edition, PHI Course Requirements.
5. Modern Compiler Construction in C , Andrew W.Appel Cambridge University Press.
6. Compiler Construction, LOUDEN, Thomson

virements, pass, phase, phases of compiler, LEX tool.

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# **Vulnerability Assessment and Penetration Testing Lab**

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**Code: 9JC65**

**Course Objectives:** This lab session focuses on training the students in

1. Penetration Testing methodologies

2. Monitoring the network traffic and

3. To understand the host and services discovery

Course Outcomes: At the end of this course, the student will be able to

1. Design for monitoring network traffic

2. Perform different penetration testing methods

3. Design different types of vulnerabilities scanning

4. Understand web application assessment

### List of Experiments:

1. Monitoring Network Traffic

2. Host & Services Discovery using Nmap

3. Vulnerability Scanning using OpenVAS

4. Internal Penetration Testing

a. Mapping

b. Scanning

5. Perform the following:

1. Gaining access through CVE’s
2. Sniffing POP3/FTP/Telnet Passwords

6. Perform the following using appropriate tools:

1. ARP Poisoning
2. DNS Poisoning

7. External Penetration Testing

a. Evaluating external Infrastructure

b. Creating topological map & identifying IP address of target

8. Perform the following tasks of penetration testing:

1. Lookup domain registry for IP information
2. Examining use of IPV6 at remote location

9. Different types of vulnerability scanning

10. Vulnerability scanning with Nessus

1. Web application assessment with nekton
2. Perform Web application assessment using Burp suite

### TEXT BOOKS:

1. Gray Hat Hacking-The Ethical Hackers Handbook, Allen Harper, Stephen Sims, Michael

Baucom, 3rd Edition, Tata Mc Graw-Hill.

2. The Web Application Hacker’s Handbook-Discovering and Exploiting Security flaws, Dafydd

Suttard, Marcus’s pinto, 1st Edition, Wiley Publishing.

### REFERENCES:

1. Penetration Testing: Hands-on Introduction to Hacking, Georgia Weidman, 1st Edition, No

Starch Press.

2. The Pen Tester Blueprint-Starting a Career as an Ethical Hacker, L. Wylie, Kim Crawly, 1st

Edition, Wiley Publications.

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### Ethical Hacking and Compiler Design Lab

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**Code: 9JC66**

**Prerequisites:** Theoretical knowledge of Ethical Hacking, Automata and Compiler Design

### Course Objectives:

1. The aim of the course is to introduce the methodologies framework tools of ethical hacking to get awareness in enhancing the security
2. To get knowledge on various attacks and their detection
3. Understand the working of the compilers and is functions.

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

1. Use the available tools to support an ethical hacking procedure.
2. Interpret the results of a controlled attack.
3. Demonstrate Lex and Yacc tools to simulate the grammar types used in the compilers.

### Ethical Hacking Lab- List of Exercises

1. Setup a honey pot and monitor the honey pot on network
2. Write a script or code to demonstrate SQL injection attacks
3. Create a social networking website login page using phishing techniques
4. Write a code to demonstrate DoS attacks
5. Install rootkits and study variety of options
6. Study of Techniques uses for Web Based Password Capturing.
7. Identify System Vulnerabilities with OpenVAS
8. Implement Passive scanning, active scanning, session hijacking, cookies extraction using Burp suite tool

### Compiler Design Programs:

1. Implement the DFA that accepts all the string of a’s and b’s where number of a’s is divisible by 3 and number of b’s is divisible by 2.
2. Design and execute lex program to implement lexical analyzer functionality.
3. Write a program to implement lexical analyzer using c program.
4. Design and execute recursive descent parser for the grammar
   1. E->E+T E->T T->T\*F T->F F->(E)/id,
   2. S->(L) S->a L->L, S L->S
5. Write a YACC program to implement top-down parser for the given grammar.
6. Write a YACC program to evaluate algebraic expression.

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# **Comprehensive Viva Voice**

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**Code: 9F686**

**Course Objectives**

Prepare students in basics and advanced relevant courses to revise and face technical interviews for enhancing employability.

## **Course Outcomes**:

At the end of this course the student will be

1. Assessed the knowledge of the students in the Core and Elective subjects that they have studied till the completion of that academic year.
2. Comprehensive Viva Voce will be conducted in third year second semester for 100 marks.
3. Two Internal Exams (Oral) of 50 marks each will be considered for CIE. There will be no SEE for this course.
4. A student must secure 40% of the total marks to obtain a pass grade.