FACULTY OF ENGINEERING

Scheme of Instructions & Detailed Syllabus of III & IV Semester

For
Four Year Degree Programme of

Bachelor of Engineering (B.E)

in

COMPUTER SCIENCE AND ENGINEERING

(With effect from the academic year 2022-23)
(Approved by College Academic Council on -- -- ----)

Issued by

Dean, Academics,
Stanley College of Engineering and Technology for Women (Autonomous)
(Affiliated to Osmania University)
(Accredited by NAAC with "A" Grade)
Abids, Hyderabad – 500 001, Telangana.

SCHEME OF INSTRUCTION &EXAMINATION
BE (COMPUTER SCIENCE AND ENGINEERING)
CSE: SEMESTER – III

S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	P/D	Contact Hrs/Wk	CIE	SEE	Duration in Hrs	
Theory Courses										
1	S BS 301 MT	Mathematics-III (Probability & Statistics)	3	-	-	3	40	60	3	3
2	S ES 301 CS	Discrete Mathematics	3	-	-	3	40	60	3	3
3	S ES 302 EC	Digital Electronics (LST)	3	-	-	3	40	60	3	3
4	S PC301 CS	Oops using Java	3	-	-	3	40	60	3	3
5	S PC 302 CS	Computer Organization	3	-	-	3	40	60	3	3
Practical/ Laboratory Courses										
6	S ES 312 CS	Python Programming Lab	2	-	2	4	40	60	3	3
7	S PC 311 CS	Oops using Java Lab	-	-	3	3	40	60	3	1.5
8	S PC 312 CS	Computer Organization Lab	-	-	3	3	40	60	3	1.5
9	S PW 311 CS	Field Work	-	-	-	-	50	-	-	1
Total			**17**	**0**	**8**	**25**	**370**	**480**		**22**

BS: Basic Sciences **ES: Engineering Sciences** **MC: Mandatory Course**
L: Lectures **T: Tutorials** **P: Practical** **D: Drawing**
CIE: Continuous Internal Evaluation **SEE: Semester End Examination**

Note:

1. **Each contact hour is a clock hour.**
2. **The duration of the practical class is two hours, however it can be extended wherever necessary, to enable the student to complete the experiment.**

Course Code	Course Title						Core/Elective
SBS301MT	**MATHEMATICS-III (PROBABILITY & STATISTICS) (Common to AI&DS, CME, CSE)**						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
SBS101MT SBS 201MT	3	-	-	-	40	60	3

Course Objectives:

Students will be able to

1. To provide knowledge of probability distribution, tests of significance, correlation and regression.

Course Outcomes:

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

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. Apply continuous probability distributions like normal to solve the practical problems
4. Perform a regression analysis and to compute and interpret the coefficient of correlation.
5. Apply Chi-square test for goodness of fit and independent attributes

Unit I

Introduction of Probability: Conditional Probability, Theorem of total probability, Baye's heorem 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 geñerating 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" 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/REFERENCE/ADDITIONAL 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.
4. N.P. Bali & M. Goyal, "A text Book of Engineering Mathematics", Laxmi Publications, 2010
5. S.C. Gupta & V.K. Kapoor, "Fundamentals of Mathematical Statistics", S. Chand Pub.

Course Code	Course Title						Core/Elective
SES301CS	**DISCRETE MATHEMATICS (Common to AI&DS, CME, CSE & IT)**						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	3	1	-	-	40	60	4

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

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

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

- Understand sets, functions, groups and relations.
- Apply permutation and combination to handle different types of problems.
- Apply propositional logic and predicate logic to solve logical statements.
- Evaluate Boolean functions and simplify expressions using the properties of Boolean Algebra.
- 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 Oriented Approach, 3rd Edition by, Tata McGraw – Hill

References:-

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
SES302EC	**DIGITAL ELECTRONICS (Common to AI&DS IVSem, CME & CSE III Sem)**						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
	3	-	-	-	40	60	3

Course Objectives:

- To learn the principles of digital hardware and support given by it to the software.
- To explain the operation and design of combinational and arithmetic logic circuits.
- To design hardware for real world problems.

Course Outcome:

On successful completion of the course, the students would be able to

- Understand the deign process of digital hardware, use Boolean algebra to minimize the logical expressions and optimize the implementation of logical functions.
- Understand the number representation and design combinational circuits like adders, MUX etc.
- Design Combinational circuits using PLDS and write Verilog HDL code for basic gates and combinational circuits.
- Analyze sequential circuits using flip-flops and design registers, counters.
- Design 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 up to 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.

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.

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.

Suggested Readings:

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

Course Code	Course Title						Core/Elective
SPC301CS	**OOPS USING JAVA (Common to AI&DS, CSE & IT , CME IVSem)**						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
Principles of Programming languages	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

- Identify classes, objects, members of a class and the relationships needed to solve a problem.
- Use interfaces and creating user-defined packages.
- Utilize exception handling and Multithreading concepts to develop Java programs.
- Compose programs using the Java Collection API.
- 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, String Buffer, 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, String Tokenizer, 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:

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
SPC302CS	**COMPUTER ORGANIZATION (Common to AI&DS& CME, IT Sem IV)**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
SES302EC	**3**	**-**	**-**	**-**	**40**	**60**	**3**

Course Objectives

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

Course Outcomes

Students will be able to

- understand the Instruction Set Architecture: Instruction format, types, various addressing modes
- understand the basic components of the CPU
- understand the parallelism both in terms of a single processor and multiple processors
- understand the 8085 and 8051 architectures
- 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 micro operations, 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,PrenticeHall.
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
S ES 312 CS	**Python Programming Lab**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**1**	**2**	**-**	**2**	**40**	**60**	**2**

Course Objectives

The students will be able to:

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

Course Outcomes

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

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

1. Introduction to Python Programming:
    1. Executing instructions in Interactive interpreter and a Python Script.
    2. Raise Indentation Error and Correct it.
    3. Compute distance between two points taking input from the user
    4. Perform all arithmetic operations with minimum two numbers.
    5. Display the following information: Your name, Full Address, Mobile Number, College Name, Subjects.
2. Decision Making and Loops
    1. Check whether a given number is even or odd.
    2. Find the largest three integers using if-else
    3. To read a number (1-7) and display corresponding day using if_elif_else?
    4. Receives a series of positive numbers and display the numbers in an ascending order and calculate the sum.
    5. Get any number from user, Generate the series with reverse order (n to 1) using While loop.
3. Functions and Recursion
    1. Write a function to find mean, median, mode for the given set of numbers in a list

2. Write a function to check whether two strings are nearly equal or not. Display how many characters are matching.
3. To print Fibonacci Sequence up to a given number n
4. To find GCD of two integers.
5. To display prime number from 2 to n.
6. Functions that accept a string as an argument and return the number of vowels and consonants that the string contains.

4. Strings & List
    1. To check whether the given string is palindrome or not.
    2. To remove the n^{th} index character from an nonempty string
    3. To create a list and perform the following methods 1) insert() 2) remove() 3) append() 4) len() 5) pop() 6) clear()
    4. To remove duplicates from a list

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

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

2. Exceptions
    1. Read two numbers n1 and n2. Write a function to compute n1/n2 and use try/except to catch the exceptions.
    2. To detect and handle the exception while solving the quadratic equation.
    3. To handle the run time errors while doing the file handling operation.
    4. To create and raise user defined exceptions.

3. Object Oriented Programming

1. Program to implement the inheritance
2. Program to implement the polymorphism

4. GUI Programming
    1. Design a GUI based calculator to perform arithmetic operations like addition, subtraction, multiplication and division.
    2. Design a GUI based application to convert temperature from Celsius to Fahrenheit.
    3. Write a python program to perform various database operations (create, insert, delete, update)
5. Numpy-2
    1. 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.
    2. Write a program to add, subtract and multiply two matrices.
    3. Create multi-dimensional arrays and find its shape and dimension.
    4. Create a null matrix and unit matrix.
    5. Reshape and flatten data in the array
6. Numpy-2
    1. Append data vertically and horizontally
    2. Apply indexing and slicing on array
    3. Use statistical functions on array - Min, Max, Mean, Median and Standard Deviation
    4. Dot product and matrix multiplication of two arrays
    5. Compute the Eigen values of a matrix.
7. Numpy-3
    1. Compute the rank of a matrix
    2. Compute the determinant of a 2-dimensional array.
    3. Perform Sorting, Searching and Counting using Numpy methods.
8. Regular Expressions
    1. Write a python program to check the validity of a password given by the user. The password should satisfy the following criteria:

1. Contain at least 1 letter between a and z
2. Contain at least 1 number between 0 and 9
3. Contain at least 1 letter between A and Z
4. Contain at least 1 character from $, #, @
5. Minimum length of password: 6
6. Maximum length of password: 12

2. 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
SPC311CS	**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	-	-	-	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:
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
SPC312CS	**COMPUTER ORGANIZATION LAB (Common to AI&DS, CME & IT Sem IV)**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**-**	**-**	**-**	**2**	**40**	**60**	**1**

Course Objectives

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

- To become familiar with the architecture and Instruction set of Intel8085microprocessor.
- To provide practical hands on experience with Assembly Language Programming.
- To familiarize the students with interfacing of various peripheral devices with 8085 microprocessors

Course Outcomes

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

- Interpret the principles of Assembly Language Programming, instruction set in developing microprocessor based applications.
- Develop Applications such as: 8-bit Addition, Multiplication, Division, array operations, swapping, negative and positive numbers.
- Analyse the interfaces like serial ports, digital-to-analog Converters and analog-to-digital converters etc.
- Build interfaces of Input-output and other units like stepper motor.
- 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.
11. Interfacing and programming of 8279.

PART C: 8051 Programming

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

SCHEME OF INSTRUCTION &EXAMINATION
BE (COMPUTER SCIENCE AND ENGINEERING)
CSE: SEMESTER – IV

S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	P/D	Contact Hrs/Wk	CIE	SEE	Duration in Hrs	
Theory Courses										
1	S HS 902 EG	Effective Technical Communication Skills	2	-	-	2	40	60	3	2
2	S PC 401 CS	Automata Theory Languages and Computation	3	-	-	3	40	60	3	3
3	S PC402 CS	Artificial Intelligence	3	-	-	3	40	60	3	3
4	S PC 403 CS	Database Management Systems	3	-	-	3	40	60	3	3
5	S PC 404 CS	Operating Systems	3	-	-	3	40	60	3	3
6	SAC903EE	Electrical Technology	2	-	-	2	50	-	-	-
Practical/ Laboratory Courses										
6	S PC 413 CS	Database Management Systems Lab	-	-	3	3	40	60	3	1.5
7	S PC 414 CS	Operating Systems Lab	-	-	3	3	40	60	3	1.5
8	S PC 415 CS	Web Technology & Applications Lab	2	-	3	5	40	60	3	3.5
9	S PW 421 CS	Summer Internship-1*	-	-	-	-	-	-	-	-
Total			**19**	**-**	**09**	**28**	**420**	**480**	24	**22.5**

BS: Basic Sciences **ES: Engineering Sciences** **MC: Mandatory Course**
L: Lectures **T: Tutorials** **P: Practical** **D: Drawing**
CIE: Continuous Internal Evaluation **SEE: Semester End Examination**
Note:

1. **Each contact hour is a clock hour.**
2. **The duration of the practical class is two hours, however it can be extended wherever necessary, to enable the student to complete the experiment.**

Course Code	Course Title						Core/Elective
SHS902EG	**Effective Technical Communication CME IV & CSE IV**						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
SH901EG	2	-	-	-	40	60	2

Course Objectives:

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1. To understand the process and barriers of communication.
2. To learn the aspects of communication and presentation.
3. To comprehend the types of business correspondence.
4. To analyze the techniques of report writing.
5. To get the knowledge of basics of manual writing.

Course Outcomes:

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

1. overcome the barriers of communication.
2. handle technical and business communication effectively.
3. build any kind of business correspondence.
4. draft efficient reports.
5. acquire adequate skills of manual writing.

UNIT- I

Introduction to Communication.

Definition and process of communication.
Channels of Communication.
ABC of Written Communication.
Barriers of Technical Communication.

UNIT- II

Aspects of Communication

Importance of listening and types of listening.
Verbal communication and non-verbal communication (proxemics, kinesics).
Persuasive techniques.
Presentation skills

UNIT III

Manual Writing

Types of manuals
User manual
Product and Process manual
Operations manual

UNIT IV

Business Correspondence

Email etiquette and Mobile etiquette
Agenda, Minutes of the Meeting and 1OM (Inter Office Memorandum).
Business letters (enquiry and response; complaint and adjustment; and sales).
Business proposals

UNIT V

Report Writing

Types of reports (Informative, analytical, periodic and special, formal and informal)
Structure of a report
Feasibility report
Progress report

Suggested Readings

1. Raman, Meenakshi & Sharma, Sangeeta, "Technical Communication: Principles and Practices(3d edition), New Delhi (2015).

2. Rizvi, Ashrad, M, Effective Technical Communication (2nd Ed.). Tata McGraw Hill Education. New Delhi. (2017).

3. Sharma, R.C., & Mohan, Krishna Business Correspondance and Report Writing: A Practical Approach to Business & Technical Communication (4th ed.) Tata McGraw Hill Education, New Delhi (2017)

4. Tyagi, Kavitha & Misra, Padma, Advanced Technical Communication, New Delhi, PHI Learning (2011).

Course Code	Course Title						Core/Elective
S PC 401 CS	**Automata Theory Languages and Computation**						**CORE**
Prerequisite	**Contact Hours per Week**				**CIE**	**SEE**	**CREDITS**
Discrete Mathematics	L	T	D	P			
	3	1	-	-	40	60	3

Course Objectives: The students will be able to

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

Course Outcomes:

After completion of this course, students will be able to

- Gain the knowledge of basic kinds of finite automata and their capabilities.
- Understand regular and context-free languages
- Gain the knowledge to analyze regular expressions and grammars
- Design finite automata, push down automata.
- 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/Title
S PC 402 CS	**ARTIFICIAL INTELLIGENCE**					CORE
Prerequisite Statistics, Probability	Contact Hours Per Week			CIE	SEE	**CREDITS** 3
	L	T	P			
	3	-	-	40	60	

Course Objectives

- ✓ Learn about one of the basic applications of A.I, search state formulations.
- ✓ Learn methods of expressing knowledge by a machine with appropriate reasoning and different mathematics involved behind it
- ✓ Learn how to reason when an agent has only uncertain information about its task.

Course Outcomes

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

- ✓ Formalize a problem in the language/framework of different AI methods
- ✓ Illustrate basic principles of AI in solutions that require problem solving, search, inference
- ✓ Demonstrate understanding of steps involved in building of intelligent agents, expert systems, Bayesian networks
- ✓ Differentiate between learning paradigms to be applied for an application

Unit I

Introduction: Definition of AI, Foundations of artificial intelligence, History of AI, Structure of Agents.

State Space Search Strategies: Formulating problems, problem types, states and operators, state space, uniformed search strategies- BFS, DFS, Depth first Iterative deepening search, Informed search strategies – A* algorithm, heuristic functions, iterative deepening A*.

Adversarial search- games, optimal decisions in games, alpha beta pruning

Unit II

Constraint Satisfaction problems: Constraint satisfaction problems

Knowledge Representation and Reasoning: Propositional calculus, the language, rules of inference, definition of proof, semantics, resolution in propositional calculus, predicate calculus, syntax, semantics, quantification, semantics of quantifiers, resolution in predicate calculus

Structured knowledge representation- Frames, semantics nets.

Unit III

Expert Systems, Reasoning with uncertainty: Expert system and applications- Introduction, phases in building expert systems, expert system architecture, applications.

Planning: strips, planning systems, states and goals forward search methods, recursive strips, plans with run time conditionals, Susman anomaly, backward search methods, plan spaces and partial order planning, hierarchical planning.

Unit IV

Uncertainty: basic probability, Bayes rule, belief networks, inference in Bayesian networks.

Fuzzy System: Fuzzy Logic Control, Sugeno style of Fuzzy inference processing, Fuzzy Hedges, α-cut threshold, Neuro Fuzzy systems.

Unit V

Machine Learning Paradigms: Introduction, machine learning systems, supervised and unsupervised learning, inductive learning, learning decision trees

Reinforcement Learning: Learning from rewards, passive and active reinforcement learning, applications.

AI : present and future.

Text Books:

1. Stuart Russell and Peter Norvig: Artificial Intelligence – A Modern Approach, 3rd Edition, Pearson education Press, 2009.
2. Saroj Kaushik, Artificial Intelligence, Cengage learning -2018.
3. Kevin Knight, Elaine Rich, B. Nair, Artificial Intelligence, 3rd edition, McGraw Hill 2008.
4. Nils J Nilsson, Artificial Intelligence A new synthesis, Morgan Kaufmann Publisher 2015.

Course Code	Course Title						Core/Elective
SPC403CS	**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, Data Structures	3	-	-	-	40	60	3

Course Objectives:

- To get familiar with fundamental concepts of database managements and with data base designing.
- To master hands on SQL and PL/SQL concepts.
- 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:

- Understand the role of database management system in an organization and learn the database concepts.
- Construct database queries using relational algebra and SQL
- Design databases using data modeling and Logical database design techniques.
- Evaluating the indexing, hashing techniques and transaction management.
- 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
SPC404CS	**OPERATING SYSTEMS (Common to AI&DS, CME, CSE & IT)**						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
	3	-	-	-	40	60	3

Course objectives:

Students will be able:

- To learn fundamentals of Operating Systems.
- To understand the functions of Operating Systems.
- To learn memory management.

Course Outcomes:

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

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

UNIT – I

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 – II

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-III

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 – IV

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.

Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault, Working Set, Dirty page/Dirty bit – Demand paging, Page Replacement algorithms, Trashing.

UNIT – V

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.

Suggested Readings:

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

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

UNIT III – DC Machines

Working principle of DC 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, principle of operation of DC Motor, Types of DC motors, applications.

UNIT IV – Induction Motors

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 of 1-phase IM, Capacitor start & capacitor run motor, applications.

UNIT V – Batteries and 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
SPC413CS	**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			
--	-	-	-	3	40	60	1.5

Course Objectives:

Students will be able:

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

Course Outcomes:

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

- Implement the basic knowledge of SQL queries and relational databases.
- Design and implement a database schema for a given problem.
- Implement different constraints for refining of the databases.
- Implement various triggers, procedures and cursors using PL/SQL.
- 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?
8. Implementation of different types of Exceptions in PL/SQL?
9. Implementation of Triggers in PL/SQL?
10. Implementation of PL/SQL Packages using various database objects?
11. Creation of Forms for Student information, Library information.
12. Report generation using SQL reports.
13. Creation of small full- fledged database application.

Text Books:

1. SQL, PL/SQL- The programming language of oracle, 4th Edition, Ivan Bayross,BPB Publications.
2. Oracle PL/SQL Training guide, SAMS, , BPB Publications.
3. The Complete Reference, SQL, 3 rd Edition, James R. Groff, Paul N.Weinberg, Andrew J. Oppel

Course Code	Course Title						Core/Elective
S PC 414 CS	**OPERATING SYSTEM 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:

Students will be able:

- Understand unix commands.
- Implement Process management related techniques.
- Implement memory management techniques

Course Outcomes:

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

- Execute the unix commands.
- Implement CPU scheduling algorithms.
- Implement producer-consumer problem reader-writers problem, dinning philosophers' problem.
- Apply the Banker's algorithm for deadlock avoidance.
- 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 for Dining Philosopher problem
6. Program to implement Process Synchronization for Producer-Consumer problem.
7. Program to implement Process Synchronization for Readers-Writers problem.
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

Suggested Reading:

1.AviSilberschatz,PeterGalvin,GregGagne,OperatingSystemConceptsEssentials,9th Edition, Wiley Asia Student Edition, 2017.

2.Naresh Chauhan, Principles of Operating Systems, Oxford University Press,2014

Course Code	Course Title						Core/Elective
S PC 415 CS	**Web Technology & Applications Lab**						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
	1	-	-	3	40	60	1.5

Course objectives:

The students will try to learn:

- Programming skills in Html5, CSS3, Bootstrap 4.
- Developing skills of Web Applications user interactions using JavaScript (i.e. ES6+).
- Web application Development Database with React and React Native.

Course outcomes:

Students will be able to learn:

- to design layouts.
- to understand the BOOTSTRAP for designing applications.
- to understand the concepts of JAVA script and implement dynamic forms.
- to design and develop games using HOOKS .
- to implement a full stack applications.

1. HTML LAYOUTS AND LINKS
    a. Develop a web application to control over different layouts.
    b. Create a webpage with HTML describing your department use paragraph and list tags.
    c. Apply various colors to suitable distinguish key words, also apply font styling like italics, underline and two other fonts to words you find appropriate, also use header tags.
    d. Create links on the words e.g. “Wi-Fi” and “LAN” to link them to Wikipedia pages.
2. WEB APPLICATION DESIGN FORMATTING
    a. Develop a web application with background banner image and navigation menus.
    b. Develop a web application with responsive images.
    c. Develop a web application using left menu.
    d. Develop setting to change the theme of entire web Application.
3. INTRODUCTION TO RESPONSIVE INTERFACE USING BOOTSTRAP.
    a. Write code for developing responsive web application with Admin panel and tables with static data.
4. BUIDLING INTERFACES USING JAVASCRIPT
    a. Set up the Folder Structure.
    b. Write the Model code and initialize the application.
    c. Implement the list objects and use cases.

d. Implement the create object use case.
e. Implement the update object use case.

5. INTRODUCTION TO INTERATIVE FORMS AND AJAX DATA BINIDNG
    a. Developing Web Page Styles using JavaScript and CSS,
    b. Develop Script interactive forms
    c. Data binding using Ajax.
6. REACT ENVIRONMENT SETUP
    a. Setting up development environment.
    b. Integration with Existing Apps.
    c. Running on Device.
    d. Debugging
    e. Testing
    f. Write source code using Typescript.
7. PROGRAMMING WITH REACT
    a. Basics Interactive examples.
    b. Function Components and Class Components
    c. React Native Fundamental, Handling Text Input,
    d. Using a scroll View, using List View.
    e. Platform Specific Code.
8. BUILD A DRUNKEN SNAKE GAME USING HOOKS
    a. Introduction and scaffolding the project.
    b. Components, Props and Styles.
    c. State and Lifecycle Events.
    d. Extended Game Functionality.
    e. Finishing up and Deployment.
9. PHP SESSIONS BOX React FOR DATA VISUALIZATION
    a. Introduction and scaffolding the Project.\
    b. Pages and Layout.
    c. Working with an API, CSS-in-JS.
    d. Dynamic Pages and React Hooks.
    e. Custom React Hooks, Dynamic CSS-in-JS.
    f. Finishing up and Deployment.
    g. Optimization and PWA.
10. CHAT APPLICATION
    a. Firebase Environment. Introduction and Scaffolding the project.

b. Private and Public pages, Context API.
c. Creating Side bar and Dashboard
d. Creating and displaying Chat Rooms.
e. Creating Layout for Chat page.

11. CHAT APPLICATION API RESPONSES
    a. Context API Problem-solution for the chat messages.
    b. Denormalization of the data to be stored in app.
    c. Displaying chat feed for Interactive UI along with Real time user presence.
12. DATABASES HANDLING
    a. Role Based Access.
    b. Messages Likes and deletion.
    c. File and Audio Chat Messages
    d. Extended Chat Features and Deployment

Text Book:

1. Adam Boduch and Roy Derks, “React and React Native: A Complete Hands-on Guide to Modern Web and

Mobile Development with React.js”, 3rd Edition, 2020.

2. W Hans Bergsten, “Java Server Pages”, O’Reilly, 3rd Edition, 2003.

REFERENCE BOOKS:

1. D. Flanagan, “Java Script”, O’Reilly, 6th Edition, 2011.

2. Jon Duckett, “Beginning Web Programming”, WROX, 2nd Edition, 2008.