FACULTY OF ENGINEERING

Scheme of Instructions & Detailed Syllabus of III & IV Semester

For

Four Year Degree Programme of

Bachelor of Engineering (B.E)
in
INFORMATION TECHNOLOGY

(With effect from Academic Year 2022-23)
(Approved by College Academic Council on .....)

Empower Women - Impact the World

Issued by **Dean, Academics**

STANLEY COLLEGE OF ENGINEERING & TECHNOLOGY FOR WOMEN (AUTONOMOUS)
(Affiliated to Osmania University)
(Accredited by NAAC with 'A' Grade)
Abids, Hyderabad - 500 001, Telangana

Programme Educational Objectives

PEO1 : Graduates shall have enhanced skills and contemporary knowledge to adapt new software and hardware technologies for professional excellence, employment and research.

PEO2 : Proficient in analyzing, developing, solving engineering problems to assist life-long learning and to develop team work.

PEO3 : To inculcate self-confidence, acquire professional and ethical attitude, infuse leadership qualities, impart proficiency in soft-skills and the ability to relate engineering with social issues.

Programme Specific Outcomes:

PSO1 : **Skilled Professional:** Ability to apply technical skills and involve in the creation, maintenance and use of Computer, Computer Networks and Computer Information Systems.

PSO2 : **Research Capability:** Use fundamental knowledge of mathematics and basic sciences to investigate emerging technologies leading to innovations in the field of Data Analytics and Artificial Intelligence.

Scheme of Instruction & Detailed Syllabus

IT : III Semester

Sl. No	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	P/D	Contact Hrs per Week	CIE	SEE	SEE Duration in Hours	
Theory Courses										
1	SBS301MT	Probability and statistics	3	-	-	3	40	60	3	3
2	SPC301IT	OOPS using JAVA	3	-	-	3	40	60	3	3
3	SES302EC	Digital Electronics & Logic Design	3	-	-	3	40	60	3	3
4	SPC302IT	Database Management Systems	3	-	-	3	40	60	3	3
5	SPC303IT	Discrete Mathematics	3	-	-	3	40	60	3	3
6	SAC903EE	Electrical Technology	2	-	-	2	50	-	-	-
Practical / Laboratory Courses										
6	SPC311IT	OOPS using JAVA Lab	-	-	3	3	40	60	3	1.5
7	SPC312IT	Database Management Systems Lab	-	-	3	3	40	60	3	1.5
8	SHS902EG	Soft Skills Lab	1	-	2	3	40	60	3	2
		Total	**18**	**-**	**8**	**24**	**330**	**480**		20

III Semester Detailed Syllabus

Course Code	Course Title						Core / Elective
SBS301MT	Probability & Statistics (Common to CSE, CME, AI & DS, IT)						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
–	3	–	–	–	40	60	3

Course Objectives:

1. To provide knowledge of probability distributions
2. To provide knowledge in tests of significance, correlation and regression.
3. Understand the basic ideas of vector algebra, linear dependence& linear independence and linear Spanning

Course Outcomes

1. Apply probability theory to solve practical problems.
2. Apply various probability distributions to solve practical problems, to estimate unknown parameters and apply tests of hypothesis.
3. Perform a regression analysis and to compute and interpret the coefficient of correlation , Chi-square test for goodness o‘f fit and independent attributes
4. To determine the numerical solutions of Ordinary differential equations.
5. To determine if a set of vector space is a vector space, Subspace or a basis

Unit I

Introduction of Probability: Conditional Probability, Theorem of total probability, Baye’s theorem and its application, Random variables, types of random variables. Probability mass function and probability density function. Mathematical Expectations, moments, Skewness and Kurtosis**.**

Unit II

Discrete and Continuous probability distributions: Binomial, Poisson, Uniform, Normal and exponential. Mean, Variance, Moment generating function.

Unit III

Curve fitting by the method of least squares: Straight line, second degree polynomial and more general curves. Correlation, regression and Rank correlation, Multiple regression, F-test,t-test and Chi- square tests.

Unit IV

Numerical Solutions of Differential Equations: Single step method, Taylor's, Euler's, R-K Method of 4^{th} order, Predictor - Corrector method, Milne's Method, Adams - Bashforth Method.

Unit V

Linear Algebra: Vector spaces, subspaces, Linearly Independent, Linearly dependent vectors, Linear span, Basis, Dimensions, Rank, Impact, Singular value decomposition, connection between eigen values and eigen vectors, SVD with low rank, Relation between SVD and regularised least square methods.

Text Books:

1. R.K. Jain and S.R. K. Iyengar , "Advanced Engineering Mathematics", Narosa Publications
2. Dr. B. S. Grewal "Higher Engineering Mathematics", Khanna Publications
3. P. Siva Rama Krishna Das & C. Vijaya Kumar, "Engineering Mathematics", Pearson India Education Services Pvt. Ltd.

Reference Books:

1. N.P. Bali & M. Goyal, "A text Book of Engineering Mathematics", Laxmi Publications, 2010
2. S.C. Gupta & V.K. Kapoor, "Fundamentals of Mathematical Statistics", S. Chand Pub.

Course Code	Course Title						Core / Elective
SPC301IT	OOPS Using JAVA (Common to AI & DS, CSE & IT, CME IV Sem)						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
Programming for Problem Solving SES101CS	3	–	–	–	40	60	3

Course Objectives:

1. To understand fundamentals of object-oriented programming in Java which includes defining classes, invoking methods, difference between applet and application programs, using class libraries
2. To create Java application programs using sound OOP practices such as interfaces, exception handling, multithreading.
3. Use Collection framework, AWT and event handling to solve real world problems.

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

1. Identify classes, objects, members of a class and the relationships needed to solve a problem.
2. Use interfaces and creating user-defined packages.
3. Utilize exception handling and Multithreading concepts to develop Java programs.
4. Compose programs using the Java Collection API.
5. Design a GUI using GUI components with the integration of event handling.

UNIT-I

Introduction: OOP concepts, benefits of OOP, history of Java, Java buzzwords, data types, variables, scope and life time of variables, operators, expressions, control statements, type conversion and casting.

Classes and Objects: Concept of classes, objects, constructors, methods, this keyword, super keyword, garbage collection, overloading methods and constructors, parameter passing, Arrays String handling: String, StringBuffer, StringBuilder

UNIT -II

Inheritance: Base class object, subclass, member access rules, super uses, using final with inheritance, method overriding, abstract classes.

Interfaces: Defining and implementing an interface, differences between classes and interfaces and extending interfaces Polymorphism.

Packages: Defining, creating and accessing a package, importing packages, exploring packages

UNIT -III

Exception handling: Concepts and benefits of exception handling, exception hierarchy, checked and unchecked exceptions, usage of-try, catch, throw, throws and finally, built in exceptions, creating User defined exceptions.

Multithreading: Difference between multi-threading and multitasking, thread life cycle, creating threads, synchronizing threads, daemon threads, thread groups.

UNIT -IV

Basic I/O Streams: Java I/O classes and interfaces, Files, Stream and Byte classes, Character streams, Serialization Exploring java.lang: Object class, Wrapper classes Exploring java.util: Scanner, StringTokenizer, BitSet, Date, Calendar, Timer

Collections: Overview of Java Collection frame work, commonly used Collection classes – Array List, Linked List, Hash Set, Tree Set, Collection Interfaces – Collection, List, Set. Accessing Collection via iterator, working with Map.

UNIT -V

GUI Programming with java: The AWT class hierarchy, MVC architecture.

Exploring Swing: JLabel, ImageIcon, JTextField, the Swing buttons, JTabbedpane, JScrollPane, JList, JComboBox

Layout manager: Border, Grid, Flow, Card and Grid Bag layouts.

Event Handling: Delegation Event Model, Event Classes, Source of Events, Event Listener Interfaces. Handling mouse and keyboard events, Adapter classes.

New Features in Java: Major enhancement made in Java5, Java6, Java7 and Java8 like auto-boxing, generics, var-args, java annotations, enum, premain method, lambda expressions, functional interface, method references.

Text Books:

1. Schildt and Herbert, Java The complete reference, McGraw, 8th edition, TMH, 2017.
2. R Nageswara Rao, Core JAVA: An Integrated Approach, Black Book, DreamTech, 2016.
3. Cay S. Horstmann, Core JAVA Volume I—Fundamentals, Kindle Edition, 2020.

References Books:

1. Core Java: An Integrated Approach, Dr R. Nageswara Rao, dreamtech.
2. Java How to Program, H.M. Dietel and P.J. Dietel, Sixth Edition, Pearson Education/ PHI.
3. An Introduction to Object Oriented programming with Java,C Thomas Wu, Tata McGraw Hill, 2005.

Course Code	Course Title						Core / Elective
SES302EC	Digital Electronics & Logic Design						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
–	3	–	–	–	40	60	3

Course Objectives:

1. To give insights of the basic design concepts of digital hardware.
2. To explain the operation and design of combinational and arithmetic logic circuits.
3. To familiarize with the design of combinational logic circuits using PLDs.
4. To comprehend about the concepts of sequential circuits.
5. To comprehend about the concepts of synchronous sequential circuits.

Course Outcome: On successful completion of the course, the students will be able to

1. Understand the deign process of digital hardware, use Boolean algebra to minimize the logical expressions and optimize the implementation of logical functions.
2. Understand the number representation and design combinational circuits like adders, MUX etc.
3. Design Combinational circuits using PLDS and write Verilog HDL code for basic gates and combinational circuits.
4. Analyse sequential circuits using flip-flops and design registers, counters.
5. Represent a sequential circuit using Finite State machine and apply state minimization techniques to design a FSM

UNIT – I

Design Concepts: Digital Hardware, Design process, Design of digital hardware. Introduction to logic circuits – Variables and functions, Logic gates and networks. Boolean algebra, Synthesis using gates, Design examples. Optimized implementation of logic functions using K-Map upto 5 Variable maps and Quine-McCluskey Tabular method.

UNIT – II

Number representation: Addition and Subtraction of signed and unsigned numbers.

Combinational circuit building blocks: Adders and Subtractors, Multiplexers. Demultiplexers, Parity Checkers and Generators, Decoders. Encoders. Code converters, BCD

to 7-segment converter, Arithmetic comparator circuits.Design of combination logic using Verilog HDL.

UNIT – III

Design of combinational circuits using Programmable Logic Devices (PLDs): General structure of a Programmable Array Logic (PAL), Programmable Logic Arrays (PLAs), Structure of CPLDs and FPGAs, 2-input and 3-input lookup tables (LUTs).

UNIT – IV

Sequential Circuits: Basic Latch, Gated SR Latch, gated D Latch, Master-Slave edge triggered flip-flops, T Flip-flop, JK Flip-flop, Excitation tables. Registers and Counters. Design of FFs uing Verilog.

UNIT – V

Synchronous Sequential Circuits: Basic Design Steps, Finite State machine (FSM) representation using Moore and Mealy state models, State minimization, Design of FSM for Sequence Generation and Detection, Algorithmic State Machine charts.

Text Books:

1. Moris Mano and Michael D CIletti, Digital Design, Pearson, fourth edition, 2008.
2. Zvi Kohavi, Switching and Finite Automata Theory, 3rd ed., Cambridge University Press-New Delhi, 2011.
3. R. P Jain, Modern Digital Electronics, 4th ed., McGraw Hill Education (India) Private Limited, 2003.

Reference Books:

1. Ronald J. Tocci, Neal S. Widmer &Gregory L. Moss, "Digital Systems: Principles and Applications," PHI, 10/e, 2009.
2. Samir Palnitkar-Verilog HDL A guide to digital design and Synthesis, Pearson, 2nd edition, 2015.

Course Code	Course Title						Core / Elective
SPC302IT	Database Management Systems (Common to AI & DS, CME & IT, CSE IV Sem)						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
Programming for Problem Solving SES101CS, Data Structures SPC201IT	3	–	–	–	40	60	3

Course Objectives:

1. To get familiar with fundamental concepts of database managements and with data base designing.
2. To master hands on SQL and PL/SQL concepts.
3. To impart knowledge in Indexing, hashing, transaction Management, concurrency control techniques and recovery techniques.

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

1. Understand the role of database management system in an organization and learn the database concepts.
2. Construct database queries using relational algebra and SQL
3. Design databases using data modeling and Logical database design techniques.
4. Evaluating the indexing, hashing techniques and transaction management.
5. Understand the concept of a database transaction and related concurrent, recovery facilities.

UNIT – I

Introduction: Database-System Applications, Purpose of Database Systems, View of Data, Database Languages, E.F. Codd rules.

Relational Databases: Database Design, Data Storage and Querying, Transaction Management, Database Architecture, Database Users and Administrators, History of Database Systems.

UNIT – II

Relational model: Structure of relational databases, fuundamental relational-algebra operations.

Introduction to SQL: Overview of the SQL, SQL Data Definition, Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, Null Values, Aggregate Functions, Nested Sub queries, Modification of the Database.

Advanced SQL: Join Expressions, Views, Transactions, Integrity Constraints, SQL Data Types and Schemas, Indexes and types of indexes. Functions, Procedures, Triggers, Cursors, Exceptions, and Packages.

UNIT – III

Database Design and the E-R Model: Overview of the Design Process, E-R Diagrams, Reduction to Relational Schemas, E-R Design Issues, Extended E-R Features.

Relational Database Design: Features of Good Relational Designs, Atomic Domains and First Normal Form, Decomposition Using Functional Dependencies, Functional-Dependency Theory, Algorithms for Decomposition, 2NF, 3NF, BCNF and 4NF.

UNIT – IV

Indexing and Hashing: Sparse index and dense index, static and dynamic hashing.

Transactions: Transaction Concept, A Simple Transaction Model, Storage Structure, Properties of a transaction, Serializability, Implementation of Isolation Levels, Transactions as SQL Statements.

UNIT – V

Concurrency Control: Lock-Based Protocols, Multiple Granularity, Timestamp-Based Protocols, Validation-Based Protocols, Weak Levels of Consistency in Practice.

Backup and Recovery System: Failure Classification, Storage structure, Recovery and Atomicity, log-based recovery with concurrent transactions, Buffer Management, Failure with Loss of Nonvolatile Storage, advanced recovery techniques, Remote Backup Systems.

Text Books:

1. Abraham Silberchatz, Henry F Korth and Sudarshan S, "Database System Concepts", Tata McGraw- Hill, 7th Edition.
2. Raghu Ramakrishnan and Johannes Gehrke, "Database Management Systems", Tata McGraw-Hill, 3rd Edition.
3. RamezElmasri and Shamkant B Navathe, "Fundamentals of Database Systems", Addison Wesley, USA, 6th Edition

Reference Books:

1. C J Date , "AN introduction to database systems", 8th Edition, Pearson.
2. Gupta G K, "Database Management System", Tata McGraw-Hill, New Delhi, 2011.

Course Code	Course Title						Core / Elective
SPC303IT	Discrete Mathematics (Common to AI & DS, CME, CSE & IT)						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
–	3	–	–	–	40	60	4

Course Objectives :- Throughout the course, students will be expected to demonstrate their understanding of Discrete Mathematics.

1. To learn mathematically correct terminology and notation and to perform the operations associated with sets, functions, groups and relations.
2. To apply logical reasoning to solve a variety of problems.
3. To analyze the properties of graphs and trees.

Course Outcomes :- After completion of the course, the students should be able to

1. Understand sets, functions, groups and relations.
2. Apply permutation and combination to handle different types of problems.
3. Apply propositional logic and predicate logic to solve logical statements.
4. Evaluate Boolean functions and simplify expressions using the properties of Boolean Algebra.
5. Develop the given problem as graph networks and solve with techniques of graph theory.

UNIT – 1:-

Sets, Relation and Function: Operations and Laws of Sets, Cartesian Products, Binary Relation, Partial Ordering Relation, Equivalence Relation, Image of a Set, Sum and Product of Functions, Bijective functions, Inverse and Composite Function, Size of a Set, Finite and infinite Sets, Countable and uncountable Sets, Cantor's diagonal argument and The Power Set theorem, Schroeder-Bernstein theorem. Principles of Mathematical Induction: The Well-Ordering Principle, Recursive definition, The Division algorithm: Prime Numbers, The Greatest Common Divisor: Euclidean Algorithm, The Fundamental Theorem of Arithmetic.

UNIT – 2:-

Elementary Combinations :-Basics of counting, combinations and permutations, with repetitions constrained repetitions ,Binomial coefficients. The principle of inclusion-exclusion, pigeon hole principle and its applications.

UNIT 3 :-

Propositional Logic: Syntax, Semantics, Validity and Satisfiability, Basic Connectives and Truth Tables, Logical Equivalence: The Laws of Logic, Logical Implication, Rules of Inference, The use of Quantifiers. Proof Techniques: Some Terminology, Proof Methods and Strategies, Forward Proof, Proof by Contradiction, Proof by Contraposition, Proof of Necessity and Sufficiency.

UNIT 4:-

Algebraic Structures and Morphism: Algebraic Structures with one Binary Operation, Semi Groups, Monoids, Groups, Congruence Relation and Quotient Structures, Free and Cyclic Monoids and Groups, Permutation Groups, Substructures, Normal Subgroups, Algebraic Structures with two Binary Operation, Rings, Integral Domain and Fields. Boolean Algebra and Boolean Ring, Identities of Boolean Algebra, Duality, Representation of Boolean Function, Disjunctive and Conjunctive Normal Form

UNIT -5:-

Graphs and Trees: Graphs and their properties, Degree, Connectivity, Path, Cycle, Sub Graph, Isomorphism, Eulerian and Hamiltonian Walks, Graph Coloring, Coloring maps and Planar Graphs, Coloring Vertices, Coloring Edges, List Coloring, Perfect Graph, definition properties and Example, rooted trees, trees and sorting, weighted trees and prefix codes, Bi-connected component and Articulation Points, Shortest distances.

Text Books:-

1. Kenneth H. Rosen, Discrete Mathematics and its Applications, Tata McGraw- Hill
2. Susanna S. Epp, Discrete Mathematics with Applications,4th edition, Wadsworth Publishing Co. Inc
3. C L Liu and D P Mohapatra, Elements of Discrete Mathematics A Computer riented Approach, 3rd Edition by, Tata McGraw – Hill

References Books:-

1. J.P.Trembly and R.Manohar ,Discrete Mathematical Structures with applications to Computer Science TMG Edition ,Tata MC Graw Hill.
2. JL Mott, A. Kandel, T.P. Baker, Discrete Mathematics for Computer Scientists & Mathematicians, 2nd Edition PHI.
3. Narsing Deo, Graph Theory: with Application to Engineering and Computer Science. Prentice Hall of India 2003.

Course Code	Course Title						Core / Elective
SAC903EE	Electrical Technology						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
–	2	–	–	–	50	–	–

Course Objectives

1. To introduce Generation of energy through conventional sources such as: Thermal, Hydro and Nuclear and renewable energy sources.
2. To familiarize present practices in working of static and dynamic machines and devices.
3. To familiarize mechanical design of Electrical vehicle and hybrid vehicle.

Course Outcomes

1. Gain knowledge of construction and operation of conventional and non-conventional sources of energy
2. Understand the working principle of single phase and three phase transformers
3. Understand the Working principle of generator and motor
4. Know the working of inverter and rectifier operation
5. Understand the concept of Electrical vehicles

UNIT I – Generation of Electrical Energy

Importance of Electrical Energy, Conventional Energy sources for generation of electrical energy, schematic diagram of steam power station, Hydro Electric power plants, Fissile materials, working principle of nuclear power plants and reactor control, Importance of Non-Conventional energy sources, Generation of electrical energy by using Solar and wind, Hybrid power generation.

UNIT II – Transformers

Electromagnetic induction, Faradays laws, statically induced Emf, Lenz law, BH characteristics, Construction and working of transformer, ideal and practical transformer, losses and efficiency, Auto-transformer and three-phase transformer connections. Difference between single phase and three phase transformers. Applications of Transformers.

UNIT III – Generators and Motors

AC & DC Generators: working principle of DC generator and AC generator.

Dynamically induced Emf, Fleming's Right hand and Left-hand rules, Construction and principle of operation of DC generator, EMF equation, Types of DC Generators, OCC characteristics, applications, Working principle of AC generator

AC motors and DC Motors: principle of operation of DC Motor, Types of DC motors, applications. Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, squirrel cage IM, slip-ring IM, Applications, Construction and principle of operation, Capacitor start & capacitor run motor, applications

UNIT IV – Principles of Power Electronics

Principle of operation of single-phase half wave and full wave rectifier, operation of Ac voltage controller and Cyclo converters, working principle of single phase and three phase inverters.

UNIT V – Electric Vehicles

Introduction to Electrical vehicles, EV system, Components of Electrical Vehicle, Electrical vehicle advantages.

Batteries: LED acid, Ni-Cd, Li-Ion batteries and battery characteristics and parameters.

Hybrid Electrical Vehicle-Types of hybrid vehicles, advantages and disadvantages, comparison between Electrical vehicle and Hybrid Vehicle.

Text Books:

1. J.B. Gupta "Fundamentals of Electrical Engineering and Electronics" S.K. Kataria & Sons Publications, 2010.
2. P. S. Bimbhra, Electrical Machinery, Khanna Publishers, 2011.
3. Sunil R. Pawar "Electrical vehicle technology" Notion press, First edition 2021.

Reference Books:

1. Dr. P.S. Bhimbra, Power Electronics, Khanna Publishers, 2009.
2. Wadhwa C.L., Electrical Power Systems, New Age International (P) Ltd., 4th Edition, 2007.
3. Hughes, "Electrical Technology", VII Edition, International Student -on, Addison Welsey Longman Inc., 1995.

Course Code	Course Title						Core / Elective
SPC311IT	OOPS Using JAVA LAB (Common to AI&DS, CSE, IT & CME Sem IV)						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
Programming for Problem Solving SES101CS	–	–	–	3	40	60	1.5

Course Objectives:

1. To introduce fundamentals of object-oriented concepts using java programming such as classes, inheritance, packages and interfaces.
2. To understand and apply concepts of exception handling, multithreading, collection framework.
3. To learn and use concepts of I/O streams, serialization, GUI programming using Swings, database connectivity.

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

1. Understand object-oriented programming fundamental and java programming fundamentals such as classes, inheritance, abstract classes, interfaces, packages.
2. Apply exception handling, multithreading, input output basics and string handling.
3. Design and apply collection framework.
4. Design AWT and Swings concept.
5. Apply input-output operations through IO package.

List of Experiments: Write Programs using Java Language

1. To implement the concept of class with method overloading
2. To apply the concept of Single level and Multi level Inheritance.
3. To understand the concept of Interfaces.
4. To implement Abstract Classes concept.
5. To implement
   a) Checked Exception (IOException).
   b) Unchecked Exceptions. (Arithmetic Exception, Null Pointer Exception, Array Index Out Of Bounds Exception).

c) User defined exception handling when user enters marks for a subject beyond the minimum and maximum range.

6. To implement
   a) The concept of threading using Thread Class and Runnable Interface.
   b) The concept of Thread synchronization.
7. To implement collection classes like Array List, Linked List, Tree map and Hash map.
8. To execute iteration over Collection using Iterator interface and List Iterator Interface.
9. To read a file name from the user, and display information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes. To copy contents of one file into another file.
10. To implement serialization concept
11. To implement event handlers: mouse and key board events
12. To design a basic calculator application using swings.
13. To develop an applet that displays a simple message in center of a screen.

Text Books:

1. Java The complete reference, 8th edition, Herbert Schildt, TMH.
2. Core and Advanced Java, Black Book, Recommended by CDAC, Revised and Upgraded Dream tech Press.

References Books:

1. Core Java: An Integrated Approach, Dr R. Nageswara Rao, dreamtech.
2. Java How to Program, H.M. Dietel and P.J. Dietel, Sixth Edition, Pearson Education/PHI.
3. An Introduction to Object Oriented programming with Java,C Thomas Wu, Tata McGraw Hill, 2005.

Software Required: Java 8

Course Code	Course Title						Core / Elective
SPC312IT	Database Management Systems Lab (Common to AI & DS, CME, IT & CSE Sem IV)						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
Programming for Problem Solving SES101CS, Data Structures SPC201IT	–	–	–	3	40	60	1.5

Course Objectives:

1. To practice various commands of SQL.
2. To write simple and Complex queries in SQL.
3. To familiarize with the PL/SQL programs.

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

1. Implement the basic knowledge of SQL queries and relational databases.
2. Design and implement a database schema for a given problem.
3. Implement different constraints for refining of the databases.
4. Implement various triggers, procedures and cursors using PL/SQL.
5. Generate forms and reports.

List of Experiments:

1. Creation of database and writing SQL queries to retrieve information from the database.
2. Performing insertion, deletion, modifying, altering, updating and viewing records based on the conditions.
3. Creation of views, synonyms and save points.
4. To set various constraints.
5. Implementation of SQL inbuilt functions.
6. Implementation of Nested queries and Complex queries in SQL database.
7. Implementation of PL/SQL procedures and Functions?
8. Implementation of PL/SQL Cursors?
9. Implementation of different types of Exceptions in PL/SQL?
10. Implementation of Triggers in PL/SQL?

11. Implementation of PL/SQL Packages using various database objects?
12. Creation of Forms for Student information, Library information.
13. Report generation using SQL reports.
14. Creation of small full- fledged database application.

Text Books:

1. Abraham Silberchatz, Henry F Korth and Sudarshan S, "Database System Concepts", Tata McGraw- Hill, 7th Edition.
2. Raghu Ramakrishnan and Johannes Gehrke, "Database Management Systems", Tata McGraw-Hill, 3rd Edition.
3. RamezElmasri and Shamkant B Navathe, "Fundamentals of Database Systems", Addison Wesley, USA, 6th Edition

Reference Books:

1. C J Date , "AN introduction to database systems", 8th Edition, Pearson.
2. Gupta G K, "Database Management System", Tata McGraw-Hill, New Delhi, 2011.

Course Code	Course Title						Core / Elective
SPS912EG	Soft SkillsLab (Common to IT-III Sem & AI & DS, Sem IV)						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
–	–	–	–	2	40	60	2

Course Objectives:

1. To enable the students to learn, understand by listening to different speakers in different contexts for various purposes.
2. To enable the students to develop the interactive skills to speak professionally in public and while emceeing.
3. To enable the students to acquire skills to face any interview.
4. To equip the students with the right attitude and coping techniques required to manage time and in decision making.
5. To develop leadership skills required among students to speak professionally in building a team.

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

1. Listen to a variety of speakers and texts and will be able to comprehend and perform the required tasks.
2. Interact in a group professionally.
3. Face any interview confidently.
4. Manage time and make decision by speaking appropriately according to the context.
5. Demonstrate the right attitude and skills to cope with team and communicate professionally

LIST OF EXPERIMENTS

I Listening Skills

1. Listening for comprehensive/ critical/ analytical.
2. Listening for job recruitment.
3. Listening and watching to a variety of speakers in different contexts to dialogues from TV/Radio/Ted talks/Podcasts.

II Speaking Skills-I (Group Communication)

1. Presentation Skills.
2. Public Speaking Skills (ceremonial, demonstrative, informative and persuasive)
3. Emceeing.

III Speaking Skills- II (Interview Skills)

1. Initial Round(Group Discussion, Debate and JAM)
2. Final Round(Telephonic, HR and Panel)

IV Specific Soft Skills- I (Activities Situations)

1. Time Management.
2. Decision Making.

V Specific Soft Skills-II (Activities & Situtaions)

1. Team Building.
2. Leaderships Skills.

Text Books:

1. Andrea J. Rutherford. Basic Communication Skills for Technology. Person Education. Inc. New Delhi.
2. Anne Dannellon. Team Talk The Power of Language in Team Dynamics. Harvard Business School.
3. Antony Jay and Ros Jay. Effective Presentation. How to be a Top Class Presenter. Universities Press. (India) Limited. 1999.
4. Daniel Goldman. Emotional Intelligence. New York. Bantam Books. 1995.

Reference Books:

1. Fnedrike Klippel. Keep Talking. Cambridge University Press London. 1984.
2. Lewis, Hedwing Body Language: A Guide for Professionals. Response Book (a division of Saga Publications India. Pvt. Ltd.)New Delhi.1998.
3. Hari Mohan Prasad and Rajnish Mohan. How to prepare for Group Discussion and Ineview. 2nd Edition, Tata McGraw-Hill Publishing Company Ltd., New Delhi. 2005.
4. Mitra, Barun. Personality Development and Soft Skills.
5. Good heart and Willcox. Soft Skills at Workplace.

IT IV Semester

Sl. No	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	P/D	Contact Hrs per Week	CIE	SEE	SEE Duration in Hours	
Theory Courses										
1	SES401EC	Techniques on Signals and Systems	3	-	-	3	40	60	3	3
2	SPC401IT	Theory of Automata	3	-	-	3	40	60	3	3
3	SPC402IT	Operating Systems	3		-	3	40	60	3	3
4	SES402EC	Fundamentals of Digital Image Processing	3	-	-	3	40	60	3	3
5	SPC403IT	Computer Organization and Microprocessor	3	-	-	3	40	60	3	3
Practical/Laboratory Courses										
6	SPC411IT	Python Lab	1		2	3	40	60	3	2
7	SPC412IT	Operating Systems Lab	-	-	3	3	40	60	3	1.5
8	SPC413IT	Microprocessor Lab	-	-	3	3	40	60	3	1.5
9	SPW511IT	Internship- 1	The students have to undergo a Internship of 4 week duration after IV- Semester SEE				50	-		1
		Total	**16**	**-**	**18**	**24**	**370**	**540**		**21**

IV Semester Detailed Syllabus

Course Code	Course Title						Core / Elective
SES401EC	Techniques on signals and Systems						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
–	3	–	–	–	40	60	3

Course Objectives:

1. To give insights of the classification of continuous-time systems and basic operations on continuous-time signals.
2. To comprehend the mathematical representation of continuous time signals and Fourier series.
3. To describe Fourier and Laplace Transforms of continuous-time signals.
4. To familiarize with the discrete time signals, systems and Fourier analysis in discrete-time domain.
5. To give insights of Z-transform analysis.

Course Outcomes: On successful completion of the course, the students will be able to

1. Define and differentiate types of signals and systems in continuous and discrete time
2. Apply the properties of Fourier transform for continuous time signals
3. Relate Laplace transforms to solve differential equations and to determine the response of the continuous time linear time invariant systems to known inputs.
4. Apply Z-transforms for discrete time signals to solve difference equations.
5. Obtain linear convolution and correlation of discrete time signals with graphical representation.

UNIT-I: Definitions and classifications: Classification of signals, Elementary continuous time signals, Basic operations on continuous-time signals

Classification of continuous time Systems: Continuous time & discrete time systems, Lumped Parameter and distributed parameter systems, Static and dynamic systems, Causal and Non-causal systems, Time-Variant & Time-invariant, Stable and unstable systems.

UNIT-II: Representation of Continuous time signals: Analogy between Signals and Vectors, Orthogonality & completeness

Fourier Series Analysis of continuous time signals: Fourier series- Existence of Fourier series, Trigonometric& Exponential Fourier Series, computational formulae, Symmetry conditions, complex Fourier spectrum.

UNIT-III: Continuous-Time Fourier transform: Direct & inverse Fourier Transform, existence and properties of Fourier Transform, Fourier Transform of standard signals, frequency spectrum, correlation between continuous time signals: Auto and cross correlation, graphical interpretation, properties of correlation.

Laplace transform: The direct LT, Region of Convergence, existence of LT, properties of LT, inverse LT, solution of differential equations, system transfer function.

UNIT-IV: Discrete-time signals and systems: Sampling, Classification of discrete time signals, basic operation on discrete time signals, Classification on discrete time systems, properties of systems.

Fourier analysis of discrete-time signals: Discrete time Fourier transform (DTFT), properties of DTFT, Transfer function, Discrete Fourier transform properties of DFT.

UNIT-V: Z-Transform analysis of signals: The direct Z-Transform, Region of Convergence, Z-plane & S-plane correspondence, inverse Z-transform, properties of Z-Transforms, Solution to linear difference equations, Linear constant coefficient systems, system transfer function.

Text Books:

1. B. P. Lathi, Linear Systems and Signals, Oxford University Press, 2nd Edition, 2009.
2. A. V. Oppenheim, A.S. Willsky – Signals & Systems – 2nd Edition, Prentice Hall.
3. P. Ramesh Babu, R.Ananada Natarajan-Signals and Systems-4th Edition, Scitech Publications.
4. P. Ramakrishna Rao, Signals and Systems, 2e, TMH.

Reference Books:

1. Rodger E. Ziemer, William H Trenter, D. Ronald Faninn – Signals & Systems – 4th Edition, Pearson 1998.
2. Douglas K. Linder. Introduction to Signals and Systems, MC Graw Hill,1999.

Course Code	Course Title						Core / Elective
SPC401IT	Theory of Automata						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
Discrete Mathematics SPC303IT	3	–	–	–	40	60	3

Course Objectives: The students will be able to:

1. To give an overview of the theoretical foundations of computer science from the perspective of formal languages.
2. To illustrate finite state machines and push down automata to solve problems in computing
3. To familiarize Regular grammars, context frees grammar and context sensitive grammar

Course Outcomes: After completion of this course, students will be able to:

1. Gain the knowledge of basic kinds of finite automata and their capabilities.
2. Understand regular and context-free languages
3. Gain the knowledge to analyze regular expressions and grammars
4. Design finite automata, push down automata.
5. Constructing the Turing machine for Recursive languages.

UNIT-I

Automata: Introduction to Finite Automata, Central Concepts of Automata Theory.

Finite Automata: An informal picture of Finite Automata, Deterministic Finite Automata, Nondeterministic Finite Automata, An Application, Finite Automata with Epsilon Transitions.

UNIT-II

Regular Expression And languages: Regular Expressions, Finite Automata and Regular Expression, Applications of Regular Expressions, Algebraic Laws for Regular Expression.

Properties of Regular Languages: Proving Languages not to be Regular, Closure Properties of Regular Languages, Decision Properties of Regular Languages, Equivalence and Minimization of Automata.

UNIT-III

Context Free Grammars and Languages: Context-Free Grammars, Parse Trees, Applications, Ambiguity in Grammars and Languages

Properties of Context Free Languages: Normal Forms for Context-Free Grammars, Pumping Lemma, Closure Properties, Decision Properties of CFL 's.

UNIT-IV

PUSHDOWN AUTOMATA: Definition, Model, Acceptance of CFL, Acceptance by Final State and Acceptance by Empty stack and its Equivalence, Equivalence of CFG and PDA.

TURING MACHINES (TM): Formal definition and behaviour, Languages of a TM, TM as accepters, and TM as a computer of integer functions, Types of Tms.

UNIT-V

RECURSIVE AND RECURSIVELY ENUMERABLE LANGUAGES (REL): Properties of recursive and recursively enumerable languages, Universal Turing machine, The Halting problem, Undecidable problems about TMs. Context sensitive language and linear bounded automata (LBA), Chomsky hierarchy, Decidability, Post's correspondence problem (PCP), undecidability of PCP.

Text Books:

1. John Hopcroft, Rajeev Motwani, Jeffery D Ulman. Introduction to Automata Theory Languages and Computation, third edition, Pearson Education, 2009.
2. John C. Martin, Introduction to Languages and the Theory of computation, third Edition, Tata McGrawHill,2003.
3. Thomas Sudkamp, *Languages and Machines: An Introduction to the Theory of Computer Science*. (Third Edition)

Reference Books:

1. K. L. P Mishra, N. Chandrashekaran (2003), Theory of Computer Science-Automata Languages and Computation, 4th edition, Prentice Hall of India, India.
2. Kavi Mahesh, Theory of Computation A Problem solving approach, Wiley India Pvt. Ltd
3. Daniel I.A. Cohen, Introduction to Computer Theory, John Wiley & Sons, 2nd Edition, 2004

Course Code	Course Title						Core / Elective
SPC402IT	Operating Systems (Common to AI & DS, CME, CSE, IT)						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
SBS301MT	3	–	–	–	40	60	3

Course Objectives: Students will be able

1. To learn fundamentals of Operating Systems.
2. To understand the functions of Operating Systems.
3. To learn memory management.

Course Outcomes: After completion of this course, students will be able to:

1. Understand System calls and evaluate process scheduling.
2. Apply procedures for process synchronization.
3. Understand the concepts of deadlock.
4. Implement the concepts of memory management.
5. Understand file system interface and I/O systems.

UNIT-1

Introduction: Concept of Operating Systems, Generations of Operating systems, Types of Operating Systems, OS Services, System Calls, Structure of an OS - Layered, Monolithic, Microkernel Operating Systems, Concept of Virtual Machine.

UNIT-2

Processes: Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching.

Thread: Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads.

Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, Scheduling Criteria, Scheduling algorithms, multiprocessor scheduling.

UNIT-3

Process Synchronization: Inter-process Communication: Critical Section, Race Conditions, Mutual Exclusion, Peterson‘s Solution, classical problems of synchronization: The Bounded

buffer problem, Producer\Consumer Problem, reader's & writer problem, Dinning philosopher's problem. Semaphores, Event Counters, Monitors, Message Passing,

Deadlocks: Definition, Necessary and sufficient conditions for Deadlock, Methods for Handling: Deadlocks: Deadlock prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.

UNIT-4

Memory Management: Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation, fragmentation, and Compaction; Paging: Principle of operation – Page allocation – Hardware support for paging, structure of page table, Protection and sharing, Disadvantages of paging.

UNIT-5

File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods, Free-space management, directory implementation, efficiency, and performance.

Secondary-Storage Structure: Disk structure, Disk scheduling algorithms, Disk Management, RAID structure.

Text Books:

1. AviSilberschatz,PeterGalvin,GregGagne,OperatingSystemConceptsEssentials,9th Edition, Wiley Asia Student Edition, 2017.
2. William Stallings, Operating Systems: Internals and Design Principles, 5th Edition,Prentice Hall of India, 2016.
3. Maurice Bach, Design of the Unix Operating Systems, 8th Edition, Prentice-Hall of India, 2009.

Reference Books:

1. Daniel P. Bovet, Marco Cesati, Understanding the Linux Kernel, 3rd Edition, O'Reilly and Associates.
2. Naresh Chauhan, Principles of Operating Systems, Oxford University Press,2014.

Course Code	Course Title						Core / Elective
SES402EC	Fundamentals of Digial Image Processing						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
–	3	–	–	–	40	60	3

Course Objectives:

1. To familiarize with the basic concepts and methodologies for digital image processing.
2. To give insights of various image transforms.
3. To describe the spatial and transform domain techniques used in image enhancement.
4. To comprehend the degradation functions for image restoration.
5. To evaluate the image segmentation and compression techniques

Course Outcomes: On successful completion of the course, the students will be able to

1. Illustrate basic concepts of digital image processing
2. Implement image transforms
3. Distinguish spatial and frequency domain image enhancement
4. Estimate degradation function for image restoration
5. Apply image segmentation and compression techniques

UNIT-I: Digital Image Fundamentals

Image sensing, acquisition, Image formation model, sampling and Quantization, Basic relationships between pixels; neighbors of a pixel, adjacency, connectivity, regions, and boundaries. Image formation, brightness, adaptation, and discrimination, Color Image Processing – Color Models and Representation, Categorization of images according to their source of EM radiation.

UNIT-II: Qualitative Analysis of Image Transforms

2D Fourier transform, Properties of 2D Fourier transform, Walsh, Hadamard, Slant, Haar, Discrete Cosine Transform and Hotelling transform.

UNIT-III: Image Enhancement

Spatial domain techniques: Contrast Stretching, Histogram Equalization and Histogram Specification method, Neighborhood averaging and adaptive Median filter.

Frequency domain methods: Ideal Low pass, Butterworth and Gaussian Low pass filters. Ideal High pass, Butterworth and Gaussian High pass filters. Homomorphic filtering.

UNIT-IV:

Image Restoration: Mathematical expression for degraded image.

Estimation of degradation functions: image observation, experimentation and by modeling, Inverse filter, Wiener filter, Geometric transformation, periodic noise reduction method.

UNIT-V:

Image Segmentation and Compression: Detection of discontinuities, point, line and Edge detection methods: Gradient operation, Laplacian, Prewitt, Sobel, Laplacian of Gaussian and Canny edge detector.

Image compression: Functional block diagram of a general image compression system, various types of redundancies, Huffman coding, Arithmetic coding.

Text Books:

1. Rafeal C. Gonzalez, Richards E. Woods, Steven L. Eddins, "Digital Image Processing Using MATLAB," 2nd Edition, Tata McGraw Hill, 2010.
2. Jayaraman S., Esakkirajan S., Veera Kumar T., "Digital Image Processing," TGH, 2009.
3. Anil K. Jain, "Fundamentals of Digital Image Processing," Prentice-Hall of India Private Limited, New Delhi, 1995.

Reference Books:

1. Vipula Singh, "Digital Image Processing with Matlab and LabView," Elsevier, 2013.
2. Milan Sonka, Vaclav Havel and Roger Boyle, "Digital Image Processing and Computer Vision," Cengage Learning India Pvt. Limited, 2008.
3. Qidwai, "Digital Image Processing: An Algorithmic Approach with MATLAB," Taylor & Francis, Yesdee Publications, First Indian Reprint 2013.

Course Code	Course Title						Core / Elective
SPC403IT	Computer Organization and Microprocessor (Common to AI & DS, CME, IT Sem IV)						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
–	3	–	–	–	40	60	3

Course Objectives

1. To understand the Instruction Set Architecture and the basic components of CPU.
2. To learn the interfacing of I/O Organization, Interrupt-driven I/O, and DMA
3. To understand the 8085 and 8051 architectures.

Course Outcomes: Students will be able to

1. Understand the Instruction Set Architecture: Instruction format, types, various addressing modes
2. Understand the basic components of the CPU
3. Understand the parallelism both in terms of a single processor and multiple processors
4. Understand the 8085 and 8051 architectures
5. Apply interfacing with I/O Organization, Interrupt-driven I/O, DMA

UNIT-I

Data Representation: Fixed and Floating Point representations.

Overview of Computer Function and Interconnections: Computer components, Interconnection structures, Bus interconnection, Bus structure, and Data transfer.

Register Transfer Microoperations: Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic, Logic and Shift microoperations, Arithmetic Logic Shift Unit.

UNIT-II

Basic Computer Organization and Design: Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory reference instruction, Input-Output and Interrupt.

Microprogrammed Control: Control memory, Address Sequencing, Microprogram example, Design of Control Unit.

UNIT-III

Central Processing Unit: General Register Organization, Stack Organization, Instruction formats, Addressing modes, Data Transfer and Manipulation, and Program control. Floating Point Arithmetic Operations.

Pipeline Processing: Arithmetic, Instruction and RISC Pipelines.

Memory Organization: Cache memory, Virtual memory, Memory Management hardware

UNIT-IV

8085 Architecture: Introduction to microprocessors and microcontrollers, 8085 Processor Architecture, Internal operations, Instructions and timings. Programming the 8085 - Introduction to 8085 instructions, Addressing modes and Programming techniques with Additional instructions.

Input-Output Organization: Modes of Transfer, Priority Interrupt, Direct Memory Access (DMA), I/O Processor. Basic Interfacing concepts with 8085, Programmable Interrupt Controller(8259A). Direct Memory Access(DMA) - DMA Controller (Intel 8257)

UNIT-V

Introduction to Microcontrollers, 8051 – Architecture, Instruction set, Addressing modes and Programming techniques. Comparison of various families of 8-bit micro controllers. System Design Techniques - Interfacing of LCD, ADC, Sensors, Stepper motor, Keyboard and DAC using microcontrollers. Communication Standards - Serial RS 232 and USB. Features of Multi-Core Processors architectures and Graphics Processing Units.

Text Books:

1. Carl Hamacher, ZvonkoVranesic, SafwatZaky, Computer Organization, 5th Edition, McGraw Hill, 2002.
2. Ramesh S Gaonkar, Microprocessor Architecture, Programming, and Applications with the 8085, 5/E PrenticeHall,2002.
3. Pal Chouduri, Computer Organization and Design, Prentice Hall ofIndia,1994.

Reference Books:

1. M. M. Mano, Computer System Architecture, 3rd Edition, Prentice Hall.
2. Ramesh S. Gaonkar "Microprocessor Architecture, Programming, and Applications with the 8085", 5/E, Prentice Hall, 2002.
3. Myke Predko "Programming and Customizing the 8051 Microcontroller", Tata McGraw Hill, 1994

Course Code	Course Title						Core / Elective
SPC411IT	Electrical Technology						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
–	1	–	–	2	40	60	2

Course Objectives: The students will be able to:

1. Learn basic Programming using Python
2. Learn Object-oriented programming.
3. Design graphical-user interfaces (GUI).

Course Outcomes: After completing this course, the student will be able to:

1. Develop and execute simple programs using Python.
2. Use conditional control structures for problem solving
3. Decompose a problem using functions.
4. Represent compound data using lists, tuples, dictionaries using Python
5. Solve the complex problems using advanced Python concepts and design GUI.

1. Introduction to Python Programming:

a. Executing instructions in Interactive interpreter and a Python Script.
b. Raise Indentation Error and Correct it.
c. Compute distance between two points taking input from the user
d. Perform all arithmetic operations with minimum two numbers.
e. Display the following information: Your name, Full Address, Mobile Number, College Name, Subjects.

2. Decision Making and Loops

a. Check whether a given number is even or odd.
b. Find the largest three integers using if-else
c. To read a number (1-7) and display corresponding day using if_elif_else?
d. Receives a series of positive numbers and display the numbers in an ascending order and calculate the sum.
e. Get any number from user, Generate the series with reverse order (n to 1) using While loop.

3. Functions and Recursion

a. Write a function to find mean, median, mode for the given set of numbers in a list
b. Write a function to check whether two strings are nearly equal or not. Display how many characters are matching.
c. To print Fibonacci Sequence up to a given number n
d. To find GCD of two integers.
e. To display prime number from 2 to n.
f. Functions that accept a string as an argument and return the number of vowels and consonants that the string contains.

4. Strings & List

a. To check whether the given string is palindrome or not.
b. To remove the nth index character from an nonempty string
c. To create a list and perform the following methods 1) insert() 2) remove() 3) append() 4) len() 5) pop() 6) clear()
d. To remove duplicates from a list

5. Tuples & Dictionaries

a. To Create a dictionary and apply the following methods 1) Print the dictionary items 2) access items 3) use get() 4)change values
b. To count the number of characters in the string and store them in a dictionary data structure
c. To convert nested list into dictionary.

6. Files

a. Generate 1 to n random numbers and write it in a file then read from a file.
b. To display a list of all unique words in a text file
c. To analyse the two text files using set operations
d. To print each line of a file in reverse order.
e. To count frequency of words in a given file.

7. Exceptions

a. Read two numbers n1 and n2. Write a function to compute n1/n2 and use try/except to catch the exceptions.
b. To detect and handle the exception while solving the quadratic equation.

c. To handle the run time errors while doing the file handling operation.
d. To create and raise user defined exceptions.

8. Object Oriented Programming

a. Program to implement the inheritance
b. Program to implement the polymorphism

9. GUI Programming

a. Design a GUI based calculator to perform arithmetic operations like addition, subtraction, multiplication and division.
b. Design a GUI based application to convert temperature from Celsius to Fahrenheit.
c. Write a python program to perform various database operations (create, insert, delete, update)

10. Numpy-2

a. Write a basic array of operations on single array to add x to each element of array and subtract y from each element of array.
b. Write a program to add, subtract and multiply two matrices.
c. Create multi-dimensional arrays and find its shape and dimension.
d. Create a null matrix and unit matrix.
e. Reshape and flatten data in the array

11. Numpy-2

a. Append data vertically and horizontally
b. Apply indexing and slicing on array
c. Use statistical functions on array - Min, Max, Mean, Median and Standard Deviation
d. Dot product and matrix multiplication of two arrays
e. Compute the Eigen values of a matrix.

12. Numpy-3

a. Compute the rank of a matrix
b. Compute the determinant of a 2-dimensional array.
c. Perform Sorting, Searching and Counting using Numpy methods.

13. Regular Expressions

a. Write a python program to check the validity of a password given by the user. The password should satisfy the following criteria:
   i. Contain at least 1 letter between a and z
   ii. Contain at least 1 number between 0 and 9
   iii. Contain at least 1 letter between A and Z
   iv. Contain at least 1 character from $, #, @
   v. Minimum length of password: 6
   vi. Maximum length of password: 12

b. Write a Python program to validate mobile number.

Text Books:

1. Monu Singh Rakesh K. Yadav, Srinivas Arukonda "Zero To Mastery In Python Programming ", Vayu Education Of India, 2021
2. Martin C. Brown," PYTHON: The Complete Reference", McGraw-Hill, 2018
3. Allen Downey , "Learning with Python", Dreamtech Press; 1st edition , 2015

Reference Books:

1. Wesley J Chun," Core Python Applications Programming", Prentice Hall, 2012.
2. R. Nageswara Rao , "Core Python Programming" Dreamtech Press India Pvt Ltd 2018.
3. Allen B Downey," Think Python", O'Reilly, 2012.

Course Code	Course Title						Core / Elective
SPC412IT	Operating Systems Lab (Common to AI & DS, CME, CSE, IT)						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
–	3	–	–	–	40	60	1.5

Course Objectives:

1. Understand unix commands.
2. Implement Process management related techniques.
3. Implement memory management techniques.

Course Outcomes: Upon completion of the course, the students will be able to:

1. Execute the unix commands.
2. Implement CPU scheduling algorithms.
3. Implement producer-consumer problem reader-writers problem, dinning philosophers' problem.
4. Apply the Banker's algorithm for deadlock avoidance.
5. Implement page replacement and disk scheduling techniques.

1. Program to implement Unix system calls (fork(), wait(), exec(), sleep()) and file management.
2. Program to implement multithread concepts.
3. Program to implement CPU scheduling algorithms:
   (i) FCFS (ii) SJF (iii) Round Robin
4. Program to implement Shared memory and Inter Process Communication (IPC) techniques.
5. Program to implement Process Synchronization using Dining Philosopher
6. Program to implement Process Synchronization using Producer-Consumer.
7. Program to implement Process Synchronization using Readers-Writers.
8. Program to implement deadlock detection.
9. Program to implement Bankers Algorithm for Deadlock Avoidance.
10. Program to implement the following Page Replacement Algorithms using FIFO

11. Program to implement the following Page Replacement Algorithms using LRU and LFU.
12. Program to implement FCFS Disk Scheduling Algorithm.
13. Program to implement SSTF Disk Scheduling Algorithms

Text Books:

1. AviSilberschatz, Peter Galvin, Greg Gagne, Operating System Concepts Essentials,9th Edition, Wiley Asia Student Edition, 2017.
2. Naresh Chauhan, Principles of Operating Systems, Oxford University Press,2014

Software Required: Putty interface, Windows

Course Code	Course Title						Core / Elective
SPC413IT	Microporcessor Lab (Common to AI & DS, CME & IT Sem IV)						Core
Prerequisite	Contact hours per week				CIE	SEE	Credits
	L	T	D	P			
–	–	–	–	3	40	60	1.5

Course Objectives: The objectives of the course are to impart knowledge of the:

1. To become familiar with the architecture and Instruction set of Intel 8085 microprocessor.
2. To provide practical hands-on experience with Assembly Language Programming.
3. To familiarize the students with interfacing of various peripheral devices with 8085 micro processors

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

1. Interpret the principles of Assembly Language Programming, instruction set in developing microprocessor-based applications.
2. Develop Applications such as: 8-bit Addition, Multiplication, Division, array operations, swapping, negative and positive numbers.
3. Analyse the interfaces like serial ports, digital-to-analog Converters and analog-to-digital converters etc.
4. Build interfaces of Input-output and other units like stepper motor.
5. Analyse the function of traffic light controller.

List of Experiments

PART A: Programs using VERILOG

1. Review of the different logic design ckts., a) Gates b) Flip/Flop (RS, JK, D, T)
2. Familiarity with state of art IC-chips, e.g. a) Multiplexer , b) Decoder, c) Encoder, d) Counter, e)Shift-Register, f)adder Truth Table verification and clarification from Data-book.
3. Design a BCD adder.
4. Design an Adder/Subtracter composite unit
5. Design a carry-look ahead Adder

6. Design a ripple counter and carry-look ahead counter.
7. Design ALU and 4-bit processor

PART B: 8085 Programming using Microprocessor Trainer Kit

8. Simple programming examples using 8085 instruction set. To understand the use of various instructions and addressing modes.
9. Interfacing and programming of 8255 (Eg. Traffic Light Controller)
10. Interfacing and programming of 8254 and 8279.

PART C: 8051 Programming

11. Simple programming examples using 8051 Microcontroller
12. A/D and D/A converter interface
13. Stepper motor interface
14. Display Interface