

HYDERABAD INSTITUTE OF TECHNOLOGY AND MANAGEMENT

B.TECH. HR-21 COURSE STRUCTURE

CSE-CYBER SECURITY

(Applicable for the batch admitted from 2021-22 onwards)

V – Semester (III – Year)

S. No.	Course code	Subject	Hours Per Week			Credits	Scheme of Evaluation		
			L	T	P		Maximum Marks		
							Int.	Ext.	Tot.
1	21PC5CD04	Software Engineering & Testing Methodologies	3	-	-	3	30	70	100
2	21PC5CD02	Data Mining and Data Analytics	3	-	-	3	30	70	100
3	21PC5CC01	Cryptography and Network Security	3	1	-	4	30	70	100
4		Professional Elective-I	3	-	-	3	30	70	100
5		Open Elective-I	3	-	-	3	30	70	100
6	21PC5CD03	Data Mining and Data Analytics Lab	-	-	3	1.5	30	70	100
7	21PC5CC02	Cryptography and Network Security- Lab	-	-	2	1	30	70	100
8	21PR5IN02	Evaluation of Internship-II	-	-	2	1	100	0	100
9	21PC5CD05	Software Engineering & Testing Methodologies-Lab	-	-	3	1.5	30	70	100
TOTAL						21	340	560	900
10	21MC5HS03	Analytical Reasoning	2	-	-	0	100	0	100

VI – Semester (III – Year)

S. No.	Course code	Subject	Hours Per Week			Credits	Scheme of Evaluation		
			L	T	P		Maximum Marks		
							Int.	Ext.	Tot.
1	21PC6CC03	Ethical Hacking	3	1	-	4	30	70	100
2	21PC6CS15	Compiler Design	3	-	-	3	30	70	100
3	21PC6CM03	Machine Learning	3	-	-	3	30	70	100
4		Professional Elective-II	3	-	-	3	30	70	100
5		Open elective-II	3	-	-	3	30	70	100
6	21HS6EG05	Advanced English Communication Skills-Lab	-	-	2	1	30	70	100
7	21PC6CS26	Compiler Design Lab	-	-	3	1.5	30	70	100
8	21PC6CC04	Ethical Hacking -Lab	-	-	3	1.5	30	70	100
9	21PC6CM04	Machine Learning Lab	-	-	3	1.5	30	70	100
10	21PR6CD02	Doing Engineering-2	-	-	-	1.5	30	70	100
TOTAL						23	300	700	1000
11	21MC6HS04	Quantitative Aptitude	2	-	-	0	100	0	100

Professional Elective-I		
1	21PE5CC11	Cyber Security Governance
2	21PE5CO12	Virtual Reality
3	21PE5CS54	Secure Software Engineering
4	21PE5CS22	Mobile Application Development

Professional Elective-II		
1	21PE6CC21	Fault Tolerance System
2	21PE6CD23	Information Retrieval Systems
3	21PE6CD22	Blockchain Technology
4	21PE6CS13	Computer Graphics

Sl.no	SUBJECT CODE	Open Elective-I	Offering Department
1	21OE6CS06	Computer Organization and Architecture	CSE
2	21OE5EC01	Electronics measurement & Instrumentation	ECE
3	21OE5ME01	Hybrid & Electric Vehicles	MECH
4	21OE5EE01	Fundamentals of Electric Circuit Analysis	EEE
5	21OE5HS01	Nanoscience and Technology	H&S
6	21OE5CM01	Introduction to Artificial Intelligence	CSE-AI&ML
7	21OE5CD01	Statistics for Data Science	CSE-DS
8	21OE5CO01	Introduction to IoT	CSE-IOT
9	21OE5CC01	Data Security	CSE-CS

Sl.no	SUBJECT CODE	Open Elective-II	Offering Department
1	21OE5CS09	OOPS using Java	CSE
2	21OE6EC02	Fundamentals of Digital Electronics	ECE

3	21OE6ME02	Total Quality Measurement & Six Sigma Applications	MECH
4	21OE6EE02	Fundamentals of Industrial Electronics	EEE
5	21OE6HS02	Medical Instrumentation	H&S
6	21OE6CM06	Expert Systems	CSE-AI
7	21OE6CD02	Data Mining and Data Analytics	CSE-DS
8	21OE6CO05	Sensors & Devices	CSE-IOT
9	21OE6CC02	Computer Hardware and System Essentials	CSE-CS

Software Engineering & Testing Methodologies

Course Objectives:

- To provide knowledge of the concepts in software testing such as testing process, criteria, strategies, and methodologies.
- To develop skills in software test automation and management using latest tools.

Course Outcomes:

- Ability to translate end-user requirements into system and software requirements, using e.g. UML, and structure the requirements in a Software Requirements Document (SRD).
- Identify and apply appropriate software architectures and patterns to carry out high level design of a system and be able to critically compare alternative choices.
- Will have experience and/or awareness of testing problems and will be able to develop a simple testing report
- Design and develop the best test strategies in accordance to the development model.

UNIT - I

Introduction: Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs. Flow graphs and Path testing: Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

UNIT - II

Transaction Flow Testing: transaction flows, transaction flow testing techniques. Dataflow testing: Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing. Domain Testing: domains and paths, Nice & ugly domains, domain testing, domains and interfaces testing, domain and interface testing, domains and testability.

UNIT - III

Paths, Path products and Regular expressions: path products & path expression, reduction procedure, applications, regular expressions & flow anomaly detection. Logic Based Testing: overview, decision tables, path expressions, kv charts, specifications.

UNIT - IV

State, State Graphs and Transition testing: state graphs, good & bad state graphs, state testing, Testability tips.

UNIT - V

Graph Matrices and Application: Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools. (Student should be given an exposure to a tool like JMeter or Win-runner).

TEXT BOOKS: 1. Software Testing techniques - Baris Beizer, Dreamtech, second edition.
2. Software Testing Tools – Dr. K. V. K. K. Prasad, Dreamtech.

REFERENCE BOOKS:

1. The craft of software testing - Brian Marick, Pearson Education.
2. Software Testing Techniques – SPD(Oreille)
3. Software Testing in the Real World – Edward Kit, Pearson.
4. Effective methods of Software Testing, Perry, John Wiley.
5. Art of Software Testing – Meyers, John Wiley

CO-PO & PSO Mapping:

Course Name - Course Outcomes / Program Outcomes	1	2	3	4	5	6	7	8	9	10	11	12	PSO 1	PSO 2	PSO 3
CO1			H										H		
CO2		H											H		M
CO3			H										H		M
CO4			H										H		

Data Mining and Data Analytics

Course Objective

1. Understand the concepts of Data Mining
2. Familiarize with association rule mining
3. Familiarize various classification algorithms
4. Understand the concepts of Cluster analysis
5. Implement the Data mining concepts with various domains

Course Outcomes:

1. Discuss various Data Mining Principles.
2. Analyze the impact of data analytics for business decisions and strategy.
3. Apply the Association, Clustering rules for mining the data.
4. Design various classification techniques.

Module I

Introduction to Data warehouse, Difference between operational database systems and data warehouses.

Data warehouse Characteristics, Data warehouse Architecture.

Introduction: What is Data Mining, Definition, KDD, Challenges, Data Mining Tasks, Data Preprocessing, Data Cleaning, Missing data, Dimensionality Reduction, Feature Subset Selection, Discretization and Binarization, Data Transformation; Measures of Similarity and Dissimilarity – Basics.

Module II

Data Analytics: Introduction to Analytics, Introduction to Tools and Environment, Application of Modeling in Business, Databases & Types of Data and variables. Data Modeling Techniques, Missing Imputations etc. Need for Business Modeling.

Module III

Regression – Concepts, Blue property assumptions, Least Square Estimation, Variable Rationalization, and Model Building etc.

Logistic Regression: Model Theory, Model fit Statistics, Model Construction, Analytics applications to various Business Domains etc.

Module IV

Association Rule Mining & Classification: Mining Frequent Patterns–Associations and correlations – Mining Methods–Mining Various kinds of Association Rules– Correlation Analysis.

Classification: Classification and Prediction – Basic concepts–Decision tree induction– Bayesian classification, Lazy learner.

CRYPTOGRAPHY AND NETWORK SECURITY

Prerequisite: Knowledge of C Programming

Course Objectives:

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

Course Outcomes:

At the end of this course, the students should be able to:

CO1: Apply a solid foundation in digital security and measures taken to protect device from threats.

CO2: Learning access control mechanism and understand how to protect servers.

CO3: Understand the importance of a network basics and brief introduction on security of network protocols.

CO4: To understand cyber-attacks and learn data privacy issues and preventive measure.

Module 1:

Security Concepts: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks.

Cryptography Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, key range and key size, possible types of attacks.

Module 2:

Symmetric key Ciphers: Algorithms Types, Algorithm Modes, Data Encryption Standards, International Data Encryption Algorithm (IDEA), RC4, RC5, Blowfish,

Case Study: Secure Multiparty Calculation.

Module 3:

Asymmetric key Ciphers - I: Principles of public key cryptosystems, RSA algorithm, Elgamal Cryptography, Comparison of symmetric and symmetric Key Cryptography.

Asymmetric key Ciphers - II: Digital signatures, Elgamal Digital Signature Scheme, Attacks on Digital Signature, Knapsack Algorithm , Problems with Public key Exchange.

Module 4:

Public – Key Infrastructure : Digital Certificates, private - Key management, The PKIX Model, Public Key Cryptography Standards(PKCS) , XML, PKI and security.

Module 5:

User Authentication Mechanism: Authentication Basics, Passwords, Authentication Tokens, Certificate Based Authentication, Biometric Authentication, Kerberos, Key Distribution Centre.

Network Security: Firewalls, IP Security, Virtual Private Network, Intrusion, IP Spoofing Attacks.

Text Books:

1. Padmanabhan T R, Shyamala C and Harini N, “Cryptography and Security”, Wiley Publications 2011.
2. Josef Pieprzyk, Thomas Hardjono and Jenifer Seberry, “Fundamentals of Computer Security”, Springer 2010.

Resources:

1. Douglas R Stinson, “Cryptography:Theory and Practice”, CRC Press 2005.
2. Alfred J Menezes, Paul C Van Oorshot and Scott A. Vanstone, “Handbook of Applied Cryptography”, CRC press 1996.

CO-PO/PSO Mapping:

CO-PO	1	2	3	4	5	6	7	8	9	10	11	12	PSO 1	PSO2	PSO3
CO-1			2				3								
CO-2		2	2	2											
CO-3			2	3	2	2									
CO-4			3	3	3	3	3	3							

Data mining and Data Analytics-lab

Course Objective

- To obtain practical experience using data mining techniques on real world data sets.
- Emphasize hands-on experience working with all real data sets.

Course Outcomes:

- 1: Build a data warehouse and query it using open-source tools.
- 2: Evaluate various data mining tasks using a data mining toolkit (such as weka) and visualize the results.
- 3: Determine the working of algorithms for data mining tasks such as association rule mining, classification, and clustering.
- 4: Implement classical models and algorithms in data mining

List of Programs:

Credit Risk Assessment

Description:

The business of banks is making loans. Assessing the credit worthiness of an applicant is of crucial importance. You have to develop a system to help a loan officer decide whether the credit of a customer is good, or bad. A bank's business rules regarding loans must consider two opposing factors. On the one hand, a bank wants to make as many loans as possible. Interest on these loans is the bank's profit source. On the other hand, a bank cannot afford to make too many bad loans. Too many bad loans could lead to the collapse of the bank. The bank's loan policy must involve a compromise: not too strict, and not too lenient. To do the assignment, you first and foremost need some knowledge about the world of credit. You can acquire such knowledge in a number of ways.

- i. Knowledge Engineering. Find a loan officer who is willing to talk. Interview her and try to represent her knowledge in the form of production rules.
- ii. Find some training manuals for loan officers or perhaps a suitable textbook on finance. Translate this knowledge from text form to production rule form.
- iii. Common sense. Imagine yourself as a loan officer and make up reasonable rules which can be used to judge the credit worthiness of a loan applicant.
- iv. Case histories. Find records of actual cases where competent loan officers correctly judged when, and when not to, approve a loan application.

The German Credit Data:

Actual historical credit data is not always easy to come by because of confidentiality rules. Here is one such dataset, consisting of 1000 actual cases collected in Germany. credit dataset (original) Excel spreadsheet version of the German credit data.

In spite of the fact that the data is German, you should probably make use of it for this assignment. (Unless you really can consult a real loan officer!)

A few notes on the German dataset

- DM stands for Deutsche Mark, the unit of currency, worth about 90 cents Canadian (but looks and acts like a quarter).
- owns telephone. German phone rates are much higher than in Canada so fewer people own telephones.
- foreign worker. There are millions of these in Germany (many from Turkey). It is very hard to get German citizenship if you were not born of German parents.
- There are 20 attributes used in judging a loan applicant. The goal is to classify the applicant into one of two categories, good or bad.

Subtasks: (Turn in your answers to the following tasks)

1. List all the categorical (or nominal) attributes and the real-valued attributes separately.
2. What attributes do you think might be crucial in making the credit assessment? Come up with some simple rules in plain English using your selected attributes.
3. One type of model that you can create is a Decision Tree - train a Decision Tree using the complete dataset as the training data. Report the model obtained after training.
4. Suppose you use your above model trained on the complete dataset, and classify credit good/bad for each of the examples in the dataset. What % of examples can you classify correctly? (This is also called testing on the training set) Why do you think you cannot get 100 % training accuracy?
5. Is testing on the training set as you did above a good idea? Why or Why not ?
6. One approach for solving the problem encountered in the previous question is using cross-validation? Describe what is cross-validation briefly. Train a Decision Tree again using cross-validation and report your results. Does your accuracy increase/decrease? Why?
7. Check to see if the data shows a bias against “foreign workers” (attribute 20), or “personal-status” (attribute 9). One way to do this (perhaps rather simple minded) is to remove these attributes from the dataset and see if the decision tree created in those cases is significantly different from the full dataset case which you have already done. To remove an attribute you can use the preprocess tab in Weka’s GUI Explorer. Did removing these attributes have any significant effect? Discuss.
8. Another question might be, do you really need to input so many attributes to get good results? Maybe only a few would do. For example, you could try just having attributes 2, 3, 5, 7, 10, 17 (and 21, the class attribute (naturally)). Try out some combinations. (You had removed two attributes in problem 7. Remember to reload the arff data file to get all the attributes initially before you start selecting the ones you want.)
9. Sometimes, the cost of rejecting an applicant who actually has a good credit (case 1) might be higher than accepting an applicant who has bad credit (case 2). Instead of counting the misclassifications equally in both cases, give a higher cost to the first case (say cost 5) and lower cost to the second case. You can do this by using a cost matrix in Weka. Train your Decision Tree again and report the Decision Tree and cross-validation results. Are they significantly different from results obtained in

B.Tech III Year – V Sem
Subject Code: 21PC5CC02

L	T	P	C
0	0	2	1

CRYPTOGRAPHY AND NETWORK SECURITY LAB

Course Objective:

- Learn to implement the algorithms DES, RSA,MD5,SHA-1
- Learn to use network security tools like GnuPG, KF sensor, Net Strumbler

Course Outcomes:

At the end of this course, the students should be able to:

CO1: Implement the cipher techniques

CO2: Develop the various security algorithms

CO3: Use different open source tools for network security and analysis

List of Programs

1. Implement the following SUBSTITUTION & TRANSPOSITION TECHNIQUES concepts:

a) Caesar Cipher

b) Playfair Cipher

2. Implement the following SUBSTITUTION & TRANSPOSITION TECHNIQUES concepts:

a) Hill Cipher

b) Vigenere Cipher

3. Implement the following SUBSTITUTION & TRANSPOSITION TECHNIQUES concepts:

a) Rail fence – row & Column Transformation

4. Implement the following algorithms

a) DES

b) RSA Algorithm

5. Implement the following algorithms

a) Diffie-Hellman

b) MD5

c) SHA-1

6. Implement the Signature Scheme - Digital Signature Standard

7. Demonstrate how to provide secure data storage, secure data transmission and for creating digital signatures (GnuPG).

8. Setup a honey pot and monitor the honeypot on network (KF Sensor).

9. Write a C program that contains a string (char pointer) with a value $\frac{1}{2}$ Hello world $\frac{1}{2}$. The program should XOR each character in this string with 0 and displays the result.

10. Write a C program that contains a string (char pointer) with a value $\frac{1}{2}$ Hello world $\frac{1}{2}$. The program should AND or and XOR each character in this string with 127 and display the result.

11. Write a C program to implement Affine Cipher with equation $c=3x+12$.

12. Write a C program to implement Advanced Euclidean Algorithm.

Text Books:

1. Padmanabhan T R, Shyamala C and Harini N, "Cryptography and Security", Wiley Publications 2011.
2. Josef Pieprzyk, Thomas Hardjono and Jenifer Seberry, "Fundamentals of Computer Security", Springer 2010.

Resources:

1. Douglas R Stinson, "Cryptography: Theory and Practice", CRC Press 2005.
2. Alfred J Menezes, Paul C Van Oorshot and Scott A. Vanstone, "Handbook of Applied Cryptography", CRC press 1996.

CO-PO/PSO Mapping:

B.Tech
Subject Code: 21PC5CD05

L	T	P	C
0	0	3	1.5

Software Engineering & Testing Methodologies -LAB

Course Objectives:

- To have hands on experience in developing a software project by using various software engineering principles and methods in each of the phases of software development.

Course Outcomes:

1. Ability to translate end-user requirements into system and software requirements
2. Ability to generate a high-level design of the system from the software requirements
3. Will have experience and/or awareness of testing problems and will be able to develop a simple testing report
4. Design and develop the best test strategies in accordance to the development model.

List of Experiments

1. Development of problem statement.
2. Preparation of Software Requirement Specification Document, Design Documents and Testing Phase related documents.
3. Preparation of Software Configuration Management and Risk Management related documents.
4. Study and usage of any Design phase CASE tool
5. Develop test cases for unit testing and integration testing
6. Develop test cases for various white box and black box testing techniques.
7. Write a c program to demonstrate the working of the following constructs:
 - i) do...while
 - ii) while...do
 - iii) if ...else
 - iv)switch
 - v) for Loops in C language
8. Recording in context sensitive mode and analog mode

B.Tech III Year I Sem
Subject Code: 21MC5HS03

L	T	P	C
1	0	0	0

Analytical Reasoning

Pre-requisite: Nil

Course Objectives:

1. Improve logical thinking to solve various questions and puzzles in Reasoning.
2. To help the student understand the importance of having his language skills kept ready for effective use
3. To understand the concept of employability skills
4. To enrich their problem solving, critical and analytical skills

Course Outcomes:

1. Improve logical thinking to solve various questions and puzzles in Reasoning.
2. To help the student understand the importance of having his language skills kept ready for effective use
3. To understand the concept of employability skills
4. To enrich their problem solving, critical and analytical skills

Module I:

Coding and Decoding: Coding and Decoding, Arrow Method, Chinese coding, Series, Analogy, Odd man out

Articles and Tenses: Introduction, usage of articles, Omission of Articles, Types of tenses, Forms and Usage of tenses.

Module II:

Direction Sense: Introduction, Distance method, Facing Method and Shadow Method.

Blood Relations: Introduction, Direct, Puzzle and Coded models.

Module III:

Voices and Forms of Speech: Introduction, conversion of active and passive voice, conversions of direct and indirect speech.

Module IV:

Data Arrangements: Linear Arrangement, Circular Arrangement, Multiple Arrangements.

Syllogisms: Introduction, Tick-Cross method, Inferential Technique, Venn-Diagram method.

Module V:

Visual Reasoning: Patterns, Folded Images, Cubes and Analytical Reasoning.

Sentence Correction: Subject-Verb Agreement, Pronoun Antecedent, Parallelism, Verb-Time Sequence Error, Determiners and Modifiers.

Text Books:

1. Quick Learning Objective General English, R.S. Aggarwal, Vikas Aggarwal, 2nd edition, S.Chand, 2003.
2. A Modern Approach to Logical Reasoning, R.S. Aggarwal, Revised Edition, 2nd edition, S Chand & Co Ltd, 2018.

Reference Books:

1. Test of Reasoning for all competitive examinations, Edgar Thorpe, 6th Edition, McGraw Hill Education, 2017.
2. How to Prepare for Logical Reasoning for CAT and other Management Examinations, Arun Sharma, 4th edition, McGraw Hill Education, 2017.
3. English Grammar and Verbal Reasoning – The Toolkit for Success, SimboNuga, Trafford Publishing, 2013

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – High; 2 – Medium; 1 - Low														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes*	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1						1					2	3		
CO2						1					2	3		
CO3						1					2	3		
CO4						1					2	3		

B.Tech III Year V Semester
Subject Code: 21PE5CC11

L	T	P	C
3	0	0	3

CYBER SECURITY GOVERNANCE

Course Objectives:

- Knowledge and understanding of the different theories on cyber-governance, the implications of cyberspace.
- Understanding the internet for traditional notions such as sovereignty, power, war and conflict, terrorism and crime.
- Understanding the historical developments in cyber governance and how key events have led to the current state of affairs.

Course Outcomes:

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

CO1: Label the fundamental concepts and principles of the cyber Security Governance and theories of governance.

CO2: Demonstrate the metrics of Cyber Security Governance.

CO3: Explain the principal driving force for Cyber security governance is risk management, which involves mitigating risks and reducing or preventing potential impact on information resources.

CO4: Model the enterprise needs metric against which to judge Cyber security policy to ensure that organizational objectives are achieved.

Module 1:

Cyber security Governance-Principles of cyber security governance, Assessment of cyber security maturity. Theories of governance: introduction, Governance – definitions and typologies, Tools, methods and processes.

Module 2:

Network Device metrics-Vulnerability management, Threat management, Endpoint management, Intrusion detection and prevention (IDPS), Security incident management, Security operations center (SOC) and related concepts.

Module 3:

Measurement of Governance-Metrics – concepts, Application security metrics, Network security metrics, Security incident metrics, Vulnerability metrics, Service level objectives / agreement (SLO / SLA), NIST metrics.

B. Tech III Year–V Sem
Subject Code: 21PC5CO12

L	T	P	C
3	0	0	3

VIRTUAL REALITY

Pre requisite: Basic Mathematics, Computer knowledge

Course Objectives:

1. Introducing the concepts of Computer Graphics, VR systems and Virtual Environment.
2. Introducing the concepts of Augmented Reality.
3. Applying Augmented and Virtual Reality for various applications.

Course Outcomes: Upon completion of the course, the student should be able to

1. Comprehend the basics of computer graphics, modelling and Geometric Transformations.
2. Comprehend Virtual Environment, VR systems and VR Hardware.
3. Develop a Prototype, a Product for automotive/ any applications.
4. Apply augmented and virtual reality to solve challenging problems.

MODULE I

Virtual Reality and Virtual Environment: Introduction, Computer graphics, Real time computer graphics, Virtual environment requirement, benefits of virtual reality, Historical development of VR, Scientific Landmark.

3D Computer Graphics: Introduction, The Virtual world space, positioning the virtual observer, the perspective projection, human vision, stereo perspective projection, 3D clipping, Colour theory, Simple 3D modelling, Illumination models, Reflection models, Shading algorithms, Radiosity, Hidden Surface Removal, Realism -Stereographic image.

MODULE II

Geometric Modelling: Introduction, From 2D to 3D, 3D space curves, 3D boundary representation Geometrical Transformations: Introduction, Frames of reference, Modelling transformations, Instances, Picking, Flying, Scaling the VE, Collision detection.

Generic VR system: Introduction, Virtual environment, Computer environment, VR technology, Model of interaction, VR Systems.

VR Hardware: Introduction, sensor hardware, Head-coupled displays, Acoustic hardware, Integrated VR systems.

MODULE III:

Animating the Virtual Environment: Introduction, The dynamics of numbers, Linear and Non-linear interpolation, the animation of objects, linear and non-linear translation, shape & object inbetweening, free from deformation, particle system.

Physical Simulation: Introduction, Objects falling in a gravitational field, Rotating wheels, Elastic collisions, projectiles, simple pendulum, springs, Flight dynamics of an aircraft.

B.Tech IVYear –VIII Sem
Subject Code: 21PE8CS54

L	T	P	C
3	0	0	3

SECURE SOFTWARE ENGINEERING
(Professional Elective –V)

Pre-Requisite(s): Nil

Course Objectives:

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

Course Outcomes:

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

- CO1: Develop secure software engineering problems and secure system models depending on user Requirements.
- CO2: Analyze and specify security requirements through SRS
- CO3: Design and Plan software solutions to security problems using various paradigms
- CO4: Apply testing strategies for Secure software applications compliance.

Module 1:

Process Models–Waterfall, incremental, evolutionary, concurrent, Agile Programming-Introduction, Flavors of Agile Development, Limitations of the Agile Process, Agile Modeling with XP, Scrum Methodology.

Module 2:

Software assurance and software security, threats to software security, sources of software insecurity, benefits of detecting software security, managing secure software development

Defining properties of secure software, how to influence the security properties of software, how to assert and specify desired security properties

B.Tech III year- VI sem
Subject Code: 21PE6CS22

L	T	P	C
3	0	0	3

Mobile Application Development

Course Objective

1. Facilitate students to understand android SDK
2. Help students to gain a basic understanding of Android application development
3. Inculcate working knowledge of Android Studio development tool

Course Outcomes

At the end of the course student will be able to

1. Identify various concepts of mobile programming that make it unique from programming for other platforms
2. Evaluate mobile applications on their design pros and cons.
3. Develop mobile applications for the Android operating system that use basic and advanced phone features.
4. Demonstrate the deployment of applications to the Android marketplace for distribution.

Module-I

Introduction to Android: The Android Platform, Android SDK, Eclipse Installation, Android Installation, Building you First Android application, Understanding Anatomy of Android Application, Android Manifest file.

Module -II

Android Application Design Essentials: Anatomy of an Android applications, Android terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents, Android Manifest File and its common settings, Using Intent Filter, Permissions

Module -III

Android User Interface Design Essentials: User Interface Screen elements, Designing User Interfaces with Layouts, Drawing and Working with Animation.

Module -IV

Testing Android applications, Publishing Android application, Using Android preferences, Managing Application resources in a hierarchy, working with different types of resources.

Module V

Using Common Android APIs: Using Android Data and Storage APIs, Managing data using Sqlite, Sharing Data between Applications with Content Providers, Using Android Networking APIs, Using Android Web APIs, Using Android Telephony APIs, Deploying Android Application to the World.

B. Tech III Year–V Sem
Subject Code: 21OE5CS06

L	T	P	C
3	0	0	3

Computer Organization and Architecture

Pre-requisite: NIL

Course Objective:

1. The purpose of the course is to introduce principles of computer organization and the basic architectural concepts
2. Understand the representation fixed-point and floating-point numbers in computer and develop hardware algorithms using them for fixed-point and floating-point arithmetic.
3. The course would display understanding of instruction set of RISC processor and develop understanding of how memory is organized and managed in a modern digital computer, including cache, virtual and physical memory.
4. It discusses input-output units and how they communicate with the processor, and how their performance is computed.

Course Outcomes:

1. Understand the theory and architecture of Digital computer system
2. Define different number systems, compliments, combinational circuits and Sequential circuits
3. Explain and use fixed point addition, subtraction, multiplication (Booth's) and division (Restoring and non-restoring) algorithms
4. Explain the concept of Computer I/O Organization, Memory, RISC, CISC Characteristics

Module I:

Digital Computers: Introduction to digital computers, need of Computer Organization and Computer Architecture, Basic of Computer Architecture and Organisation, Von Neumann Computers

Data Representation: Data Types, (r-1)'s Compliment, r's compliment, Fixed point Representation, conversion of Fractions, Floating point representation, Gray code, Error detection code

Module II:

Digital Logic Circuits -I: Logic gates, Boolean Algebra, Map simplification, Combinational circuits-Half Adder and Full Adder, Decoders and Multiplexers

Digital Logic Circuits -II: Flip-Flops- SR, JK, D, T and Edge triggered, Excitation Tables, Registers, Shift Registers, Binary Counters

Module III:

Computer Arithmetic -I: Addition and subtraction, multiplication Algorithms, Division Algorithms

B. Tech III Year – V Sem	L	T	P	C
Subject Code: 21OE5EC01	3	0	0	3

ELECTRONIC MEASUREMENTS & INSTRUMENTATION

(OPEN ELECTIVE)

Prerequisite: Basic Electrical and Electronics

Course Objectives: This course will enable students to:

1. Learn and understand functioning of various measuring system and metrics for performance analysis.
2. Acquire knowledge of principle of operation, working of different electronic instruments viz. signal generators, signal analyzers, recorders and measuring equipment.
3. To Compare various measuring bridges and their balancing conditions.
4. Learn and understand the use of various measuring techniques for measurement of different physical parameters using different classes of transducers.

Course Outcomes: Upon completion of the course, the student should be able to

1. Explain the instrument and measurements of the parameters
2. Describe signal generators and analyzers
3. Categorize oscilloscopes for different applications
4. Apply the transducers for measurement of different parameters

MODULE I : Performance characteristics of instruments

Static characteristics: Accuracy, Resolution, Precision, Expected value, Error, Sensitivity.

Dynamic Characteristics: Speed of response, Fidelity, Lag and Dynamic error.

Types of errors in measurements and their analysis. Design of multi-range AC , DC meters (voltmeter & ammeter) and ohmmeter(series & shunt type) using D'Arsonval movement. True rms meter.

MODULE II

Bridge circuits : Wheat stone bridge, measurement of very low resistance, Measurement of inductance- Maxwell's bridge, Anderson bridge. Measurement of capacitance-Schering Bridge. Wien Bridge, Errors and precautions in using bridges.

Q-meter: principle of operation, measurement methods and sources of errors.

Counters : principle of operation -modes of operation- totalizing mode, frequency mode and time period mode- sources of errors.

MODULE III

Specifications and designing aspects of Signal Generators: AF sine and square wave signal generators, Function Generators, Random noise generators, arbitrary waveform generators.

Wave Analyzers: Harmonic Distortion Analyzers, Spectrum Analyzers, Digital Fourier Analyzers.

MODULE IV:

General purpose CROs: Block diagram, functions and implementation of various blocks, specifications, various controls and their functions, types of probes used in CROs. Measurement of frequency and phase difference using Lissajous patterns.

Special purpose CROs: sampling oscilloscope, analog storage oscilloscope, digital storage oscilloscope.

MODULE V:

Transducers: Transducers, Active & Passive transducers: Resistance, Capacitance, inductance; Strain gauges, LVDT, Piezo Electric transducers.

Measurement of physical parameters: Temperature, force, pressure, velocity, acceleration and displacement.

Textbooks :

1. Electronic instrumentation, second edition - H.S. Kalsi, Tata McGrawHill,2004.
2. Modern Electronic Instrumentation and Measurement Techniques – A.D. Helfrickand W.D. Cooper, PHI, 5th Edition, 2002.
3. Electronic Measurements And Instrumentation- A.K. Sawhney, Dhanpat Rai&CO(P) Limited, Jan2015.

Reference books:

1. Electronic Instrumentation & Measurements - David A. Bell, PHI, 3rd Edition,2013.
2. Electrical and Electronic Measurement and Instrumentation A.K. Sawhney. Dhanpat Rai & Co, 12thEdition,2002.

CO-PO & PSO Mapping:

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – High; 2 – Medium; 1 - Low														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes*	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	2	-	-	-	-	-	-	-	-	-	1	2	-
CO2	2	2	-	-	-	-	-	-	-	-	-	-	2	-
CO3	2	2	-	-	-	-	-	-	-	-	-	-	2	-
CO4	2	2	-	-	-	-	-	-	-	-	-	1	2	-

B. Tech III Year–V Sem	L	T	P	C
Subject Code: 21OE5ME01	3	0	0	3

Hybrid & Electric Vehicles

Pre-requisites: IC engines, automobile engineering, basic electrical electronics engineering

Objectives: To understand the fundamental concepts, and principles, of hybrid and electric vehicles.

To know the various aspects of hybrid and electric drive trains such as their configuration,

Students should understand various automotive systems and the basics of the drive train in automobiles.

Module I

Introduction: Layout of the automobile–introduction chassis and body components. Types of Automobile engines–Power unit -working of two stroke and four stroke engine–Introduction to engine lubrication–engine servicing

Fuel System: Fuel supply systems working in IC engines,–fuel injection an its types.

Cooling System: Cooling Requirements, Air Cooling, Forced Circulation System–Radiators–Types–Cooling Fan-water pump, thermostat, evaporative cooling-antifreeze solutions.

Module II

Ignition System: Function of an ignition system, battery ignition system, constructional features of storage, battery, auto transformer, contact breaker points, condenser, and spark plug.

Electrical System: Charging circuit, generator, current – voltage regulator – starting system, Bendix drive mechanism solenoid switch, lighting systems, Horn, wiper, fuel gauge–oil pressure gauge, engine temperature indicator etc.

Transmission System: -components and working principle. The layout of the power transmission system in a conventional and hybrid vehicle (fuel vs electrical)-introduction of components

Suspension System: Objects of suspension systems –, Dependent and Independent suspension system, air suspension system. Vehicle stability assist supplemental restraint system (SRS).

Module III

Braking System: Hydraulic brake system, Master cylinder, wheel cylinder tandem master cylinder Requirement of brake fluid, Pneumatic..

Steering System: Steering geometry – Ackerman Steering Mechanism, Davis Steering Mechanism ,Hydraulic and electric power steering-working principle ,construction and working.

Introduction To Hybrid Vehicles:

History of hybrid and electric vehicles, social and The environmental importance of hybrid and electric vehicles, the impact of modern drive-trains on energy supplies.

Module IV

Hybrid Electric Drive-Trains: Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis.

Electric Trains: Electric Drive-trains: Basic concept of electric traction, introduction to various electric drive train topologies, power flow control in electric drive-train topologies, fuel efficiency analysis.

Module V

Energy Storage: Energy Storage: Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery based energy storage and its analysis, Fuel Cell based energy storage and its analysis, Super Capacitor based energy storage and its analysis, Flywheel based energy storage and its analysis, Hybridization of different energy storage devices.

Energy Management Strategies: Energy Management Strategies: Introduction to energy management strategies used in hybrid and electric vehicles, classification of different energy management strategies,

TEXTBOOKS:

1. Automobile Engineering/WilliamHCrouse.
2. A Text Book Automobile Engineering–Manzoor, Nawazish Mehdi & Yosuf Ali, Frontline Publications.
3. T. Denton, Electric and Hybrid Vehicles, Routledge, 2016

Reference Books:

B.Tech III Year – V Sem**L T P C****Subject Code: 21OE5EE01****3 0 0 3****FUNDAMENTALS OF ELECTRICAL CIRCUIT ANALYSIS****Pre-requisite: Basic Mathematics & Physics****Course Objectives:**

- 1) To introduce the concepts of electrical circuits and their components
- 2) To Analyze electrical circuits with the help of network theorems
- 3) To understand DC circuits and single-phase AC circuits
- 4) To analyse the magnetic circuits

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

1. CO1 – To understand the electrical circuits with DC excitation.
2. CO2 – To analyze electrical circuits with the help of network theorems
3. CO3 – To analyze electrical circuits with AC excitation
4. CO4 – To analyse the magnetic circuits.

Module I: D.C. Circuits

Introduction to Electrical Circuits: Current, Voltage, Power, Energy, Ohm's law, types of elements, Kirchoff laws, types of sources, resistive networks, inductive networks, capacitive networks, series, parallel circuits, analysis of simple circuits with dc excitation.

Network Analysis: Mesh and Nodal analysis, Voltage and current divide rule, source transformation technique, and star-delta and delta star transformation, simple problems.

Module II: Network Theorems

Network Theorems -I: Superposition, reciprocity, Thevenin's, Norton's theorems for DC excitations, numerical problems.

Network Theorems -II: Tellegen's, Maximum power transfer, Milliman's for DC excitations, numerical problems.

Module III: A.C. Circuits

Single Phase AC Circuits: Representation of sinusoidal waveforms, Average and RMS values, peak factor, and Formfactor. Real power, Reactive power, Apparent power, power factor, Numerical problems.

RLC Analysis: Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, and RLC combinations for both series and parallel, Numerical problems.

Module IV: Magnetic Circuits

Absolute and Relative Permeability of a Medium, Laws of Magnetic Force, Flux Density (B), Faraday's laws of electromagnetic induction – concept of self and mutual inductance – dot convention

Coefficient of coupling – composite magnetic circuit - Analysis of series and parallel magnetic circuit, Simple Problems.

Module V: Network Topologies

Network Topology-I

Basic definitions of graph theory, Incidence Matrices, Branch path incidence matrices, and numerical problems.

Network Topology-II

Cut set matrices, Relation between branch currents I_b and loop currents I_l , Tie set matrices, the relation between branch voltages and node voltages. Duality concept and numerical problems.

TEXTBOOKS:

1. A Chakrabarty, "Electric Circuits", Dhanipat Rai & Sons, 6th Edition, 2010. L.S. Bobrow, Fundamentals of Electrical Engineering", Oxford University Press, 2011
2. M E Van Valkenberg, "Network Analysis", PHI, 3rd Edition, 2014.

REFERENCE BOOKS:

1. A Sudhakar, Shyammohan S Palli, "Circuits and Networks", Tata McGraw-Hill, 4th Edition, 2010.
2. David A Bell, "Electric circuits", Oxford University Press, 7th Edition, 2009.
3. Electrical Engineering Fundamentals, Vincent Deltoro, Second Edition, Prentice-Hall India, 1989

Web Resources:

1. <https://nptel.ac.in/courses/108/104/108104139/>

B.Tech III Year – V Sem
Subject Code: 21OE5CM01

L	T	P	C
3	0	0	3

INTRODUCTION TO ARTIFICIAL INTELLIGENCE

Course Objectives

1. To provide a strong foundation of fundamental concepts in artificial intelligence.
2. To provide a basic exposition to the goals and methods of Artificial intelligence
3. To provide the exposition to uncertainty management, decision making and learning methods.
4. To provide different knowledge representation, reasoning, and learning techniques.

Course Outcomes

1. Discuss basic concepts of Artificial Intelligence, AI principles, AI Task domains and application.
2. Apply searching techniques, constraint satisfaction problem and game playing techniques which involve perception, reasoning and learning.
3. Explain working of uncertainty management, decision making and learning methods.
4. Apply different knowledge representation, reasoning, and learning techniques to real world problems.

MODULE-I

Introduction: Artificial Intelligence, AI Problems, AI Techniques, the Level of the Model, Criteria for Success. Problem Space and Search, Defining the Problem as a State Space Search, Problem Characteristics; Tic-Tac-Toe Problem, Production Systems.

Basic Search Techniques: Solving Problems by searching; Issues in The Design of Search Programs; Uniform search strategies; Breadth first search, depth first search, depth limited search, bidirectional search, Best First search, comparing search strategies in terms of complexity.

MODULE-II

Special Search Techniques: Heuristic Search, greedy best first search, A* search Problem Reduction, AO*Algorithm; Hill climbing search, Simulated Annealing search; Genetic Algorithm; Constraint Satisfaction Problems; Adversarial search, Games, Optimal decisions and strategies in games, Minimax search, Alpha, beta pruning.

Knowledge Representation: Procedural Vs Declarative Knowledge, Representations & Approaches to Knowledge Representation, Forward Vs Backward Reasoning, Matching Techniques, Partial Matching, Fuzzy Matching Algorithms and RETE Matching Algorithms.

MODULE-III

Symbolic Logic: Propositional Logic, First Order Predicate Logic: Representing Instance and is-a Relationships, Computable Functions and Predicates, Syntax & Semantics of FOPL, Normal Forms, Unification & Resolution, Representation Using Rules, Natural Deduction.

Structured Representations of Knowledge: Semantic Nets, Partitioned Semantic Nets, Frames, Conceptual Dependency, Conceptual Graphs, Scripts, CYC.

MODULE-IV

Reasoning under Uncertainty: Introduction to Non-Monotonic Reasoning, Truth Maintenance Systems, Logics for Non-Monotonic Reasoning, Model and Temporal Logics.

Statistical Reasoning: Bayes Theorem, Certainty Factors and Rule-Based Systems, Bayesian Probabilistic Inference, Bayesian Networks, Dempster-Shafer Theory.

Fuzzy Logic: Crisp Sets, Fuzzy Sets, Fuzzy Logic Control, Fuzzy Inferences & Fuzzy Systems.

MODULE-IV

Experts Systems: Overview of an Expert System, Structure of an Expert Systems, Different Types of Expert Systems- Rule Based, Model Based, Case Based and Hybrid Expert Systems, Knowledge Acquisition and Validation Techniques, Black Board Architecture, Knowledge Building System Tools, Expert System Shells, Fuzzy Expert systems.

Learning: Types of learning, general learning model, Learning by induction; generalization, specialization, example of inductive learner.

Text Book:

1. Artificial Intelligence, George F Luger, Pearson Education Publications
2. Artificial Intelligence, Elaine Rich and Knight, Mcgraw-Hill Publications

References:

1. Introduction To Artificial Intelligence & Expert Systems, Patterson, PHI
2. Multi Agent systems- a modern approach to Distributed Artificial intelligence, Weiss. G, MIT Press.
3. Artificial Intelligence: A modern Approach, Russell and Norvig, Printice Hall

CO-PO/PSO Mapping Chart															
(3/2/1 indicates strength of correlation) 3 – High; 2 – Medium; 1 – Low															
CO/PO	1	2	3	4	5	6	7	8	9	10	11	12	PSO 1	PSO2	PSO3
CO-1		3										2	2		
CO-2	3												2		
CO-3		3										2	2		
CO-4	3											2	2		

Statistics for Data Science

Course Objective

1. The Number Theory basic concepts useful for cryptography etc
2. The theory of Probability, and probability distributions of single and multiple random variables
3. The sampling theory and testing of hypothesis and making inferences
4. Stochastic process and Markov chains.

Course Outcomes:

1. Apply the number theory concepts to cryptography domain
2. Apply the concepts of probability and distributions to some case studies
3. Correlate the material of one unit to the material in other units
4. Resolve the potential misconceptions and hazards in each topic of study.

Module I

Greatest Common Divisors and Prime Factorization: Greatest common divisors, The Euclidean algorithm, The fundamental theorem of arithmetic, Factorization of integers and the Fermat numbers

Congruences: Introduction to congruences, Linear congruences, The Chinese remainder theorem, Systems of linear congruences

Module II

Simple Linear Regression and Correlation: Introduction to Linear Regression, The Simple Linear Regression Model, Least Squares and the Fitted Model, Properties of the Least Squares Estimators, Inferences Concerning the Regression Coefficients, Prediction, Simple Linear Regression Case Study

Random Variables and Probability Distributions: Concept of a Random Variable, Discrete Probability Distributions, Continuous Probability Distributions, Statistical Independence. Discrete probability

Distributions: Binomial Distribution, Poisson distribution.

Module III

Continuous Probability Distributions: Normal Distribution, Areas under the Normal Curve, Applications of the Normal Distribution, Normal Approximation to the Binomial, Fundamental Sampling

Distributions: Random Sampling, Sampling Distributions, Sampling, Distribution of Means and the Central Limit Theorem, Sampling Distribution of S^2 , t-Distribution, F Distribution.

Module IV

Estimation & Tests of Hypotheses: Introduction, Statistical Inference, Classical Methods of Estimation. Estimating the Mean, Standard Error of a Point Estimate, Prediction Intervals, Tolerance Limits, Estimating the Variance, Estimating a Proportion for single mean, Difference between Two Means, between Two Proportions for Two Samples and Maximum Likelihood Estimation.

B. Tech III Year – V Sem
Subject Code: 21OE5CO01

L	T	P	C
3	0	0	3

FUNDAMENTALS OF IOT

PREREQUISITE: Basics of computers

COURSE OBJECTIVE:

1. The Internet is evolving to connect people to physical things and also physical things to other physical things all in real time.
2. The course enables student to understand the basics of Internet of things and protocols.
3. Introduces some of the application areas where Internet of Things can be applied.
4. Students will learn about the middleware for Internet of Things. To understand the concepts of Web of Things

COURSE OUTCOMES:

1. Interpret the concepts of IoT
2. Analyze the importance of Protocols in IoT
3. Understand the IoT architecture
4. Apply IoT concepts in Industry applications and IoT platforms

Module 1:

Introduction to IOT - IoT and its importance, Elements of an IoT ecosystem, Technology drivers, Business drivers, Trends and implications

Overview of Governance, Privacy and Security Issues.

Module II

IOT PROTOCOLS - Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Issues with IoT Standardization – Unified Data Standards –

Protocols – IEEE802.15.4–BACNet Protocol– Modbus – KNX – Zigbee– Network layer – APS layer – Security

Module III

IOT ARCHITECTURE - IoT Open-source architecture (OIC)- OIC Architecture & Design principles- IoT Devices and deployment models

IoTivity : An Open source IoT stack - Overview- IoTivity stack architecture- Resource model and Abstraction.

Module IV

WEB OF THINGS - Web of Things versus Internet of Things – Two Pillars of the Web – Architecture Standardization for WoT– Platform Middleware for WoT

Unified Multitier WoT Architecture – WoT Portals and Business Intelligence.

Module V:

IOT APPLICATIONS – Qualitative study of sensors, IoT applications for industry: Future Factory Concepts, Smart Objects, Smart Applications.

Study of existing IoT platforms /middleware, IoT- A, Hydra etc.

TEXT & REFERENCES:

Text:

- Honbo Zhou, “The Internet of Things in the Cloud: A Middleware Perspective”, CRC Press,2012.
- Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), “Architecting the Internet ofThings”, Springer, 2011.
- David Easley and Jon Kleinberg, “Networks, Crowds, and Markets: Reasoning About a HighlyConnected World”, Cambridge University Press, 2010.
- Olivier Hersent, David Boswarthick, Omar Elloumi , “The Internet of Things – Key applicationsand Protocols”, Wiley, 2012.

References:

- Vijay Madiseti and ArshdeepBahga, “Internet of Things (A Hands-on-Approach)”,1st Edition, VPT, 2014
- Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to ConnectingEverything”, 1st Edition, Apress Publications, 2013
- CunoPfister, Getting Started with the Internet of Things, O’Reilly Media, 2011, ISBN: 978-1-4493-9357-1

Course Outcomes (CO)	CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – High; 2 – Medium; 1 - Low													
	Program Outcomes (POs)												Program Specific Outcomes*	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3								2	2			1	
CO2	3	1			3				2	2			2	
CO3	3	1			2				2	2			2	
CO4	3	1	3		3				2	2			1	

B. Tech III Year–V Sem
Subject Code: 21OE5CC01

L T P C
3 1 - 4

DATA SECURITY

Prerequisite(s): Nil

Course Objectives:

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

Course Outcomes:

At the end of the course, students are able to:

CO1: Identify the basic language & terminologies of cryptography.

CO2: Demonstrate Encryption and Decryption methods using various ciphers of classical cryptography.

CO3: Perform cryptanalysis of classical cryptography.

CO4: Understand the concept of digital signatures.

Module 1:

Security Concepts: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks.

Cryptography Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, key range and key size, possible types of attacks.

Module 2:

Symmetric key Ciphers: Algorithms Types, Algorithm Modes, Data Encryption Standards, International Data Encryption Algorithm (IDEA), RC4, RC5, Blowfish,

Case Study: Secure Multiparty Calculation.

Module 3:

Asymmetric key Ciphers - I: Principles of public key cryptosystems, RSA algorithm, Elgamal Cryptography, Comparison of symmetric and asymmetric Key Cryptography.

Module 4:

Asymmetric key Ciphers - II: Digital signatures, Elgamal Digital Signature Scheme, Attacks on Digital Signature, Knapsack Algorithm, Problems with Public key Exchange.

Module 5:

Public – Key Infrastructure : Digital Certificates, private - Key management, The PKIX Model, Public Key Cryptography Standards(PKCS) , XML, PKI and security.

Text Books:

1. Padmanabhan T R, Shyamala C and Harini N, “Cryptography and Security”, Wiley Publications 2011.
2. Josef Pieprzyk, Thomas Hardjono and Jenifer Seberry, “Fundamentals of Computer Security”, Springer 2010.

Resources:

1. Douglas R Stinson, “Cryptography: Theory and Practice”, CRC Press 2005.
2. Alfred J Menezes, Paul C Van Oorshot and Scott A. Vanstone, “Handbook of Applied Cryptography”, CRC press 1996.

CO-PO/PSO Mapping:

CO-PO	1	2	3	4	5	6	7	8	9	10	11	12	PSO 1	PSO2	PSO3
CO-1			2				3								
CO-2				2			1								
CO-3				3				1							
CO-4		1						3							

B.Tech III Year – VI Sem
Subject Code: 21PC6CC03

L	T	P	C
3	1	0	4

ETHICAL HACKING

Prerequisite:

- Basic concepts of information security and Cryptography
- Knowledge of computer networking, operating systems and servers

Course Objectives:

- To help students understand how ethical hacking is used as a method to prevent hacking
- To make it possible for students to learn the process of identifying vulnerabilities and exploits of the technological ecosystem comprising of various hardware, software, network, OS and applications and identify suitable countermeasures
- To facilitate students, appreciate the need for understanding non-technology aspects of ethical hacking such as legal frameworks, documentation and report writing.

Course Outcomes:

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

- CO1: Explain the importance of ethical hacking in achieving the goals of information security and discuss the threat associated with wireless network.
- CO2: Demonstrate usage of open-source tools for vulnerability scanning.
- CO3: Differentiate various types of attack vector.
- CO4: Examine possible way of webserver hacking and demonstrate techniques to Counter measures.

Module 1:

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.

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

Module 2:

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

Planning for a Controlled Attack: Inherent Limitations, Imposed Limitations, timing is Everything, Attack Type, Source Point, Required Knowledge, Multi-Phased

B.Tech III Year – VI Sem
Subject Code: 21PC6CS15

L	T	P	C
3	0	0	3

COMPILER DESIGN

Prerequisite: Formal Languages of Automata Theory and C programming

Course Objectives:

1. To introduce the major concept areas of language translation and compiler design
2. To enrich the knowledge in various phases of compiler and its use
3. To implement Various parsers like LL,LR
4. To provide practical programming skills necessary for constructing a compiler

Course Outcomes:

1. Ability to apply the knowledge of lex tool & yacc tool to develop a scanner & parser
2. Ability to design a compiler, given a set of language features
3. Ability to implement various parsers like LR,LL
4. Design algorithms to do code optimization in order to improve the performance of a program in terms of space complexity and time complexity.

Module-1:

Introduction to Compilers – Analysis of the source program – Structure of a compiler, Phases of a compiler —the science of building a compiler, Compiler construction tools-YACC.

Lexical Analysis — Role of Lexical Analyzer — Input Buffering — Recognition of Tokens — the Lexical-Analyzer Generator Lex — Finite Automata — From Regular Expressions to Automata — Minimizing DFA

Module-2:

Syntax Analysis: Introduction, Grammars — Context-free grammars — Writing a grammar .Types of Parsings—Top-Down, Bottom-U, **Top-Down Parsing** : With Back Tracking –Eg : Brute Force ;Without Back Tracking or Predictive Parsing – i) Recursive Descent Parser, ii)Non-Recursive descent like LL(1) parser.

Bottom-UP Parsing, shifts reduce parser:

- i) LR parser, LR (0), SLR (1),LALR(1),CLR(1)
- ii) Operator Precedence parser Error Handling and Recovery in Syntax Analyzer-YACC.

Module – 3:

Syntax-Directed Translation: Syntax-Directed Definitions, Evaluation Orders for SDD's, Applications of Syntax-Directed Translation, Syntax-Directed Translation Schemes, Implementing L-Attributed SDD's.

Intermediate-Code Generation:

Variants of Syntax Trees, Three-Address Code, Types and Declarations, Type Checking, Control Flow, Switch-Statements, Intermediate Code for Procedures.

Module – 4:

Run-Time Environment And Code Generation: Storage Organization, Stack Allocation Space, Access to Non-local Data on the Stack, Heap Management ,Garbage and Trace-Based collection

Code Generation: Issues in design of Code Generation —design of a simple Code Generator.

Module-5:

Code Optimization: The Principal Sources of Optimization , Peephole Optimization , DAG ,Foundations of Data flow analysis, constant propagation, partial-redundancy elimination, loops in flow graphs, Register allocation and assignment, dynamic programming.

Text Books

1. Alfred V. Aho, Jeffrey D Ullman, “Compilers: Principles, Techniques and Tools”, Pearson Education Asia, 2012
2. Jean Paul Tremblay, Paul G Serenson, "The Theory and Practice of Compiler Writing", BS Publications, 2005

Reference books

1. Allen I. Holub, “Compiler Design in C”, Prentice Hall of India, 2003
2. C. N. Fischer and R. J. LeBlanc, “Crafting a compiler with C”, Benjamin Cummings, 2003
3. HenkAlblas and Albert Nymeyer, “Practice and Principles of Compiler Building with C”, PHI, 2001
4. Kenneth C. Loudon, “Compiler Construction: Principles and Practice”, Thompson Learning, 2003
5. Dhamdhere, D. M., "Compiler Construction Principles and Practice", 2nd edition, Macmillan India Ltd., New Delhi, 2008

B. Tech III Year–I Sem
Subject Code: 21PC5CM03

L	T	P	C
3	1	0	4

Machine Learning

Prerequisite:

1. Linear Algebra and Calculus
2. Knowledge of statistics

Course Objectives:

1. To introduce the basic concepts and techniques of Machine Learning.
2. To apply feature engineering techniques to the given data.
3. To apply machine learning concepts to solve problems.
4. To apply clustering techniques to the given problem.

Module-I

Introduction to Machine Learning and Pre-processing: Introduction to Machine learning, Types of Machine Learning: Supervised Learning, Unsupervised Learning, Semi-supervised Learning, Reinforcement Learning, Deep Learning, Extreme Learning, Application of Machine learning.

Data Collection (Sources), Types of missing data, Missing data handling using Imputation Technique.

Module – II

Data Engineering: Different types of data distribution: Normal distribution, Skewed distribution, Data transformations, Handling Imbalanced data, Outlier detection, Different types of Feature selection techniques in machine learning.

Module - III

Linear Algorithms: Linear Regression, Logistic Regression, Logistic Regression using Maximum Likelihood Estimation, Gradient Descent for Machine Learning, Batch Gradient Descent, Stochastic Gradient Descent, lasso and ridge regression, Parametric machine learning techniques, Performance metrics for Linear algorithms.

Module – IV

Non-Linear Algorithms: Decision Trees: ID3, CART, Naive Bayes, K-Nearest Neighbour's, Support Vector Machines: Maximal-Margin Classifier, Soft Margin Classifier, Kernels, non-parametric machine learning techniques, performance metrics for Non-linear algorithms.

Module – V

Unsupervised Learning: Introduction to Unsupervised learning, fundamentals of Clustering techniques: K-mean clustering, Hierarchical clustering-agglomerative and divisive clustering, linkages, different distance measures, and its appropriate application.

Text Books:

1. Python: Deeper Insights into Machine Learning by David Julian, John Hearty, and Sebastian Raschka, 2016.
2. Machine Learning with Python, Coding Mark, Charlie Creative Lab, 2020.

Reference Text Books:

1. U Dinesh Kumar Manaranjan Pradhan, Machine Learning Using Python, Wiley India Pvt. Ltd, 2019.
2. Mark Fenner, Machine Learning with Python for Everyone, Addison-Wesley Professional, 2019.

Web Resources & E-Books:

1. <https://machinelearningmastery.com/>
2. <https://www.kdnuggets.com/>

MOOC’s Courses:

1. “Introduction to Machine Learning”, NPTEL
2. “Machine Learning for Engineering and Science applications”, NPTEL

Course Outcomes:

Upon completing this course, the student will be able to

1. Describe the different types of machine learning techniques.
2. Use different feature engineering techniques on the given data.
3. Classify the given data using machine learning techniques.
4. Employ clustering techniques to handle unlabelled data.

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – High; 2 – Medium; 1 – Low															
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes*		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 0	PO 1	PO 2	PSO 1	PSO 2	PSO 3
CO1	2														
CO2	3	2											2		
CO3	3	2											2		1
CO4	3	2											2		1

B.Tech III Year -I/II Sem

L T P C

Subject Code:21HS6EG05

0 0 2 1

ADVANCED ENGLISH COMMUNICATION SKILLS LAB
(Common to CSE/EEE/ECE/CSM/CSD/CSC/CSO/ME)

1. INTRODUCTION:

The introduction of the Advanced Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalized context.

The proposed course should be a laboratory course to enable students to use 'good' English and perform the following:

1. Gathering ideas and information to organize ideas relevantly and coherently.
2. Engaging in debates.
3. Participating in group discussions.
4. Facing interviews.
5. Writing project/research reports/technical reports.
6. Making oral presentations.
7. Writing formal letters.
8. Transferring information from non-verbal to verbal texts and vice-versa.
9. Taking part in social and professional communication.

2. OBJECTIVES:

This Lab focuses on using multi-media instruction for language development to meet the following targets:

1. To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
2. Further, they would be required to communicate their ideas relevantly and coherently in writing.
3. To prepare all the students for their placements.
4. Learn conversation skills
5. Learn reading strategies
6. Learn time management
7. Learn stress management
8. Learn career planning

Course outcomes

- Express conversational skills
- Specify reading strategies
- Perform time management

- Perform stress management
- Explore career planning

6. SYLLABUS:

The following course content to conduct the activities is prescribed for the Advanced English Communication Skills (AECS) Lab:

1. **Activities on Fundamentals of 7c's of effective Communication, Behaviour skills and Building Vocabulary** - Starting a conversation – responding appropriately and relevantly – using the right body language - Concise - Clear - Concise - Coherent - Complete - Correct.
Behaviour Skills - Grooming - Formal and Informal Communication - Body language - Time Management.

– Role Play in different situations & Discourse Skills- using visuals - Synonyms and antonyms, wordroots, one-word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.
2. **Activities on Reading Comprehension and Business English** –General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading& effective googling,6.listening in effective communication,Style of Communication.
Business Conversation with dialogues reading and speaking activity
3. **Activities on Writing Skills** – Structure and presentation of different types of writing – *letter writing/Resume writing/ e-correspondence/Technical report writing/* – planning for writing – improving one's writing.
4. **Activities on Presentation Skills** – Oral presentations (individual and group) through JAM sessions/seminars/PPTs and written presentations through posters/projects/reports/**Group Writing, info-graphics,** e-mails/assignments etc.
5. **Activities on Group Discussion and Interview Skills** – Dynamics of group discussion, intervention, summarizing, modulation of voice,Career Planning, body language, relevance, fluency and organization of ideas and rubrics for evaluation-Concept and process, pre-interview planning, opening strategies, answering strategies, interviewthrough tele-conference & video-conference and Mock Interviews.

B.Tech III Year – V Sem
Subject Code: 21PC5CS17

L	T	P	C
0	0	2	1

Compiler Design Lab

Course Objectives:

- To understand the various phases in the design of a compiler.
- To understand the design of top-down and bottom-up parsers.
- To understand syntax directed translation schemes.
- To introduce lex and yacc tools.

Course Outcomes:

- Design and develop Lex program
- Ability to design and develop for any language.
- Able to use lex and yacc tools for developing a scanner and a parser.
- Able to design and implement LL and LR parsers.

List of Experiments:

Compiler Design Experiments

1. Write a LEX Program to scan reserved word & Identifiers of C Language
2. Implement Predictive parsing algorithm
3. Develop an operator precedence parser for a given language.
4. Construct a recursive descent parser for an expression.
5. Construct a LL(1) parser for an expression
6. Convert the BNF rules into YACC form and write code to generate abstract syntax tree.
7. Write a C program to generate three address code.
8. Implement SLR(1) Parsing algorithm
9. Design LALR bottom up parser for the given language

CO-PO& PSO Mapping:

CO-PO	1	2	3	4	5	6	7	8	9	10	11	12	PSO 1	PSO 2	PSO 3
CO-1	L	M	L		H				L	L					L
CO-2	L	H	L		H				H	H					M
CO-3	L	M	L		H				L	L					L
CO-4	L	M	L		H				L	L					L

B.Tech III Year – VI Sem
Subject Code: 21PC6CC04

L	T	P	C
0	0	3	1.5

ETHICAL HACKING LAB

Course Objectives:

- To help students understand how ethical hacking is used as a method to prevent hacking.
- To make it possible for students to learn the process of identifying vulnerabilities and exploits of the technological ecosystem comprising of various hardware, software, network, OS and applications and identify suitable counter measures.
- Gives the students the opportunity to learn about different tools and techniques in Ethical hacking and security.

Course Outcomes:

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

- CO1: Understand the use and availability of tools to support an ethical hack
 CO2: Understand interpreting the results of a controlled attack
 CO3: Apply Ethical hacking tools to perform various activities
 CO4: Demonstrate usage of open-source tools for vulnerability scanning

List of Programs:

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. Install jcrypt tool (or any other equivalent) and demonstrate Asymmetric, Symmetric Crypto algorithm, Hash and Digital/PKI signatures studied in theory
Network Security And Management
8. Implement Passive scanning, active scanning, session hijacking, cookies extraction using Burp suit tool.
9. Exploiting eternal blue vulnerability.
10. Perform SQL injection attack using SQL Map in kaliLinux.
11. Perform Reverse Engineering of Hacking using kaliLinux.
12. Perform session hijacking using Zed Attack Proxy (ZAP).

B. Tech III Year–I Sem	L	T	P	C
Subject Code: 21PC5CM04	0	0	3	1.5

Machine Learning Lab

Prerequisite:

1. Python Programming
2. Knowledge of statistics

Course Objectives:

1. To implement the machine learning techniques on a given dataset.
2. To use various data preprocessing techniques on the given data.
3. To compare different machine learning techniques.
4. To select suitable model parameters for different machine learning techniques.

Lab Programs:

1. Working with the dataset.
 - a) Download any dataset from the repository and import it as an input.
 - b) Summarize the imported dataset: no of samples, no of features, target vector using python programming.
 - c) Split the dataset into training, testing and validation dataset using Python Programming.
2. Consider any dataset and apply suitable imputation technique to handle the missing data.
 - a) Summarize the dataset and also determine the missing values present in the dataset.
 - b) Based on the missing values, use a suitable technique to handle the missing data.
 - c) Summarize the dataset after the imputation of missing values.
3. Apply Linear Regression on a given dataset and comment on its efficiency and performance.
 - a) Implement linear regression using Sklearn library.
 - b) Split the obtained dataset into training and testing: ratio of 80-20, 70-30.
 - c) Evaluate the model using metrics: Mean Squared Error, Absolute Error and Root Mean Squared Error.
4. Apply Linear Regression to the given dataset.

- a) Evaluate the model performance after L1 Regularization.
 - b) Evaluate the model performance after L2 Regularization.
5. Apply Logistic Regression on the given dataset and perform the model evaluation using confusion matrix.
- a) Download the dataset from the repository and import it as input.
 - b) Build Logistic Regression Model and train the dataset.
 - c) Evaluate the model performance using AUC-ROC curve, Confusion Matrix: Accuracy, Precision, Recall, F score.
6. Apply Decision tree (ID3) technique to the given data set for classification.
- a) Build the decision tree for the training dataset.
 - b) Use the different hyperparameters to improve the model.
 - c) Evaluate the model performance on the test dataset.
7. Use Support Vector Machine to perform the classification and regression on a dataset.
- a) Import the dataset and perform the classification and regression using SVM.
 - b) Evaluate the model's performance on testing dataset and validation dataset.
 - c) Use Sklearn's Grid Search CV method to find the best-fit Model.
8. Apply K-Means Clustering on the collected dataset.
- a) Implement K-Means clustering using sklearn.
 - b) Check for the best k-value.
9. Use K-Nearest Neighbor technique on a given dataset and analyze the performance by changing the value of K.
- a) Implement the KNN algorithm.
 - b) Apply KNN model to the dataset and perform testing on unseen dataset.
 - c) Change the value of K in KNN and analyze the model's performance.
10. Use the different classification algorithms on the given dataset and perform the comparison.
- a) Compare different classification techniques.
 - b) Justify which classification technique is better.

Text Books:

1. Python: Deeper Insights into Machine Learning by David Julian, John Hearty, and Sebastian Raschka, 2016.

- Machine Learning with Python, Coding Mark, Charlie Creative Lab, 2020.

Reference Text Books:

- U Dinesh Kumar Manaranjan Pradhan, Machine Learning Using Python, Wiley India Pvt. Ltd, 2019.
- Mark Fenner, Machine Learning with Python for Everyone, Addison-Wesley Professional, 2019.

Web Resources & E-Books:

- <https://machinelearningmastery.com/>
- <https://www.kdnuggets.com/>

MOOC's Courses:

- “Introduction to Machine Learning”, NPTEL
- Machine Learning for Engineering and Science applications: NPTEL

Course Outcomes:

Upon completing this course, the student will be able to

- Summarize the data.
- Employ the different data preprocessing operations on the given dataset.
- Demonstrate the Regression and Classification technique on the given data.
- Use K-means clustering algorithm to handle the real-world problem.

CO-PO/PSO Mapping Chart															
(3/2/1 indicates strength of correlation)															
3 – High; 2 – Medium; 1 - Low															
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes*		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	3	2			3				1	1			2		2
CO2	3	2			3				1	1			2		2
CO3	3	2			3				1	1			3		2
CO4	3	2			3				1	1			3		2

B. Tech III Year- II Sem

L T P C

Subject Code: 21MC6HS04

2 0 0 0

QUANTITATIVE APTITUDE
(Common to CSE/EEE/ECE/CSM/CSD/CSC/CSO/ME)

Course Description

Course Overview

This course provides the basic skills required in solving the problems of Aptitude required by various companies for Campus Recruitment and competitive tests. The contents of course include solving problems on different concepts such as Permutations and Combinations, Averages, Percentages and Logarithms etc.

Course Pre/co-requisites

No prior knowledge is required.

Course Objectives:

- To categorize, apply and use thought process to distinguish between concepts of Quantitative methods.
- To prepare and explain the fundamentals related to various possibilities and probabilities related to quantitative aptitude.
- To critically evaluate numerous possibilities related to puzzles.

Course Outcomes (COs)

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

1. Apply the concepts of ratios, proportions and percentages to solve problems.
2. Solve problems on Logarithms, permutations, combinations, clocks, and calendars.
3. Able to recall and use the concepts to solve problems numerical estimation with respect to company specific and competitive tests
4. Interpret data using graphs and charts.

Module 1:

Arithmetic ability:-Algebraic operations- BODMAS – Fractions – Number system - Divisibility rules LCM&GCD (HCF), Simplification.

Ratio and Proportion: Ratio, Proportion, Variations, Problems on A

Module II:

Percentages, Simple Interest (SI) and Compound Interest (CI): Fundamentals of Percentage, Percentage change, SI and CI, Relation between SI and CI.

Profit and Loss, Partnerships: Basic terminology in profit and loss, Types of partnership, Problems related to partnership

Module III:

Time and Work, Pipe and Cistern, Speed, Time and Distance, Problems on trains & boats, Calendar problems, Clock problems.

Average, Mixtures and Alligation: Averages, Weighted average, Difference between mixture and alligation, Problems on Mixtures and alligation

Module IV:

Data Interpretation: Introduction, Tabulation, Bar Graph, Pie Charts, Line Graphs, Combined Graphs.

Geometry: Lines and Angles, Triangle, Trigonometry, Circle, Height and Distance, Quadrilateral and Polygon

Module V:

Permutations and Combinations: Fundamentals counting principle, Definition of Permutation, Seating arrangement, Problems related to alphabets, Rank of the word, Problems related to numbers, Circular permutation, Combination.

Logarithms: Fundamental formulae of logarithms and problems, finding number of terms on expanding a given number.

Books and Materials

Text Book

1. R.S Aggarwal, Quantitative Aptitude for competitive examinations, 2017 edition, S.Chand.

Reference Books

1. Abhijit Guha, Quantitative Aptitude for competitive examinations, 6th Edition, McGraw Hill Education.
2. Dinesh Khattar, The Pearson guide to Quantitative Aptitude for Competitive Examinations, 3rd Edition, Pearson Education.

Websites:

1. www.m4maths.com
2. www.Indiabix.com

CO-PO/PSO Mapping Chart
(3/2/1 indicates strength of correlation)
3 – High; 2 – Medium; 1 - Low

Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes*	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1						2					2	3		
CO2						2					2	3		
CO3						2					2	3		
CO4						2					2	3		

B. Tech III Year–VI Sem
Subject Code: 21PE6CC21

L	T	P	C
3	0	0	3

FAULT TOLERANCE SYSTEM

Prerequisite: Probability and statistics, digital design, computer architecture, and operating systems

Course Objective

- The objectives of this course are:
- To extend the students' knowledge about faults & errors
- To students know different recovery methods
- How students handle faults in different computing environments.

Course Outcomes:

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

CO1: Enumerate the need and necessity to consider fault tolerant design in digital systems.

CO2: Explain vividly, the various techniques for fault modelling and tests generation.

CO3: Determine the various forms of redundancy for enhancing reliability of digital systems.

CO4: Evaluate reliability of systems with permanent and temporary faults.

Module 1:

Introduction to Fault-Tolerance: Fault Classification: Error, Faults and Failures; Fault tolerant matrix, Reliability and Availability; Dependability Measures. Mathematical Reliability Modelling: Probability Basics, Reliability and Availability Modelling, Analysis using Markov Models.

Module 2:

Hardware Fault-Tolerance: Canonical and Resilient Structures; Reliability Evaluation Techniques and Models; Processor-level Fault Tolerance; Byzantine Failures and Agreements. Information Redundancy: Error Detection / Correction Codes (Hamming, Parity, Checksum, Berger, Cyclic, Arithmetic); Data replication (Hierarchical Vs. Non-hierarchical organization), Primary backup approach; Resilient Disk Systems (RAID), Algorithm based fault tolerance.

Module 3:

Fault-Tolerant Networks: Measures of resilience (graph theoretical measures, computer networks measures), Network Topologies and their Resilience; Fault-tolerant Routing. Software Fault-Tolerance: Single-Version Fault Tolerance; N-Version Programming; Recovery block Approach; Exception and Pre/Post Conditional (Assert) Handling.

Module 4:

Reliability Models: Software Reliability Models (Jelinski–Moranda, Littlewood–Verrall, Musa–Okumoto), Model selection and parameter estimation, Fault-Tolerant Remote Procedure

B.Tech
Subject Code: 21PE6CD23

L	T	P	C
3	0	3	3

Information Retrieval Systems

Course Objective

- 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:

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

Module 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

Module II

Cataloging 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

Module 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

Module 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

Module V

Text Search Algorithms:

Introduction to Text Search Techniques, Software Text Search Algorithms, Hardware Text Search Systems

Multimedia Information Retrieval:

Spoken Language Audio Retrieval, Non-Speech Audio Retrieval, Graph Retrieval, Imagery Retrieval, Video Retrieval

TEXT BOOKS:

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.

CO-PO & PSO Mapping:

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – High; 2 – Medium; 1 – Low															
CO/PO	1	2	3	4	5	6	7	8	9	10	11	12	PSO 1	PSO2	PSO3
CO-1	H	M											M		M
CO-2	H	M											M		M
CO-3	H	M											M		M
CO-4	H	M											M		M

B.Tech
Subject Code: 21PE6CD22

L	T	P	C
3	0	0	3

Blockchain Technology

Prerequisites: 1. Knowledge in security and applied cryptography.
2. Knowledge in distributed databases.

Course Objective:

To Introduce block chain technology and Cryptocurrency

Course Outcomes:

1. Learn about research advances related to one of the most popular technological areas today.
2. Understand Extensibility of Blockchain concepts.
3. Understand and Analyze Blockchain Science.
4. Understand Technical challenges, Business model challenges.

Module I

UNIT - I Introduction: Block chain or distributed trust, Protocol, Currency, Cryptocurrency, How a Cryptocurrency works, Crowdfunding.

Module II

UNIT - II Extensibility of Blockchain concepts, Digital Identity verification, Block chain Neutrality, Digital art, Blockchain Environment.

Module III

UNIT – III Blockchain Science: Gridcoin, Folding coin, Blockchain Genomics, Bitcoin MOOCs.

Module IV

UNIT - IV Currency, Token, Tokenizing, Campuscoin, Coindrop as a strategy for Public adoption, Currency Multiplicity, Demurrage currency.

Module V

UNIT - V Technical challenges, Business model challenges, Scandals and Public perception, Government Regulations.

TEXT BOOKS:

1. Melanie Swan, Blockchain Blueprint for Economy, O'reilly.

REFERENCE BOOKS:

1. Building Blockchain Apps, Michael Juntao Yuan, Pearson Education
2. Daniel Drescher, Blockchain Basics: A Non-Technical Introduction in 25 Steps 1st Edition
3. Bradley Lakeman, Blockchain Revolution: Understanding the Crypto Economy of the Future. A Non-Technical Guide to the Basics of Cryptocurrency Trading and Investing, ISBN: 1393889158

CO-PO & PSO Mapping:

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – High; 2 – Medium; 1 – Low															
CO/PO	1	2	3	4	5	6	7	8	9	10	11	12	PSO 1	PSO2	PSO3
CO-1	L												L		
CO-2	H	M											M		L
CO-3	H	M											M		L
CO-4	L												M		L

B.Tech III Year- V Sem
Subject Code: 21PE5CS13

L	T	P	C
3	0	0	3

Computer Graphics

Course Objectives

1. To provide a comprehensive introduction to computer graphics leading to the ability to understand contemporary terminology, progress, issues, and trends.
2. To understand computer graphics techniques (2-D/3-D), focusing on 3D modelling, image synthesis, and rendering.
3. Introduce geometric transformations, geometric algorithms, software systems (OpenGL), 3D object models (surface, volume and implicit), visible surface algorithms, image synthesis, shading and mapping, ray tracing, radiosity, global illumination, photon mapping, and anti-aliasing.
4. To explore the interdisciplinary nature of computer graphics which is emphasized in the wide variety of examples and applications.

Course Outcomes

1. Develop a facility with the relevant mathematics of computer graphics, e.g., 3D rotations using both vector algebra, geometrical transformations and projections using homogeneous co-ordinations.
2. Illustrate Geometric transformations on both 2D and 3D objects
3. Apply principles and techniques of computer graphics.
4. Apply computer graphics concepts in the development of computer games, information visualization, and business applications.

MODULE- I

Introduction and Line Generation: Types of computer graphics, Graphic Displays- Random scan displays, Raster scan displays, Frame buffer and video controller, Points and lines, Line drawing algorithms, Circle generating algorithms, Midpoint circle generating algorithm, and parallel version of these algorithms.

MODULE -II

Transformations: Basic transformation, Matrix representations and homogenous coordinates, Composite transformations, Reflections and shearing. **Windowing and Clipping:** Viewing pipeline, Viewing transformations, 2-D Clipping algorithms-Line clipping algorithms such as Cohen Sutherland line clipping algorithm, Liang Barsky algorithm, Line clipping against nonrectangular clip windows; Polygon clipping – Sutherland Hodgeman polygon clipping, Weiler and Atherton polygon clipping, Curve clipping, Text clipping.

MODULE -III

Three Dimensional: 3-D geometric primitives, 3-D Object representation, 3-D Transformation, 3-D viewing, projections, 3-D Clipping.

MODULE-IV

Curves and Surfaces: Quadric surfaces, Spheres, Ellipsoid, Blobby objects, introductory concepts of Spline, B spline and Bezier curves and surfaces.

MODULE -V

Computer animation: Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications

Hidden Lines and Surfaces: Back Face Detection algorithm, Depth buffer method, A- buffer method, Scan line method

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, Van Dam, Feiner and Hughes, Pearson Education.

Reference Books

1. Computer Graphics – Amrendra N Sinha and Arun D Udai, TMH Publications
2. Computer Graphics: A Programming Approach – Steven Harrington, TMH Publications
3. Procedural Elements of Computer Graphics – Rogers, McGraw Hill
4. Computer Graphics, Steven Harrington, TMH Publications

CO-PO & PSO Mapping:

Course Name - Course Outcomes / Program Outcomes	1	2	3	4	5	6	7	8	9	10	11	12	PSO 1	PSO 2	PSO 3
CO1	3		3						3						
CO2	3		3		3				3						
CO3	3		3		3				3						
CO4	3		3		3				3						

B.Tech III Year – VI Sem	L	T	P	C
Subject Code: 21OE6CS09	3	0	0	3

Object Oriented Programming Using Java

Prerequisites: Programming in C

Course Objectives:

1. Understand fundamental concepts and object oriented concepts in Java
2. Implementing the concept of packages and exception handling in Java.
3. Implement the concept of multithreading and inter process communication in Java.
4. Develop GUI applications.

Course Outcomes:

1. Solve the given problem using OOPS technique.
2. Explain the concept of Package and Exception Handling.
3. Implement Multi threading and Inter process communication in java
4. Develop GUI based applications using applet, AWT , Event handling and swing.

Module - I

History and Evolution of java: Java's lineage, Java and internet, Byte code, Java buzzwords, Evolution of java.

Object oriented programming - data, types, variables, Arrays, operators, control statements, type conversion and casting, Introduction to classes, objects, methods, constructor, this and static keywords , garbage collection, overloading methods, parameter passing, access control, command line arguments, exploring String class

Inheritance: member access and inheritance, Multilevel Inheritance, super and final keywords, method overriding, dynamic method dispatch, abstract classes and methods.

Module- II

Packages and Interfaces: Defining, Creating and Accessing a Package, understanding CLASSPATH, importing packages, Differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces.

Exception handling: Concepts of exception handling and its benefits, usage of try, catch, throw, throws and finally, built in exceptions, creating own exceptions.

Module -III

Multithreading: Differences between multi-threading and multi programming, thread life cycle, creating threads using thread class and Run able interface, thread priorities, synchronization , inter thread communication.

I/O Streams: Stream classes, Byte and character streams, File class, reading and writing files, reading and writing from console, serialization.

Module -IV

Applets: Concepts of Applets, differences between applets and applications, life cycle of an applet, creating applets, passing parameters to applets.

B. Tech III Year – VI Sem
Subject Code:21OE6EC02

L	T	P	C
3	0	0	3

Fundamentals of Digital Electronics

(Open Elective)

Prerequisite: Basic knowledge on computers

Course Objectives:

This course provides in-depth knowledge of Digital logic techniques of digital circuits, which is the basis for design of any digital circuit.

1. To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
2. To impart the concepts of combinational, sequential logic circuits.
3. To learn the concepts of sequential circuits, enabling them to analyse sequential systems in terms of state machines.

Course Outcomes: Upon completion of the course, the student should be able to

1. Explain the numerical information in different forms and Boolean Algebra theorems
2. Solve Boolean expressions using Boolean Theorems-maps
3. Design and analyze combinational and sequential circuits
4. Implement logic families and realization of logic gates

Module I: Number Systems & Boolean Algebra:

Number Systems: Number base conversions: Binary, Octal, Decimal, Hexa-decimal, Complements of Numbers, Codes- Weighted and Non-weighted codes and its Properties, Parity check code and Hamming code.

Boolean algebra: Basic Theorems and Properties, Switching Functions- Canonical and Standard Form, Algebraic Simplification, Digital Logic Gates, EX-OR gates, Universal Gates. The Karnaugh Map Method, don't care map entries, Prime and Essential Implicants.

Module II: Combinational Logic Circuits:

Basic Arithmetic Circuits- Half adder, Full adder, Half subtractor, Full subtractor, 4-bit parallel adder/subtractor. BCD Adder

Combinational logic circuits: 2-bit comparator, Multiplexers, Implementation of Boolean functions using Multiplexers, Decoders, Implementation of Boolean functions using Decoder, Demultiplexers, Encoder, Priority Encoder, Code converters.

Module III: Sequential Circuits Fundamentals:

Introduction to Sequential Circuits: Basic Architectural Distinctions between Combinational and Sequential circuits, SR Latch, Flip Flops: SR, JK, JK Master Slave, D and T Type Flip Flops,

Flip flop Conversions: Excitation Table of all Flip Flops, Timing and Triggering Consideration, Conversion from one type of Flip-Flop to another.

B. Tech III Year–VI Sem**L T P C****Subject Code: 21OE6ME02****3 0 0 3****TOTAL QUALITY MANAGEMENT & SIX SIGMA APPLICATIONS****Pre-requisite:** Management Science & Production Technology, Machine Tools**Course Objectives:**

1. To understand the quality concepts and tools
2. To discuss about techniques relating to total quality management.
3. To understand the Principles and Practices of TQM
4. To understand the implementation of ISO 9000 AND Six sigma in a system

Module I

Introduction: The concept of TQM, Quality and Business performance, attitude, and involvement of top management, communication, culture and management systems.

Management of Process Quality: Definition of quality, Quality Control, a brief history, Product Inspection vs. Process Control, Statistical Quality Control.

Management of Process Quality: Definition of quality, Quality Control, a brief history, Product Inspection vs. Process Control, Statistical Quality Control, Control Charts and Acceptance Sampling.

Module II

Customer Focus and Satisfaction: Process vs. Customer, internal customer conflict, quality focus, Customer Satisfaction, role of Marketing and Sales, Buyer – Supplier relationships.

Bench Marking: Evolution of Bench Marking, meaning of bench marking, benefits of bench marketing, the bench marking procedure.

Module III

Organizing for TQM: The systems approach, organizing for quality implementation, making the transition from a traditional to a TQM organization, Quality Circles, seven Tools

Seven Tools of TQM: Stratification, check sheet, Scatter diagram, Ishikawa diagram, pane to diagram, Kepner& Tregoe Methodology.

Module IV

The Cost of Quality: Definition of the Cost of Quality, Quality Costs, Measuring Quality Costs, use of Quality Cost information, Accounting Systems and Quality Management.

Use of Quality Cost information, Accounting Systems and Quality Management.

Module V

ISO9000: Universal Standards of Quality: ISO around the world, The ISO9000 ANSI/ASQC Q- 90. Series Standards, benefits of ISO9000 certification, the third party audit.

Documentation ISO9000 and services, the cost of certification implementing the system.

Six sigma and applications of sixsigma.

Text Books:

1. Total Quality Management / Joel E. Ross/Taylor and Franscis Limited.
2. Total Quality Management/P. N. Mukherjee/PHI
3. "Lean Six Sigma: Combining Six Sigma with Lean Speed" by Michael L. George, David Rowlands, and Bill Kastle, published by McGraw-Hill Education
- 4.

Reference Books:

1. Beyond TQM / Robert L.Flood
2. Statistical Quality Control / E.L. Grant.
3. Total Quality Management:A Practical Approach/H. Lal
- 4.

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

- 1) Understand the fundamental principles of Total Quality Management.
- 2) Analyze the different quality approaches
- 3) Evaluate the different tools in Total Quality Management
- 4) Describe the importance and implementing of ISO9000 in the system and Six sigma

CO-PO/PSO Mapping Chart (3/2/1 indicates strength of correlation) 3 – High; 2 – Medium; 1 - Low														
Course Outcomes (COs)	Program Outcomes (POs)												Program Specific Outcomes*	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2						1	2	2	2	2	2	
CO2	3	2	2					1	2	2	2	2	2	
CO3	3	2	2					1	2	2	2	2	2	
CO4	3	2	2					1	2	2	2	2	2	

* If more PSOs are there in a particular branch, required no of columns can be added.

B.Tech III Year – VI Sem**L T P C****Subject Code: 21OE6EE02****3 0 0 3**

**FUNDAMENTALS OF INDUSTRIAL ELECTRONICS
OPEN ELECTIVE II
ALL BRANCHES EXCEPT EEE**

Pre-requisite: Basic Electrical and Electronics Engineering or Analog and Digital Circuits

Course Objectives:

- 1) To Design/develop suitable power converter for efficient control or conversion of power in drive applications.
- 2) To Design / develop suitable power converter for efficient transmission and utilization of power in Industrial applications.

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

- 1) CO1 – Understand the differences between signal level and power level devices.
- 2) CO2 – Analyze controlled rectifier circuits.
- 3) CO3 – Analyze the operation of DC-DC choppers.
- 4) CO4 – Analyze the operation of voltage source inverters.

Module I: Power Switching Devices and Protection Circuits

Power Switching Devices:

Types of power converters; Power semiconductor switches and their V-I characteristics - Power Diodes, Power BJT, Power MOSFET, Power IGBT. SCR VI Characteristics, Switching characteristics.

Thyristor voltage and current ratings and protection using Snubber Circuit.

Module II: Triggering and Commutation

Triggering Circuits: R, RC and UJT triggering circuits

Commutation Circuits: Types of Commutation circuits (Class A, B,C,D,E,F)

Module III: Rectifiers

Single Phase Rectifier: Principles of single-phase half-controlled converter with R, RL and RLE load. Principles of single-phase fully-controlled converter with RLE load. Problems on Single phase Rectifiers.

B. Tech III Year–VI Sem
Subject Code: 21OE6CM06

L	T	P	C
3	0	0	3

Expert Systems

Prerequisite:

1. Artificial Intelligence

Course Objectives:

1. Understand Expert Systems and their applications.
2. Illustrate Fuzzy Logic Concepts with an example.
3. Understand the Genetic Algorithm and its applications.
4. Explain the components of Expert System building and its tools.

Module-I

Overview of Expert Systems:

Introduction to Expert System: Characteristics of Expert System, Advantages and Disadvantages of Expert Systems, Different types of Expert Systems: Rule-based Expert Systems, Knowledge-based Expert Systems, Model-based, Case-based, and Hybrid Expert Systems, Working Architecture of Expert Systems, Components of Expert Systems, Applications of Expert Systems, Techniques for extracting the knowledge from Domain Experts.

Module – II

Knowledge Representation:

Representations and Mapping: General goal of Knowledge Representation, Approaches to Knowledge Representation: Simple Relational Knowledge, Inheritable Knowledge, Inferential Knowledge, Procedural Knowledge or Operational Knowledge, Classification of Knowledge Representation Systems: Logics (Predicate Logic, Description Logic, Nonmonotonic Logic); Procedural Schemas (Production rules), Structural Schemas (Weak slot-and-filler structures, Strong slot-and-filler structures), Knowledge-Based Systems.

Module - III

Fuzzy Logic:

Introduction to Fuzzy Logic, Fuzzy set theory, Fuzzy sets: Operation on Fuzzy sets, Scalar cardinality, fuzzy cardinality, union and intersection, complement, equilibrium points, aggregation, projection, composition, decomposition, cylindrical extension, fuzzy relation, Fuzzy membership functions, Fuzzy Expert Systems, Fuzzy Decision Making, Applications of Fuzzy System, De-fuzzification.

Module – IV

Genetic Algorithms:

Introduction to Genetic Algorithms (GA), Representation, Operators in GA, Fitness function, population, building block hypothesis and schema theorem; Genetic algorithms operators-methods of selection, crossover and mutation, Simple GA(SGA), Different types of GA, generation gap, steady state GA, Applications of GA.

Module – V

Development of Expert System:

Data Mining and Data Analytics

Course Objective

1. Understand the concepts of Data Mining
2. Familiarize with association rule mining
3. Familiarize various classification algorithms
4. Understand the concepts of Cluster analysis
5. Implement the Data mining concepts with various domains

Course Outcomes:

1. Discuss various Data Mining Principles.
2. Analyze the impact of data analytics for business decisions and strategy.
3. Apply the Association, Clustering rules for mining the data.
4. Design various classification techniques.

Module I

Introduction to Data warehouse, Difference between operational database systems and data warehouses.

Data warehouse Characteristics, Data warehouse Architecture.

Introduction: What is Data Mining, Definition, KDD, Challenges, Data Mining Tasks, Data Preprocessing, Data Cleaning, Missing data, Dimensionality Reduction, Feature Subset Selection, Discretization and Binarization, Data Transformation; Measures of Similarity and Dissimilarity – Basics.

Module II

Data Analytics: Introduction to Analytics, Introduction to Tools and Environment, Application of Modeling in Business, Databases & Types of Data and variables. Data Modeling Techniques, Missing Imputations etc. Need for Business Modeling.

Module III

Regression – Concepts, Blue property assumptions, Least Square Estimation, Variable Rationalization, and Model Building etc.

Logistic Regression: Model Theory, Model fit Statistics, Model Construction, Analytics applications to various Business Domains etc.

Module IV

Association Rule Mining & Classification: Mining Frequent Patterns–Associations and correlations – Mining Methods–Mining Various kinds of Association Rules– Correlation Analysis.

Classification: Classification and Prediction – Basic concepts–Decision tree induction– Bayesian classification, Lazy learner.

B.Tech III Year – VI Sem
Subject Code: 21OE6CO05

L	T	P	C
3	0	0	3

SENSORS AND DEVICES

Prerequisite: IoT, ADE

Course Objectives:

- To introduce the terminology, technology and its applications
- To introduce the concept of M2M (machine to machine) with necessary protocols
- To introduce the Python Scripting Language which is used in many IoT devices
- To introduce the Raspberry PI platform, that is widely used in IoT applications
- To introduce the implementation of web-based services on IoT devices

Course Outcomes:

- Understand the IoT value chain structure (device, data cloud), application areas and technologies involved.
- Analyse IoT sensors and technological challenges faced by IoT devices, with a focus on wireless, energy, power, and sensing modules
- Market forecast for IoT devices with a focus on sensors
- Explore Internet of Things with the help of preparing projects designed for Raspberry Pi

MODULE-I:

Introduction to Internet of Things- Definition and Characteristics of IoT, Sensors, Physical Design of IoT – IoT Protocols, IoT communication models, IoT enabled Technologies – Wireless Sensor Networks, Cloud Computing, Embedded Systems

Types: Domain Specific IoTs – Home, City, Environment, Energy, Agriculture and Industry.

MODULE-II:

IoT - Software defined networks, network function virtualization, difference between SDN and NFV for IoT

M2M Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPEER

MODULE-III:

IoT Physical Devices and Endpoints- Introduction to Arduino and Raspberry Pi

Programming – Interfaces (serial, SPI, I2C), Python program with Raspberry PI with focus on interfacing external gadgets, controlling output, reading input from pins.

MODULE-IV:

Controlling Hardware- Connecting LED, Buzzer, Switching High Power devices with transistors, speed control of DC Motor, unipolar and bipolar Stepper motors

Sensors- Light sensor, temperature sensor with thermistor, voltage sensor, ADC and DAC, Temperature and Humidity Sensor DHT11, Motion Detection Sensors, Wireless Bluetooth Sensors, Level Sensors, USB Sensors

MODULE-V:

IoT Physical Servers and Cloud Offerings– Introduction to Cloud Storage models and communication APIs Webserver – Web server for IoT, Cloud for IoT

B. Tech III Year–VI Sem
Subject Code: 21OE6CC02

L	T	P	C
3	0	0	3

COMPUTER HARDWARE AND SYSTEM ESSENTIALS

Prerequisites: Nil

Course Objectives:

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

Course Outcomes:

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

CO1: Understanding the working principles of different computing devices (desktop computers, laptops, etc.).

CO2: Understand connection interfaces between peripheral devices, storage devices, displays.

CO3: Understand the procedure for Installation of OS - Linux and supporting, upgrading and new applications.

CO4: Understand the concepts of number system and circuit building.

Module 1:

Components of Computer System: Computer Memory: Secondary storage device types, Basic Principles of operation: Sequential Access device, Direct Access device -Magnetic disks,Optical disks, memory storage devices, Ports: Serial and Parallel Ports, Specialized Expansion Ports: SCSI, USB, MIDI, Expansion Slots and Boards, PC Cards, Plug and Play, HDMI ports, networking ports. System software: bootstrap module, configuration.

Module 2:

OS loading: typical Linux virtual machine. Installing a Linux virtual machine. Using package manager to install/update software. Understanding disk partitions and obtaining partition information using system tools. Obtaining essential system resource utilization and information using system tools and proc file system: disk utilization, memory utilization, process information, CPU utilization.

Module 3:

Operating System: Introduction, Objectives, classification and functions of Operating System, Basics of popular operating system (LINUX, WINDOWS). Kernel prompt, Shell commands.

The User Interface: Task Bar, Icons, Menu, Running an Application. Operating System Simple Setting: Changing System Date and Time, Changing Display Properties, To Add or

Remove a Windows Component, Changing Mouse Properties, Adding and removing Printers. File and Directory Management: Creating and renaming of files and directories, Common utilities. Interrupts statements in various OS and its uses.

Module 4:

Number systems - Signed and Unsigned numbers arithmetic, Binary, Decimal, Octal, Hex, BCD etc. Introduction to logic circuits: Variables and functions, Inversion- Truth tables – Logic Gates and Networks - Boolean algebra - Synthesis using gates - Design examples – Optimized implementation of logic functions: Karnaugh map - Strategy for minimization – Minimization of product of sums forms - Incompletely specified functions - Multiple output circuits – Tabular method for minimization.

Module 5:

Combinational circuit building blocks: Multiplexers - Decoders - Encoders, Sequential circuit building blocks: Flipflops-SR, JK, D and T- Registers - Counters - A simple sequential circuit design example from state diagram.

Textbook:

1. Brookshear JG. Computer science: an overview. Eleventh Edition, Addison-Wesley Publishing Company; 2011.
2. Givone DD. Digital Principles and Design. Tata McGraw Hill Publishing Company Limited; 2003.
3. Mano MM, Ciletti MD. Digital Design with Introduction to the Verilog HDL. Fifth Edition, Pearson Education; 2015.

References:

1. Norton, Peter. Introduction to computers. Sixth edition, Tata McGraw-HILL; 2008.
2. Wakerly JF. Digital Design Principles and Practices. Fourth Edition, Pearson Education; 2008.
3. Sinha, Pradeep K., and Priti Sinha. Computer fundamentals. BPB publications; 2010.

CO-PO/PSO Mapping:

CO-PO	1	2	3	4	5	6	7	8	9	10	11	12	PSO 1	PSO2	PSO3
CO-1			2				3								
CO-2				2											
CO-3					2	2									
CO-4		1						3							