MAHATMA GANDHI INSTITUTE OF TECHNOLOGY (Autonomous)

B.Tech. in Information Technology

Scheme of Instruction and Examination

(Choice Based Credit System)

Applicable from the Academic Year 2022-23

III SEMESTER

S. No	Course Code	Course Title	Instruction			Examination			Credits
			Hours Per Week			Max. Marks		Duration of SEE in Hours	
			L	T	P/D	CIE	SEE		
1	EC331ES	Digital Electronics	3	0	0	40	60	3	3
2	CS301PC	Data Structures	3	0	0	40	60	3	3
3	MA302BS	Computer Oriented Statistical Methods	3	1	0	40	60	3	4
4	IT301PC	Computer Organization and Microprocessor	3	0	0	40	60	3	3
5	IT302PC	Introduction to IoT	2	0	0	40	60	3	2
6	EC361ES	Digital Electronics Lab	0	0	2	40	60	3	1
7	CS351PC	Data Structures Lab	0	0	3	40	60	3	1.5
8	IT351PC	Internet of Things Lab	0	0	3	40	60	3	1.5
9	CS356PC	Data visualization- R Programming / Power BI	0	0	2	40	60	3	1
10	MC351HS	Gender Sensitization Lab	0	0	2	40	60	3	0
		Total Hours / Marks / Credits	**14**	**1**	**12**	**400**	**600**	**-**	**20**

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IV SEMESTER

S. No	Course Code	Course Title	Instruction Hours Per Week			Examination Max. Marks		Duration of SEE in Hours	Credits
			L	T	P/D	CIE	SEE		
1	CS401PC	Discrete Mathematics	3	0	0	40	60	3	3
2	MS401HS	Business Economics and Financial Analysis	3	0	0	40	60	3	3
3	CS402PC	Operating Systems	3	0	0	40	60	3	3
4	CS404PC	Database Management Systems	3	0	0	40	60	3	3
5	IT401PC	Java Programming	2	0	0	40	60	3	2
6	CS451PC	Operating Systems Lab	0	0	2	40	60	3	1
7	CS452PC	Database Management Systems Lab	0	0	2	40	60	3	1
8	CS453PC	Java Programming Lab	0	0	2	40	60	3	1
9	CS454PC	Node JS/ React JS/Django	0	0	2	40	60	3	1
10	IT451PC	Real-time Research Project / Societal Related Project	0	0	4	40	60	3	2
11	MC401HS	Constitution of India	3	0	0	40	60	3	0
Total Hours / Marks / Credits			**17**	**0**	**12**	**440**	**660**	**-**	**20**

III Semester Syllabus

EC331ES: Digital Electronics

Common to CSE, IT, CSB, & CSD

L	T	P	C
3	0	0	3

Pre-requisite: Number Systems, Mathematics

Course Objectives:

1. To understand common forms of number representation in logic circuits
2. To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
3. To understand the concepts of combinational logic circuits and sequential circuits.
4. To understand the Realization of Logic Gates Using Diodes & Transistors.

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

1. Understand the numerical information in different forms and Boolean Algebra theorems
2. Postulates of Boolean algebra and to minimize combinational functions
3. Design and analyze combinational and sequential circuits
4. Known about the logic families and realization of logic gates.

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	1	2	1	-	-	-	-	-	2	1	1
CO2	3	2	2	1	2	1	-	-	-	-	-	2	1	1
CO3	2	3	3	2	2	1	-	-	-	-	-	1	1	2
CO4	3	2	1	1	1	-	-	-	-	-	-	-	2	2

Unit – I :

Boolean Algebra and Logic Gates: Digital Systems, Binary Numbers, Number base conversions, Octal and Hexadecimal Numbers, complements, Signed binary numbers, Binary codes, Binary Storage and Registers, Binary logic.

Basic Definitions, Axiomatic definition of Boolean Algebra, Basic theorems and properties of Boolean algebra, Boolean functions, canonical and standard forms, other logic operations, Digital logic gates.

Unit – II :

Gate – Level Minimization: The map method, Four-variable map, Five-Variable map, product of sums simplification Don't-care conditions, NAND and NOR implementation other Two-level implementations, Exclusive – Or function.

Unit – III :

Combinational Logic: Combinational Circuits, Analysis procedure Design procedure, Binary Adder-Subtractor Decimal Adder, Binary multiplier, magnitude comparator, Decoders, Encoders, Multiplexers, HDL for combinational circuits.

Unit – IV :

Sequential Logic: Sequential circuits, latches, Flip-Flops Analysis of clocked sequential circuits, state Reduction and Assignment, Design Procedure. Registers, shift Registers, Ripple counters, synchronous counters, other counters.

Unit – V :

Memories and Asynchronous Sequential Logic: Introduction, Random-Access Memory, Memory Decoding, Error Detection and correction Read-only memory, Programmable logic Array programmable Array logic, Sequential Programmable Devices.

Introduction, Analysis Procedure, Circuits with Latches, Design Procedure, Reduction of state and Flow Tables, Race-Free state Assignment Hazards, Design Example.

Suggested Readings :

1. Digital Design – Third Edition, M. Morris Mano, Pearson Education/PHI.
2. Digital Principles and Applications Albert Paul Malvino Donald P. Leach TATA McGraw Hill Edition.

Reference Books:

1. Switching and Finite Automata Theory by Zvi. Kohavi, Tata McGraw Hill.
2. Switching and Logic Design, C.V.S. Rao, Pearson Education
3. Digital Principles and Design – Donald D.Givone, Tata McGraw Hill, Edition.

III Semester Syllabus
CS301PC: Data Structures
[Common to CSE, IT, CSB ,CSD & CSM]

L	T	P	C
3	0	0	3

Prerequisites:

1. Programming for Problem Solving.

Course Objectives

To Learn

- Exploring basic data structures such as stacks and queues.
- Introduces a variety of data structures such as hash tables, search trees, tries, heaps, graphs.
- Introduces sorting and pattern matching algorithms

Course Outcomes

Student will be able to:

- Ability to select the data structures that efficiently model the information in a problem.
- Ability to assess efficiency trade-offs among different data structure implementations or combinations.
- Implement and know the application of algorithms for sorting and pattern matching.
- Design programs using a variety of data structures, including hash tables, binary and general tree structures, search trees, tries, heaps, graphs, and AVL-trees.

Unit – I :

Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, Stacks-Operations, array and linked representations of stacks, stack applications, Queues- operations, array and linked representations

Unit – II :

Dictionaries: linear list representation, skip list representation, operations - insertion, deletion and searching.

Hash Table Representation: hash functions, collision resolution-separate chaining, open addressing-linear probing, quadratic probing, double hashing, rehashing, extendible hashing..

Unit – III :

Search Trees: Binary Search Trees, Definition, Implementation, Operations- Searching, Insertion and Deletion, B- Trees, B+ Trees, AVL Trees, Definition, Height of an AVL Tree, Operations – Insertion, Deletion and Searching, Red –Black, Splay Trees

Unit – IV :

Graphs: Graph Implementation Methods. Graph Traversal Methods.

Sorting: Quick Sort, Heap Sort, External Sorting- Model for external sorting, Merge Sort.

Unit – V :

Pattern Matching and Tries: Pattern matching algorithms-Brute force, the Boyer –Moore algorithm, the

Knuth-Morris-Pratt algorithm, Standard Tries, Compressed Tries, Suffix tries.

Suggested Readings :

1. Fundamentals of Data Structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson Freed, Universities Press.
2. An Introduction to Data Structures with Application, 2nd edition by Jean-Paul Tremblay, Paul Sorenson, Mc Graw Hill publications..

Reference Books:

1. Data Structures: A Pseudocode Approach with C, 2 nd Edition, R. F. Gilberg and B.A.Forouzan, Cengage Learning.
2. Data Structures using C – A. S.Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/Pearson Education.

B.Tech. III Semester
MA302BS: Computer Oriented Statistical Methods (CSE & IT)

L	T	P	C
3	1	0	4

Course Objectives

- The ideas of random variables and various discrete and continuous probability distributions and their properties
- The concept of theoretical distributions
- The sampling theory and Estimation
- Testing of hypothesis and making inferences
- The basic ideas of statistics including measures of central tendency, curve fitting, correlation and regression

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

- Formulate and solve problems involving random variables. Apply the concepts of probability and distributions to case studies
- Understand the theoretical distributions
- Understand the concept of sampling and apply concept of estimation
- Testing of hypothesis to case studies
- Apply statistical methods for analyzing experimental data

Unit – I : Random Variables and Probability Distributions

Random variables - Discrete and Continuous random variables and their distribution functions, Expectation, Variance and standard deviation of random variables.

Unit – II : Theoretical Distributions

Binomial, Poisson distributions and their properties -Poisson approximation to the Binomial distribution, Uniform distribution - Normal distributions and its properties - Normal approximation to Binomial distribution.

Unit – III : Fundamental Sampling Distributions and Estimation

Random Sampling, Sampling Distributions, Sampling Distribution of Means and the Central Limit Theorem, Theory of Estimation. Estimating the mean, standard error of a point estimate, prediction/ confidence interval.

Unit – IV : Testing of Hypothesis

Test of significance- Basics of testing of hypothesis, Null and Alternate hypothesis, types of errors, level of significance, Critical region, Large sample test - single mean, single proportion, difference of means, difference of proportions; Small sample tests: Student's t-distribution, single mean, difference of means.

Unit – V : Applied Statistics

Curve fitting by the method of least squares, fitting of straight lines, second degree parabolas and more general curves – Correlation and regression, Rank correlation.

Suggested Readings :

1. RonaldE.Walpole, Raymond H.Myers, SharonL. Myers, KeyingYe, Probability & Statistics For Engineers & Scientists, 9th Ed.Pearson Publishers.
2. S C Gupta and VK Kapoor, Fundamentals of Mathematical statistics, Khanna publications.
3. S.D.Sharma, Operations Research, Kedarnath and Ramnath Publishers, Meerut, Delhi

Reference Books:

1. T.T.Soong, Fundamentals of Probability and Statistics For Engineers, John Wiley & Sons, Ltd, 2004.
2. Sheldon M Ross, Probability and statistics for Engineers and scientists, academic press.
3. Miller and Freund's, Probability and Statistics for Engineers, 8th Edition, Pearson Educations.

III Semester Syllabus

IT301PC: Computer Organization and Microprocessor

L	T	P	C
3	0	0	3

Course Objectives:

1. To understand basic components of computers.
2. To understand the architecture of the 8086 processor.
3. To understand the instruction sets, instruction formats and various addressing modes of 8086.
4. To understand the representation of data at the machine level and how computations are performed at machine level.
5. To understand the memory organization and I/O organization.
6. To understand the parallelism both in terms of single and multiple processors

Course Outcomes:

1. Able to understand the basic components and the design of CPU, ALU and Control Unit.
2. Ability to understand memory hierarchy and its impact on computer cost/performance.
3. Ability to understand the advantage of instruction level parallelism and pipelining for high performance Processor design.
4. Ability to understand the instruction set, instruction formats and addressing modes of 8086.
5. Ability to write assembly language programs to solve problems.

Unit – I :

Digital Computers: Introduction, Block diagram of Digital Computer, Definition of Computer Organization, Computer Design and Computer Architecture.

Basic Computer Organization and Design: Instruction codes, Computer Registers, Computer instructions, Timing and Control, Instruction cycle, Memory Reference Instructions, Input – Output and Interrupt, Complete Computer Description.

Unit – II :

Central Processing Unit: The 8086 Processor Architecture, Register organization, Physical memory organization, General Bus Operation, I/O Addressing Capability, Special Processor Activities, Minimum and Maximum mode system and timings.

Unit – III :

Assembly Language Programming with 8086- Machine level programs, Machine coding the programs, Programming with an assembler, Assembly Language example programs. Stack structure of 8086, Interrupts and Interrupt service routines, Interrupt cycle of 8086, Interrupt programming, Passing parameters to procedures, Macros, Timings and Delays.

Unit – IV :

Computer Arithmetic: Introduction, Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating - point Arithmetic operations. Input-Output Organization: Peripheral Devices, Input- Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupt, Direct memory Access, Input – Output Processor (IOP), Intel 8089 IOP.

Unit – V :

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary memory, Associate Memory, Cache Memory.

Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processors.

Suggested Readings :

1. Computer System Architecture, M. Morris Mano, Third Edition, Pearson. (UNITS–I,IV,V)
2. Advanced Microprocessors and Peripherals, K M Bhurchandi, A. K Ray ,3rd edition, McGraw Hill India Education Private Ltd. (UNITS - II, III).

Reference Books:

1. Microprocessors and Interfacing, D V Hall, SSSP Rao, 3 rd edition, McGraw Hill India Education Private Ltd.
2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky: Computer Organization, 5th Edition, Tata McGraw Hill, 2002
3. Computer Organization and Architecture, William Stallings, 9th Edition, Pearson.
4. David A. Patterson, John L. Hennessy: Computer Organization and Design – The Hardware / Software Interface ARM Edition, 4th Edition, Elsevier, 2009.

III Semester Syllabus

IT302PC: Introduction to IoT

L	T	P	C
2	0	0	2

Course Objectives:

1. Understand the concepts of Internet of Things and able to build IoT applications
2. Learn the programming and use of Arduino and Raspberry Pi boards.
3. Known about data handling and analytics in SDN.

Course Outcomes:

1. Known basic protocols in sensor networks.
2. Program and configure Arduino boards for various designs.
3. Python programming and interfacing for Raspberry Pi.
4. Explore IoT applications in different domains.

Unit – I :

Introduction to Internet of Things, Characteristics of IoT, Physical design of IoT, Functional blocks of IoT, Sensing, Actuation, Basics of Networking, Communication Protocols, Sensor Networks.

Unit – II :

Machine-to-Machine Communications, Difference between IoT and M2M, Interoperability in IoT, Introduction to Arduino Programming, Integration of Sensors and Actuators with Arduino.

Unit – III :

Introduction to Python programming, Introduction to Raspberry Pi, Interfacing Raspberry Pi with basic peripherals, Implementation of IoT with Raspberry Pi, Case studies.

Unit – IV :

Implementation of IoT with Raspberry Pi, Introduction to Software defined Network (SDN), SDN for IoT, Data Handling and Analytics.

Unit – V :

Cloud Computing, Sensor-Cloud, Smart Cities and Smart Homes, Connected Vehicles, Smart Grid, Industrial IoT.

Case Study: Agriculture, Healthcare, Activity Monitoring

Suggested Readings :

1. Pethuru Raj and Anupama C. Raman "The Internet 'of Things: Enabling Technologies, Platforms, and Use Cases", (CRC Press)
2. Terokarvinen, kemo, karvinen and villey valtokari, “Make sensors”: 1st edition, maker media, 2014.

Reference Books:

1. Vijay Madisetti, Arshdeep Bahga, “Internet of Things: A Hands-On Approach”
2. Waltenegus Dargie,Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice"
3. Beginning Sensor networks with Arduino and Raspberry Pi – Charles Bell, A press, 2013

III Semester Syllabus
EC361ES: Digital Electronics Laboratory

L	T	P	C
0	0	2	1

Course Outcomes:

- Acquire the knowledge on numerical information in different forms and Boolean Algebra Theorems.
- Define Postulates of Boolean algebra and to minimize combinational functions, and design the combinational circuits.
- Design and Analyze Sequential Circuits for various cyclic functions.
- Characterize logic families analyze them for the purpose of AC and DC parameters.

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	1	2	1	-	-	1	-	-	2	2	2
CO2	3	2	2	1	2	1	-	-	1	-	-	2	2	2
CO3	2	3	3	2	2	1	-	-	1	-	-	1	2	2
CO4	3	2	1	1	1	-	-	-	1	-	-	-	2	2

List of Experiments:

1. Realization of Logic circuit to generate r's Complement using Logic Gates.
2. Realization of given Boolean function using universal gates and minimizing the same. Compare the gate count before and after minimization.
3. Design and realize Full Adder circuit using gates/universal gates. Implement Full Subtractor using full adder.
4. Design and Realization 4 – bit Comparator.
5. Design and Realization 8:1 MUX using 2:1 MUX.
6. Implement the given Boolean function using the given logic gates.
7. Design and implement 3x8 Decoder using logic gates.
8. Implement the given Boolean function using given Decoders.
9. Convert 4 bit Binary to gray and gray to binary using logic gates.
10. Verification of truth tables of flip flops using different clocks (level triggering, positive and negative edge triggering) also converts the given flip flop from one type to another.
11. Design and realization of 8 bit Parallel load serial out shift registers using flipflops.
12. Design a Synchronous binary counter using D-flipflop /given flip flop.
13. Design Asynchronous counter for the given sequence using given flip flops.
14. Designing of MOD 8 Counter using JK flip flops.

Major Equipment required for Laboratories:

1. 5 V Fixed Regulated Power Supply/ 0-5V or more Regulated Power Supply.
2. 20 MHz Oscilloscope with Dual Channel.
3. Bread board and components/ Trainer Kit.
4. Multimeter.

III Semester Syllabus
CS351PC: Data Structures Lab
[Common to CSE, IT, CSB & CSD]

L	T	P	C
0	0	3	1.5

Prerequisites:
1. A Course on "Programming for problem solving".

Course Objectives

To Learn
- It covers various concepts of C programming language
- It introduces searching and sorting algorithms
- It provides an understanding of data structures such as stacks and queues.

Course Outcomes

Student will be able to:
- Ability to develop C programs for computing and real-life applications using basic elements like control statements, arrays, functions, pointers and strings, and data structures like stacks, queues and linked lists.
- Ability to Implement searching and sorting algorithms.

List of Experiments:

1. Write a program that uses functions to perform the following operations on singly linked list.:
   i) Creation ii) Insertion iii) Deletion iv) Traversal
2. Write a program that uses functions to perform the following operations on doubly linked list.:
   i) Creation ii) Insertion iii) Deletion iv) Traversal
3. Write a program that uses functions to perform the following operations on circular linked list.:
   i) Creation ii) Insertion iii) Deletion iv) Traversal
4. Write a program that implement stack (its operations) using
   i) Arrays ii) Pointers
5. Write a program that implement Queue (its operations) using
   i) Arrays ii) Pointers
6. Write a program that implements the following sorting methods to sort a given list of integers in ascending order
   i) Quick sort ii) Heap sort iii) Merge sort
7. Write a program to implement the tree traversal methods(Recursive and Non Recursive).
8. Write a program to implement
   i) Binary Search tree ii) B Trees iii) B+ Trees iv) AVL trees v) Red - Black trees
9. Write a program to implement the graph traversal methods.
10. Implement a Pattern matching algorithms using Boyer- Moore, Knuth-Morris-Pratt

Suggested Readings :

1. Fundamentals of Data Structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson Freed, Universities Press.
2. Data Structures using C – A. S. Tanenbaum, Y. Langsam, and M. J. Augenstein, PHI/Pearson Education.

Reference Books:

1. Data Structures: A Pseudocode Approach with C, 2nd Edition, R. F. Gilberg and B. A. Forouzan, Cengage Learning.

III Semester Syllabus

IT351PC : Internet Of Things Lab

L	T	P	C
0	0	3	1.5

Course Objectives:

1. To introduce the raspberry PI platform, that is widely used in IoT applications
2. To introduce the implementation of distance sensor on IoT devices

Course Outcomes:

1. Ability to introduce the concept of M2M (machine to machine) with necessary protocols and get awareness in implementation of distance sensor
2. Get the skill to program using python scripting language which is used in many IoT devices

List of Experiments :

1. Using raspberry pi
   a. Calculate the distance using a distance sensor.
   b. Basic LED functionality.
2. Using Arduino
   a. Calculate the distance using a distance sensor.
   b. Basic LED functionality.
   c. Calculate temperature using a temperature sensor.
3. Using Node MCU
   a. Calculate the distance using a distance sensor.
   b. Basic LED functionality.
   c. Calculate temperature using a temperature sensor.
4. Installing OS on Raspberry Pi
   a. Installation using PiImager
   b. Installation using image file
      - Downloading an Image
      - Writing the image to an SD card
        - using Linux
        - using Windows
      - Booting up Follow the instructions given in the URL https://www.raspberrypi.com/documentation/computers/getting-started.html

5. Accessing GPIO pins using Python
   a. Installing GPIO Zero library.
      First, update your repositories list:
      sudo apt update
      Then install the package for Python 3:
      sudo apt install python3-gpiozero
   b. Blinking an LED connected to one of the GPIO pin
   c. Adjusting the brightness of an LED Adjust the brightness of an LED (0 to 100, where 100 means maximum brightness) using the in-built PWM wavelength.
6. Collecting Sensor Data
   a. DHT Sensor interface
      - Connect the terminals of DHT GPIO pins of Raspberry Pi.
      - Import the DHT library using import Adafruit_DHT
      - Read sensor data and display it on screen.

Suggested Readings :

1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti,
   Universities Press, 2015, ISBN: 9788173719547
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly
   (SPD), 2014, ISBN: 9789350239759

Reference Books:

1. Bernd Scholz-Reiter, Florian Michahelles, “Architecting the Internet of Things”, ISBN 978-3- 642-19156-5 e-ISBN 978-3-642-19157-2, Springer, 2016
2. N. Ida, Sensors, Actuators and Their Interfaces, Scitech Publishers, 2014.

III Semester Syllabus

CS356PC: Data Visualization - R Programming/ Power BI [Common to CSE, IT, CSB & CSD]

L	T	P	C
0	0	2	1

Course Objectives

To Learn

- Effective use of Business Intelligence (BI) technology (Tableau) to apply data visualization
- To discern patterns and relationships in the data.
- To build Dashboard applications.
- To communicate the results clearly and concisely.
- To be able to work with different formats of data sets.

Course Outcomes

Student will be able to:

- Understand How to import data into Tableau.
- Understand Tableau concepts of Dimensions and Measures.
- Develop Programs and understand how to map Visual Layouts and Graphical Properties.
- Create a Dashboard that links multiple visualizations.
- Use graphical user interfaces to create Frames for providing solutions to real world problems.

Lab Problems:

1. Understanding Data, What is data, where to find data, Foundations for building Data Visualizations, Creating Your First visualization?
2. Getting started with Tableau Software using Data file formats, connecting your Data to Tableau, creating basic charts(line, bar charts, Tree maps),Using the Show me panel.
3. Tableau Calculations, Overview of SUM, AVR, and Aggregate features, Creating custom calculations and fields.
4. Applying new data calculations to your visualizations, Formatting Visualizations, Formatting Tools and Menus, Formatting specific parts of the view.
5. Editing and Formatting Axes, Manipulating Data in Tableau data, Pivoting Tableau data.
6. Structuring your data, Sorting and filtering Tableau data, Pivoting Tableau data.
7. Advanced Visualization Tools: Using Filters, Using the Detail panel, using the Size panels, customizing filters, Using and Customizing tooltips, Formatting your data with colors.
8. Creating Dashboards & Storytelling, creating your first dashboard and Story, Design for different displays, adding interactivity to your Dashboard, Distributing & Publishing your Visualization.
9. Tableau file types, publishing to Tableau Online, Sharing your visualizations, printing, and Exporting.
10. Creating custom charts, cyclical data and circular area charts, Dual Axis charts.

Reference Books:

1. Microsoft Power BI cookbook, Brett Powell, 2nd edition.
2. R Programming for Data Science by Roger D. Peng (References)
3. The Art of R Programming by Norman Matloff Cengage Learning India

III Semester Syllabus

MC351HS: Gender Sensitization Laboratory

(EEE, CSE, IT, CSD & CSB)

L	T	P	C
0	0	2	0

Course Objectives

This course aims:

- To develop students' sensibility with regard to issues of gender in contemporary India.
- To provide a critical perspective on the socialization of men and women.
- To introduce students to information about some key biological aspects of genders.
- To expose the students to debates on the politics and economics of work.
- To help students reflect critically on gender violence.
- To expose students to more egalitarian interactions between men and women.

Course Outcomes

- Students will have developed a better understanding of important issues related to gender in contemporary India.
- Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
- Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
- Students will acquire insight into the gendered division of labour and its relation to politics and economics.
- Men and women students and professionals will be better equipped to work and live together as equals.
- Students will develop a sense of appreciation of women in all walks of life.
- Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

Course Description

This course offers an introduction to Gender Studies, an interdisciplinary field that asks critical questions about the meanings of sex and gender in society. The primary goal of this course is to familiarize students with key issues, questions and debates in Gender Studies, both historical and contemporary. It draws on multiple disciplines – such as literature, history, economics, psychology, sociology, philosophy, political science, anthropology and media studies –to examine cultural assumptions about sex, gender, and sexuality. This course integrates analysis of current events through student presentations, aiming to increase awareness of contemporary and historical experiences of women, and of the multiple ways that sex and gender interact with race, class, caste, nationality and other social identities. This course also seeks to build an understanding and initiate and strengthen programmes combating gender-based violence and discrimination. The course also features several exercises and reflective activities designed to examine the concepts of gender, gender-based violence, sexuality, and rights. It will further explore the impact of gender- based violence on education, health and development.

Unit – I : Understanding Gender

Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring Attitudes towards Gender- Construction of Gender-Socialization: Making Women, Making Men - Preparing for Womanhood. Growing up Male.

Unit – II : Gender Roles and Relations

Two or Many? -Struggles with Discrimination-Gender Roles and Relations-Types of Gender Roles-Gender Roles and Relationships Matrix-Missing Women-Sex Selection and Its Consequences-Declining Sex Ratio. Demographic Consequences-Gender Spectrum: Beyond the Binary

Unit – III : Gender and Labour

Division and Valuation of Labour-Housework: The Invisible Labor- "My Mother doesn't Work." "Share the Load."- Work: Its Politics and Economics -Fact and Fiction. Unrecognized and Unaccounted work. -Gender Development Issues-Gender, Governance and Sustainable Development-Gender and Human Rights-Gender and Mainstreaming

Unit – IV : Gender - Based Violence

The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective-Sexual Harassment: Say No! -Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "Chupulu".

Domestic Violence: Speaking Out -Is Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Thinking about Sexual Violence Blaming the Victim-"I Fought for my Life…."

Unit – V: Gender and Culture

Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature- Gender Development Issues-Gender Issues-Gender Sensitive Language-Gender and Popular Literature - Just Relationships: Being Together as Equals Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Rosa Parks-The Brave Heart.

Note: Since it is Interdisciplinary Course, Resource Persons can be drawn from the fields of **English Literature** or Sociology or Political Science or **any other qualified faculty who has expertise in this field from engineering departments.**

- Classes will consist of a combination of activities: dialogue-based lectures, discussions, collaborative learning activities, group work and in-class assignments. Apart from the above prescribed book, Teachers can make use of any authentic materials related to the topics given in the syllabus on "Gender".

Suggested Readings:

- The Textbook, "Towards a World of Equals: A Bilingual Text Book on Gender" written by A. Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu published by Telugu Akademi, Telangana Government in 2015.

Assessment and Grading:

- Discussion & Classroom Participation: 20%
- Project/Assignment: 30%
- End Term Exam: 50%.

IV Semester Syllabus
CS401PC: Discrete Mathematics
[Common to CSE, IT & CSM]

L	T	P	C
3	0	0	3

Course Objectives

To Learn
- Introduces elementary discrete mathematics for computer science and engineering.
- Topics include formal logic notation, methods of proof, induction, sets, relations, algebraic structures, elementary graph theory, permutations and combinations, counting principles; recurrence relations and generating functions.

Course Outcomes

Student will be able to:
- Understand and construct precise mathematical proofs
- Apply logic and set theory to formulate precise statements
- Analyze and solve counting problems on finite and discrete structures
- Describe and manipulate sequences
- Apply graph theory in solving computing problems.

Unit – I :

Mathematical logic: Introduction, Statements and Notation, Connectives, Normal Forms, Theory of Inference for the Statement Calculus, The Predicate Calculus, Inference Theory of the Predicate Calculus

Unit – II :

Set theory: Introduction, Basic Concepts of Set Theory, Representation of Discrete Structures, Relations and Ordering, Functions.

Unit – III :

Algebraic Structures: Introduction, Algebraic Systems, Semi groups and Monoids, Lattices as Partially Ordered Sets, Boolean Algebra.

Unit – IV :

Elementary Combinatorics: Basics of Counting, Combinations and Permutations, Enumeration of Combinations and Permutations, Enumerating Combinations and Permutations with Repetitions, Enumerating Permutation with Constrained Repetitions, Binomial Coefficient, The Binomial and Multinomial Theorems, The Principle of Exclusion.

Unit – V :

Graph Theory: Basic Concepts, Isomorphism and Subgraphs, Trees and their Properties, Spanning Trees, Directed Trees, Binary Trees, Planar Graphs, Euler's Formula, Multi-graphs and Euler Circuits, Hamiltonian Graphs, Chromatic Numbers, The Four-Color Problem.

Suggested Readings :

1. Discrete Mathematical Structures with Applications to Computer Science: J.P. Tremblay, R. Manohar, McGraw-Hill, 1st ed.
2. Discrete Mathematics for Computer Scientists & Mathematicians: Joe l. Mott, Abraham Kandel, Teodore P. Baker, Prentis Hall of India, 2nd ed.

Reference Books:

1. Discrete and Combinatorial Mathematics - an applied introduction: Ralph.P. Grimald, Pearson education, 5th edition.
2. Discrete Mathematical Structures: Thomas Kosy, Tata McGraw Hill publishing co
3. Graph Theory With Appln To Engg & Comp, Narsingh Deo, Prentice Hall India

IV Semester Syllabus

L	T	P	C
3	0	0	3

MS401HS: Business Economics and Financial Analysis
(Common to CSE, CSD, CSB and IT)

Course Objectives:

- To make the students understand various Forms of Business and the Impact of Economic variables on the Business, Concepts of Business Economics and its significance.
- To gain knowledge on various concepts related to market dynamics namely Demand and Supply: Elasticity of Demand, and Demand Forecasting, and Supply Analysis.
- To disseminate the knowledge on Production, Cost, Market Structures and Pricing - Production Function, Laws of Production, Market structures, the concepts of cost and breakeven analysis.
- To acquaint the students with books of accounts and final statements.
- To enable the students analyze a company's financial situation through ratio analysis.

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

- Select a suitable business organization with available resources.
- Analyze various Aspects of Demand and Supply - elasticity of demand, demand forecasting and supply analysis.
- Gain knowledge of different market structures, production theories, cost variables and pricing methods.
- Prepare Books of accounts and Financial Statements.
- Analyze financial well-being of a business using financial ratios.

Unit – I: Introduction to Business and Economics :

Economics: Significance of Economics, Micro and Macro Economic Concepts, National Income - Concepts and Importance, Inflation, Business Cycle - Features and Phases.

Business: Structure of Business Firm, Types of Business Entities: Sole Proprietorship – Partnership – Cooperative Societies - Limited Liability Companies; Sources of Capital – Conventional sources and Non-Conventional Sources of Finance.

Business Economics: Nature and Scope of Business Economics, Role of Business Economist, Multidisciplinary nature of Business Economics.

Unit – II: Demand and Supply Analysis:

Demand Analysis: Demand - Meaning, Determinants of Demand, Law of Demand, Exceptions to Law of Demand, Demand Function, Changes in Demand: Increase in Demand and decrease in Demand - Extension and Contraction in Demand.

Elasticity of Demand: Elasticity – Meaning, Types of Elasticity – Price Elasticity – Income Elasticity – Cross Elasticity–Advertising Elasticity of Demand, Factors affecting Elasticity of Demand, Measurement and Significance of Elasticity of Demand, Role of Elasticity of Demand in Decision Making.

Demand Forecasting: Characteristics of Good Demand Forecasting, Steps in Demand Forecasting, Methods of Demand Forecasting – Survey Methods and Statistical Methods.

Supply Analysis: Supply – Meaning, Determinants of Supply, Supply Function and Law of Supply.

Unit – III : Production, Cost, Market Structures & Pricing:

Production Analysis: Production – Meaning, Factors of Production, Production Function, Production Function with one variable input and two variable inputs, Returns to Scale, Cobb-Douglas Production Function.

Cost analysis: Cost–Meaning, Types of Costs, Short run and Long run Cost Functions.

Market Structures: Nature of Competition. Features of Perfect competition, Monopoly, Oligopoly, and Monopolistic Competition.

Pricing: Pricing -Meaning, Objectives of Pricing, and Pricing Methods – Cost based Pricing Methods – Demand based pricing methods – Competition based Pricing Methods – Strategy based Pricing Methods - Product Life Cycle based Pricing, Break Even Analysis (simple problems) and Cost Volume Profit Analysis.

Unit – IV : Financial Accounting:

Accounting concepts and Conventions, Accounting Equation, Double-Entry system of Accounting, Rules for Maintaining Books of Accounts, Journal, Posting to Ledger, Preparation of Trial Balance, Elements of Financial Statements, Preparation of Final Accounts along with Adjustments– Trading Account and Profit & Loss account – Balance Sheet (simple problems).

Unit – V: Financial Analysis through Ratios:

Concept of Ratio Analysis, Importance, Liquidity Ratios- Current Ratio – Quick Ratio – Absolute Liquid Ratio, Profitability Ratios – Gross Profit Ratio – Net Profit Ratio – Operating Ratio, Turnover Ratios – Stock Turnover Ratio – Debtors Turnover Ratio – Creditors Turnover Ratio, Leverage Ratios – Debt-to-Assets Ratio - Debt-Equity Ratio - Proprietary Ratios and Interpretation (simple problems).

Suggested Readings :

1. Geetika, Piyali Gosh, Purbaroy Choudhury, “Managerial Economics”, 2e, Tata McGraw Hill Education Pvt. Ltd. 2012.
2. Dhanesh K Khatri, “Financial Accounting”, Tata McGraw Hill, 2011.
3. Ramachandra Aryasri. A, “Business Economics and Financial Analysis”, McGraw Hill Education India Pvt. Ltd. 2020.

Reference Books:

1. P. L. Mehta, Managerial Economics, Analysis, Problems & Cases, 8th Edition, Sultan Chand & Sons, 2001.
2. S.N. Maheshwari, Sunil K Maheshwari, Sharad K Maheshwari, Financial Accounting, 5e, Vikas Publications, 2013.
3. D.D. Chaturvedi, S.L. Gupta, “Business Economics - Theory and Applications”, International Book House Pvt. Ltd. 2013.

IV Semester Syllabus
CS402PC: Operating Systems
[Common to CSE, IT, CSB & CSD]

L	T	P	C
3	0	0	3

Prerequisites:

1. A course on "Computer Programming and Data Structures".
2. A course on "Computer Organization and Architecture"

Course Objectives

To Learn

- Introduce operating system concepts (i.e., processes, threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystems and protection)
- Introduce the issues to be considered in the design and development of operating system
- Introduce basic Unix commands, system call interface for process management, interprocess communication and I/O in Unix

Course Outcomes

Student will be able to:

- Will be able to control access to a computer and the files that may be shared
- Demonstrate the knowledge of the components of computers and their respective roles in computing.
- Ability to recognize and resolve user problems with standard operating environments.
- Gain practical knowledge of how programming languages, operating systems, and architectures interact and how to use each effectively.

Unit – I :

Operating System - Introduction: Structures - Simple Batch, Multiprogrammed, Time-shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating System services, System Calls

Process - Process concepts and scheduling, Operations on processes, Cooperating Processes, Threads.

Unit – II :

CPU Scheduling: Scheduling Criteria, Scheduling Algorithms, Multiple -Processor Scheduling. System call interface for process management-fork, exit, wait, waitpid, exec

Deadlocks - System Model, Deadlocks Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock.

Unit – III :

Process Management and Synchronization: The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors

Interprocess Communication Mechanisms: IPC between processes on a single computer system, IPC between processes on different systems, using pipes, FIFOs, message queues, shared memory.

Unit – IV :

Memory Management and Virtual Memory: Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging, Demand Paging, Page Replacement, Page Replacement Algorithms.

Unit – V :

File System Interface and Operations: -Access methods, Directory Structure, Protection, File System Structure, Allocation methods, Free-space Management. Usage of open, create, read, write, close, lseek, stat, ioctl system calls

Suggested Readings :

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley.
2. Advanced programming in the UNIX environment, W.R. Stevens, Pearson education.

Reference Books:

1. Operating Systems- Internals and Design Principles, William Stallings, Fifth Edition– 2005, Pearson Education/PHI
2. Operating System A Design Approach- Crowley, TMH.
3. Modern Operating Systems, Andrew S. Tanenbaum 2nd edition, Pearson/PHI

IV Semester Syllabus
CS404PC: Database Management Systems
[Common to CSE, IT, CSB, CSD & CSM]

L	T	P	C
3	0	0	3

Prerequisites:

1. A course on "Data Structures".

Course Objectives

To Learn
- To understand the basic concepts and the applications of database systems.
- To master the basics of SQL and construct queries using SQL.
- Topics include data models, database design, relational model, relational algebra, transaction control, concurrency control, storage structures and access techniques.

Course Outcomes

Student will be able to:
- Gain knowledge of fundamentals of DBMS, database design and normal forms
- Master the basics of SQL for retrieval and management of data.
- Be acquainted with the basics of transaction processing and concurrency control.
- Familiarity with database storage structures and access techniques.

Unit – I :

Database System Applications: A Historical Perspective, File Systems versus a DBMS, the Data Model, Levels of Abstraction in a DBMS, Data Independence, Structure of a DBMS

Introduction to Database Design: Database Design and ER Diagrams, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design With the ER Model.

Unit – II :

Introduction to the Relational Model: Integrity constraint over relations, enforcing integrity constraints, querying relational data, logical database design, introduction to views, destroying/altering tables and views.

Relational Algebra, Tuple relational Calculus, Domain relational calculus

Unit – III :

SQL: QUERIES, CONSTRAINTS, TRIGGERS: form of basic SQL query, UNION, INTERSECT, and EXCEPT, Nested Queries, aggregation operators, NULL values, complex integrity constraints in SQL, triggers and active databases.

Schema Refinement: Problems caused by redundancy, decompositions, problems related to decomposition, reasoning about functional dependencies, First, Second, Third normal forms, BCNF, lossless join decomposition, multivalued dependencies, Fourth normal form, Fifth normal form

Unit – IV :

Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for serializability, Lock Based Protocols, Timestamp Based Protocols, Validation- Based Protocols, Multiple Granularity, Recovery and Atomicity, Log–Based Recovery, Recovery with Concurrent Transactions.

Unit – V :

Data on External Storage, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes, Index data Structures, Hash Based Indexing, Tree based Indexing, Comparison of File Organizations, Indexes- Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic Index Structure.

Suggested Readings :

1. Database System Concepts, Silberschatz, Korth, McGraw hill, V edition.3rd Edition
2. Introduction to Database Systems, C. J. Date, Pearson Education

Reference Books:

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate, Pearson Education
3. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill

IV Semester Syllabus

IT401PC : JAVA Programming

L	T	P	C
2	0	0	2

Course Objectives:

1. To introduce object-oriented programming principles and apply them in solving problems.
2. To introduce the implementation of packages and interfaces.
3. To introduce the concepts of exception handling and multithreading.
4. To introduce the design of Graphical User Interface using swing controls.

Course Outcomes:

1. Able to solve real world problems using OOP techniques.
2. Able to solve problems using java collection framework and I/O classes.
3. Able to develop multithreaded applications with synchronization.
4. Able to design GUI based applications.

Unit – I :

Foundations of Java: History of Java, Java Features, Variables, Data Types, Operators, Expressions, Control Statements. Elements of Java - Class, Object, Methods, Constructors and Access Modifiers, Generics, Inner classes, String class and Annotations.

OOP Principles: Encapsulation – concept, setter and getter method usage, this keyword. Inheritance concept, Inheritance Types, super keyword. Polymorphism – concept, Method Overriding usage and Type Casting. Abstraction – concept, abstract keyword and Interface.

Unit – II :

Exception Handling: Exception and Error, Exception Types, Exception Handler, Exception Handling Clauses – try, catch, finally, throws and the throw statement, Built-in-Exceptions and Custom Exceptions.

Files and I/O Streams: The file class, Streams, The Byte Streams, Filtered Byte Streams, The Random Access File class.

Unit – III :

Packages- Defining a Package, CLASSPATH, Access Specifiers, importing packages. Few Utility Classes - String Tokenizer, BitSet, Date, Calendar, Random, Formatter, Scanner.

Collections: Collections overview, Collection Interfaces, Collections Implementation Classes, Sorting in Collections, Comparable and Comparator Interfaces.

Unit – IV :

Multithreading: Process and Thread, Differences between thread-based multitasking and process- based multitasking, Java thread life cycle, creating threads, thread priorities, synchronizing threads, inter thread communication.

Java Database Connectivity: Types of Drivers, JDBC architecture, JDBC Classes and Interfaces, Basic steps in Developing JDBC Application, Creating a New Database and Table with JDBC.

Unit – V :

GUI Programming with Swing – Introduction, limitations of AWT, MVC architecture, components, containers, Layout Manager Classes, Simple Applications using AWT and Swing.

Event Handling- The Delegation event model- Events, Event sources, Event Listeners, Event classes, Handling mouse and keyboard events, Adapter classes.

Suggested Readings :

1. Java The complete reference, 9th edition, Herbert Schildt, McGraw Hill Education (India) Pvt. Ltd.
2. Understanding Object-Oriented Programming with Java, updated edition, T. Budd, Pearson Education.

Reference Books:

1. An Introduction to programming and OO design using Java, J. Nino and F.A. Hosch, John Wiley & sons
2. Introduction to Java programming, Y. Daniel Liang, Pearson Education.
3. Object Oriented Programming through Java, P. Radha Krishna, University Press.
4. Programming in Java, S. Malhotra, S. Chudhary, 2nd edition, Oxford Univ. Press.
5. Java Programming and Object-oriented Application Development, R. A. Johnson, Cengage Learning.

IV Semester Syllabus
CS451PC: Operating Systems Lab
[Common to CSE, IT, CSB & CSD]

L	T	P	C
0	0	2	1

Prerequisites:

1. A course on "Programming for Problem Solving", A course on "Computer Organization and Architecture".
2. A course on "Operating Systems"

Course Objectives

To Learn
- To provide an understanding of the design aspects of operating system concepts through simulation
- Introduce basic Unix commands, system call interface for process management, interprocess communication and I/O in Unix.

Course Outcomes

Student will be able to:
- Simulate and implement operating system concepts such as scheduling, deadlock management, file management and memory management.
- Able to implement C programs using Unix system calls.

List of Experiments:

1. Write C programs to simulate the following CPU Scheduling algorithms a) FCFS b) SJF c) Round Robin d) priority
2. Write programs using the I/O system calls of UNIX/LINUX operating system (open, read, write, close, fcntl, seek, stat, opendir, readdir)
3. Write a C program to simulate Bankers Algorithm for Deadlock Avoidance and Prevention.
4. Write a C program to implement the Producer – Consumer problem using semaphores using UNIX/LINUX system calls.
5. Write C programs to illustrate the following IPC mechanisms a) Pipes b) FIFOs c) Message Queues d) Shared Memory
6. Write C programs to simulate the following memory management techniques a) Paging b) Segmentation
7. Write C programs to simulate Page replacement policies a) FCFS b) LRU c) Optimal

Suggested Readings :

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley
2. Advanced programming in the Unix environment, W.R.Stevens, Pearson education.

Reference Books:

1. Operating Systems – Internals and Design Principles, William Stallings, Fifth Edition– 2005, Pearson Education/PHI
2. Operating System - A Design Approach-Crowley, TMH.
3. Modern Operating Systems, Andrew S Tanenbaum, 2nd edition, Pearson/PHI
4. UNIX Programming Environment, Kernighan and Pike, PHI/Pearson Education
5. UNIX Internals: The New Frontiers, U. Vahalia, Pearson Education

IV Semester Syllabus
CS452PC: Database Management Systems Lab
[Common to CSE, IT, CSB, CSD & CSM]

L	T	P	C
0	0	2	1

Course Objectives

To Learn
- Introduce ER data model, database design and normalization
- Learn SQL basics for data definition and data manipulation.

Course Outcomes

Student will be able to:
- Design database schema for a given application and apply normalization
- Acquire skills in using SQL commands for data definition and data manipulation.
- Develop solutions for database applications using procedures, cursors and triggers

List of Experiments:

1. Concept design with E-R Model
2. Relational Model
3. Normalization
4. Practicing DDL commands
5. Practicing DML commands
6. A. Querying (using ANY, ALL, UNION, INTERSECT, JOIN, Constraints etc.)
   B. Nested, Correlated subqueries
7. Queries using Aggregate functions, GROUP BY, HAVING and Creation and dropping of Views.
8. Triggers (Creation of insert trigger, delete trigger, update trigger)
9. Procedures
10. Usage of Cursors

Suggested Readings :

1. Oracle for Professionals, The X Team, S. Shah and V. Shah, SPD.
2. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, Shah, PHI.

Reference Books:

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate, Pearson Education
3. Fundamentals of Database Management Systems, M. L. Gillenson, Wiley Student Edition.

IV Semester Syllabus
CS453PC: Java Programming Lab
[Common to IT & CSM]

L	T	P	C
0	0	2	1

Course Objectives:

To understand OOP principles.
To understand the Exception Handling mechanism.
To understand Java collection framework.
To understand multithreaded programming.
To understand swing controls in Java.

Course Outcomes:

- Able to write the programs for solving real world problems using Java OOP principles.
- Able to write programs using Exceptional Handling approach.
- Able to write multithreaded applications.
- Able to write GUI programs using swing controls in Java.

List of Experiments:

1. Use Eclipse or Net bean platform and acquaint yourself with the various menus. Create a test project, add a test class, and run it. See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods, and classes. Try debug step by step with a small program of about 10 to 15 lines which contains at least one if else conditionand a for loop.
2. Write a Java program to demonstrate the OOP principles. [i.e., Encapsulation, Inheritance, Polymorphism and Abstraction]
3. Write a Java program to handle checked and unchecked exceptions. Also, demonstrate the usage of custom exceptions in real time scenario.
4. Write a Java program on Random Access File class to perform different read and write operations.
5. Write a Java program to demonstrate the working of different collection classes. [Use packagestructure to store multiple classes].
6. Write a program to synchronize the threads acting on the same object. [Consider the exampleof any reservations like railway, bus, movie ticket booking, etc.]
7. Write a program to perform CRUD operations on the student table in a database using JDBC.
8. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result. Handle any possible exceptions like divided by zero.
9. Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired. [Use Adapter classes]

Suggested Readings :

1. Java for Programmers, P. J. Deitel and H. M. Deitel, 10th Edition Pearson education.
2. Java Programming, D. S. Malik and P. S. Nair, Cengage Learning.

Reference Books:

1. Thinking in Java, Bruce Eckel, Pearson Education.
2. Core Java, Volume 1, 9th edition, Cay S. Horstmann and G Cornell, Pearson..

IV Semester Syllabus
CS454PC: Node JS/ React JS/ Django
[Common to CSE & IT]

L	T	P	C
0	0	2	1

Prerequisites:

1. Object Oriented Programming through Java, HTML Basics

Course Objectives

To Learn

- To implement the static web pages using HTML and do client side validation using JavaScript.
- To design and work with databases using Java
- To develop an end to end application using java full stack.
- To introduce Node JS implementation for server side programming.
- To experiment with single page application development using React.

Course Outcomes

Student will be able to:

- Build a custom website with HTML, CSS, and Bootstrap and little JavaScript.
- Demonstrate Advanced features of JavaScript and learn about JDBC
- Develop Server – side implementation using Java technologies like
- Develop the server – side implementation using Node JS.
- Design a Single Page Application using React..

Exercises:

1. Build a responsive web application for shopping cart with registration, login, catalog and cart pages using CSS3 features, flex and grid.
2. Make the above web application responsive web application using Bootstrap framework.
3. Use JavaScript for doing client – side validation of the pages implemented in experiment 1 and experiment 2.
4. Explore the features of ES6 like arrow functions, callbacks, promises, async/await. Implement an application for reading the weather information from openweathermap.org and display the information in the form of a graph on the web page.
5. Develop a java standalone application that connects with the database (Oracle / mySql) and perform the CRUD operation on the database tables.
6. Create an xml for the bookstore. Validate the same using both DTD and XSD.
7. Design a controller with servlet that provides the interaction with application developed in experiment 1 and the database created in experiment 5.
8. Maintaining the transactional history of any user is very important. Explore the various session tracking mechanism (Cookies, HTTP Session)
9. Create a custom server using http module and explore the other modules of Node JS like OS, path, event.
10. Develop an express web application that can interact with REST API to perform CRUD operations on student data. (Use Postman)
11. For the above application create authorized end points using JWT (JSON Web Token).
12. Create a react application for the student management system having registration, login, contact, about pages and implement routing to navigate through these pages.
13. Create a service in react that fetches the weather information from openweathermap.org and the display the current and historical weather information using graphical representation using chart.js
14. Create a TODO application in react with necessary components and deploy it into github.

Reference Books:

1. Jon Duckett, Beginning HTML, XHTML, CSS, and JavaScript, Wrox Publications, 2010
2. Bryan Basham, Kathy Sierra and Bert Bates, Head First Servlets and JSP, O'Reilly Media, 2nd Edition, 2008.
3. Vasan Subramanian, Pro MERN Stack, Full Stack Web App Development with Mongo, Express, React, and Node, 2 nd Edition, A Press.

IV Semester Syllabus
MC401HS: Constitution of India
(EEE, CSE, IT, CSD & CSB)

L	T	P	C
3	0	0	0

Course Objectives

- Students will get to know about the history of Indian Constitution.
- Students will get to know about President Election and his Power.
- Students will get to know about Council of Ministers and their election procedure and their powers and responsibilities.
- Students will get to know about Judicial System in India.
- Students will get to know about Panchayat-raj System in India

Course Outcomes

- This enables the Students to know about the Rights of Citizen.
- This enables the Students to know about Fundamental Duties of People.
- This enables the Students to Know the Directive principles of State Policy.
- This enables the Students to know about Functioning of Parliament and its Powers.
- This enables the Students to know about various Constitutional bodies in India.

Course content

1. Meaning of the constitution, law and constitutionalism
2. Historical perspective of the Constitution of India
   - Drafting Committee
3. Salient features and characteristics of the Constitution of India
   - Preamble
   - Salient Features
   - Major Sources of Indian Constitution
4. Scheme of the fundamental rights
   - Article 13 to 32
   - Scheme of the Fundamental Right to Equality
   - Scheme of the Fundamental Right to certain Freedom
   - Scope of the Right to Life and Personal Liberty
5. The scheme of the Fundamental Duties and its legal status
   - List of Fundamental Duties
   - Justifiability of Fundamental Duties
6. The Directive Principles of State Policy – Its importance and implementation
   - Categories - Gandhian, Socialist and Liberal Principles
   - Significance of Directive Principles of State Policy
   - Relation between Fundamental rights and Directive Principles of State Policy

7. Federal structure and distribution of legislative and financial powers between theUnion and the States
   - Union List
   - State List
   - Concurrent List
   - Residuary Powers
8. Parliamentary Form of Government in India.
9. The constitutional powers and status of the President of India vs the constitutionalpowers and status of the Council of ministers headed by the Prime Minister
10. Amendment of the Constitution and its Procedure
    - Procedure of Amendment to Constitution of India
    - Important Amendments
11. Emergency Provisions: National Emergency, President Rule, Financial Emergency
12. Local Self Government – Constitutional Scheme in India
    - Urban local Self Government
    - Rural local Self Government
13. Important Constitutional Bodies
    - Election Commission of India
    - Finance Commission of India
    - Union Public Service Commission
    - C-AG

Suggested Readings:

1. Subhash Kashyap, Our Constitution, National Book Trust, 5th Edition, Reprint- 2017.
2. V. N Shukla, The Constitution of India, Law literature Publication, 11th Edition, 2020.

Reference Books:

1. M P Jain, Indian Constitutional Law, Lexis Nexis, 8th Edition, 2018.
2. Samar Aditya Pal, Indian Constitution-Origin& Evolution, Lexis Nexis, 1st Edition,2019.