VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY HYDERABAD
B.TECH. II YEAR
INFORMATION TECHNOLOGY

III SEMESTER   **R22**

Course Code	Title of the Course	L	T	P/D	CH	C
22BS1MT205	Statistical Inference and Queuing Theory	2	1	0	3	3
22PC1EC211	Digital Logic Design	3	0	0	3	3
22PC1DS201	Mathematical Foundations for Data Science	3	0	0	3	3
22PC1IT201	Object Oriented Programming Through Java	3	0	0	3	3
22PC1AM201	Database Management systems	3	0	0	3	3
22PC2AM201	Database Management systems Laboratory	0	0	2	2	1
22PC2IT201	Object Oriented Programming Through Java Laboratory	0	0	2	2	1
22SD5DS201	Data Visualization	0	0	2	2	1
22PW4IT201	Design Thinking	1	0	2	3	2
22MN6HS102	Environmental Science	2	0	0	2	0
Total		**17**	**1**	**8**	**26**	**20**

IV SEMESTER   **R22**

Course Code	Title of the Course	L	T	P/D	CH	C
22HS1MG201	Engineering Economics and Accountancy	3	0	0	3	3
22PC1CS202	Design and Analysis of Algorithms	3	1	0	4	4
22PC1IT202	Operating Systems	3	0	0	3	3
22PC1CS201	Software Engineering	3	0	0	3	3
22PC1CS203	Computer Organization	3	0	0	3	3
22PC2IT202	Operating Systems Laboratory	0	0	2	2	1
22PC2CS201	Software Engineering Laboratory	0	0	2	2	1
22SD5IT201	Web Application Development	0	0	2	2	1
22SD5IT202	Field Project	0	0	2	2	1
22MN6HS201	Intellectual Property Rights	2	0	0	2	0
Total		**17**	**1**	**8**	**26**	**20**

L – Lecture   T – Tutorial   P – Practical   D – Drawing   CH – Contact Hours/Week
C – Credits   SE – Sessional Examination   CA – Class Assessment   ELA – Experiential Learning Assessment
SEE – Semester End Examination   D-D – Day to Day Evaluation   LR – Lab Record
CP – Course Project   PE – Practical Examination

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. III Semester

(22BS1MT205) STATISTICAL INFERENCE AND QUEUING THEORY

TEACHING SCHEME		
L	T/P	C
2	1	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

COURSE PRE-REQUISITES: Statistical Methods for Data Analysis

COURSE OBJECTIVES:
- To learn the concept of sampling distribution
- To learn the various methods to test the hypothesis for large sample
- To learn the various methods to test the hypothesis for small sample
- To learn the linear and polynomial relationship between the given data set
- To learn the basic concepts of queuing theory

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Evaluate sampling distribution of means, variance and confidence interval
CO-2: Apply the knowledge to test the hypothesis for large sample
CO-3: Apply the Knowledge about small sample tests based on Chi-square, t and F distributions
CO-4: Use and fit a linear and polynomial regression model to data and use it for prediction
CO-5: Apply the knowledge of different probability distributions to solve problems in Queuing theory

COURSE ARTICULATION MATRIX:
(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using ***mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)***

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3	PSO-3
CO-1	3	2	1	1	1	-	-	-	-	-	-	-	3	2	2	2
CO-2	3	3	2	2	2	-	-	-	-	-	-	-	2	2	-	2
CO-3	3	2	1	1	-	-	-	-	-	-	-	-	2	-	-	-
CO-4	3	3	2	2	2	-	-	-	-	-	-	-	2	2	2	-
CO-5	3	2	-	-	-	-	-	-	-	-	-	-	3	-	2	1

UNIT- I:
Sampling Distributions: Definition of population, sampling, statistic, parameter, Types of sampling, sample mean and Variance, sampling distribution, standard error, sampling distributions of means and variance, Estimation, interval estimation, point estimation and confidence interval for the mean and proportions.

UNIT- II:
Testing of Hypothesis - Large Samples: Central limit theorem, Tests of hypothesis - null hypothesis, alternate hypothesis, type I, type II errors, critical region. Inferences

concerning means and proportions- Large samples- test of hypothesis for single mean and difference between the means. Test of hypothesis for the proportions- single and difference between the proportions.

UNIT- III:
Testing of Hypothesis - Small Samples: Test of significance-t distribution, confidence interval for the t- distribution, F-distribution and Chi square distribution, Analysis of variance (ANOVA).

UNIT- IV:
Correlation and Regression: Correlation, Correlation coefficient and its properties, rank correlation coefficient, Multiple and partial correlation, Introduction to Linear Regression, Estimation of parameters of β_0 and β_1, Multiple linear regression, Inferences for Linear Regression, Regression of second degree polynomial by least square method.

UNIT -V:
Queuing Theory: Queuing theory -Arrival process and service process- Pure birth and death process, M/M/1 model with finite and infinite capacities, M/M/C model with infinite capacity.

TEXT BOOKS:
1. Applied Probability, I. N. Blake, 9th Edition, John Wiley & Sons, 1979
2. Introductory Statistics, Thomas H. Wonnacott & Ronald J. Wonnacot, John Wiley & Sons, 1969
3. The Single Server Queue, J. W. Cohen, Wiley Interscience, 1969

REFERENCES:
1. Applied Statistics and Probability for Engineers, Douglas C. Montgomery, George C. Runger, 3rd Edition, John Wiley & Sons, 2003
2. Probability and Statistics for Engineers, Richard A. Johanson, 5th Edition, Prentice Hall, 1995
3. Applied Statistics for Engineers, Jay L. Devore, Nicholas R. Famum, Jimmy A. Doi, 3rd Edition, Cengage Learning
4. Some Problems in the Theory of Queues, D. G. Kendall, Journal of the Royal Statistical Society, Series B, 13, 151–185, 1951

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. III Semester

(22PC1EC211) DIGITAL LOGIC DESIGN

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

COURSE OBJECTIVES:
- To analyze and explore uses of number conversions for building digital circuits
- To explore uses logic functions for building digital logic circuits
- To explore the combinational logic circuits
- To implementation of PLDs and examine the operation of sequential circuits
- To analysis of counters, registers and clocked sequential circuits

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

CO-1: Represent numbers, base conversions and error detection and correction codes

CO-2: Simplify the complex logic functions using postulates, theorems and k-maps

CO-3: Design combinational circuits for various digital applications

CO-4: Implement PLD's and design sequential circuits

CO-5: Apply the sequential circuit concepts in designing counters, registers and state machines

COURSE ARTICULATION MATRIX:
(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial***)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3	2	3	1	2	1	-	-	-	-	-	1	3	2	2	2
CO-2	3	2	2	1	2	1	-	-	-	-	-	1	2	2	3	2
CO-3	2	3	3	1	2	1	-	-	-	-	-	1	2	3	3	3
CO-4	3	2	1	2	1	1	-	-	-	-	-	1	3	2	-	-
CO-5	3	3	1	1	1	-	-	-	-	-	--	-	2	1	2	2

UNIT-I:
Numbers Systems and Codes: Review of number systems, number base conversion, binary arithmetic, binary weighted and non-weighted codes, Complements, Signed binary numbers, Error Detection and Correcting Codes.

UNIT-II:
Boolean Algebra and Gate Level Minimization: Binary Logic, Postulates and theorems, representation of switching functions, SOP and POS forms –Canonical forms, digital logic gates, Karnaugh Maps –minimization using two variable, three variable, four variable K-Maps, Don't Care Conditions, NAND and NOR implementation, Other Two-Level Implementation, Exclusive-OR function. Tabulation method

UNIT-III:
Design of Combinational Circuits: Combinational Circuits - Analysis and Design Procedure, Binary adders, Binary subtractors, adder/subtractor, CLA, 1-bit and 2-bit magnitude comparator, Decoders, Encoders, 4 to 2 priority encoder, Multiplexers, function implementation using Multiplexers, Demultiplexers, Code Converters, 2-bit Binary multiplier, BCD adder.

UNIT-IV:
Programmable Logic Devices: Programmable Read Only Memory, Programmable Logic Array, Programmable Array Logic.
Design of Sequential Circuits: Combinational Vs Sequential Circuits, Latches, Flip Flops-RS flip flop, D flip flop, JK flip flop, T flip flop, Master-Slave Flip flop, Flip Flops excitation functions, Conversion of one flip flop to another flip flop.

UNIT-V:
Counters and Registers: Design of synchronous counters, Asynchronous counters, Registers, Shift Registers-SISO, SIPO, PISO, PIPO, universal shift register, Synchronous Vs Asynchronous sequential circuits, Analysis of clocked sequential circuits, State Table, State Diagram, State Reduction and State Assignment, Sequence detector, FSM, Mealy and Moore Machines.

TEXT BOOKS:
1. Digital Design, M. Morris Mano, 3rd Edition, Pearson Education/PHI
2. Fundamentals of Logic Design, Roth, 5th Edition, Thomson
3. Logic Design Theory, Nripendra N. Biswas, PHI

REFERENCES:
1. Switching and Finite Automata Theory, 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
4. Fundamentals of Digital Logic & Micro Computer Design, M. Rafiquzzaman, 5th Edition, John Wiley

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. III Semester

(22PC1DS201) MATHEMATICAL FOUNDATIONS FOR DATA SCIENCE

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

COURSE OBJECTIVES:
- To apply logical reasoning to variety of problems
- To understand the concepts on elementary combinatorics and permutations
- To analyze the properties of graphs and trees
- To evaluate various methods for solving the recurrence relations

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Demonstrate problems using statement calculus, predicate logic and set theory
CO-2: Analyze sets, relations, functions, and discrete structures
CO-3: Apply and calculate permutations and combinations
CO-4: Understand the use of graphs and trees as models
CO-5: Solve various problems using recurrence relation techniques

COURSE ARTICULATION MATRIX:
(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial***)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3	3	1	2	1	2	-	-	-	-	-	1	-	3	2	2
CO-2	3	3	1	2	1	2	-	-	-	-	-	1	-	3	2	-
CO-3	3	3	1	2	1	2	-	-	-	-	-	1	-	3	2	3
CO-4	3	3	1	2	1	2	-	-	-	-	-	1	-	3	2	2
CO-5	3	-	2	-	2	-	-	-	-	-	-	-	-	2	2	2

UNIT-I:
Mathematical Logic: Statements and notations, Connectives, Well-formed formulas, Truth Tables, tautology, equivalence implication, Normal forms, Rules of inference, Consistency, proof of contradiction, Automatic Theorem Proving.
Predicates: Quantifiers, Predicative logic, Free & Bound variables.

UNIT-II:
Set Theory: Notations, inclusion and equality sets, operations on sets, Venn diagrams.
Relations: Properties of binary Relations, equivalence, transitive closure, compatibility and partial ordering relations, Hasse diagram.
Functions: Types of Functions, Inverse Function, Composition of functions, recursive Functions.

UNIT-III:
Elementary Combinatorics: Basics of counting, Combinations & Permutations, with repetitions, Constrained repetitions, the principles of Inclusion – Exclusion, Pigeon hole principle, Binomial Coefficients.

UNIT-IV:
Graphs: Basic Concepts, Isomorphisms and Subgraphs, Trees and their Properties, Spanning Trees, Directed Trees, Binary Trees, Planar Graphs, Euler 's Formula, Multigraphs and Euler Circuits, Hamiltonian Graphs, Chromatic Numbers, The Four-Color Problem.

UNIT-V:
Recurrence Relations: Generating Functions, Function of Sequences, Calculating Coefficients of generating functions, Recurrence relations, solving recurrence relation by substitution and Generating functions, the method of Characteristic roots, solution of Inhomogeneous Recurrence Relations.

TEXT BOOKS:
1. Discrete Mathematical Structures with Applications to Computer Science, J. P. Trembly and R. Manohar, Tata McGraw-Hill, 2019
2. Discrete Mathematics for Computer Scientists & Mathematicians, J. L. Mott, A. Kandel, T. P. Baker, 2nd Edition, PHI, 1986
3. Graph Theory: With Application to Engineering and Computer Science, Narsingh Deo, Prentice Hall of India, 2003

REFERENCES:
1. Elements of Discrete Mathematics, A Computer Oriented Approach, C. L. Liu and D. P. Mohapatra, 3rd Edition, Tata McGraw-Hill, 2017
2. Discrete Mathematics and its Applications, Kenneth H. Rosen, Tata McGraw-Hill, 2003
3. Discrete Mathematics, Norman L. Biggs, 2nd Edition, Oxford University Press, 1989

ONLINE RESOURCES:
1. IIT Discrete Mathematics Lectures – YouTube

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. III Semester

(22PC1IT201) OBJECT ORIENTED PROGRAMMING THROUGH JAVA

TEACHING SCHEME		
L	**T/P**	**C**
3	0	3

EVALUATION SCHEME				
SE	**CA**	**ELA**	**SEE**	**TOTAL**
30	5	5	60	100

COURSE OBJECTIVES:
- To understand object oriented concepts and problem solving techniques
- To obtain knowledge about the principles of inheritance and polymorphism
- To implement the concept of packages, interfaces, exception handling and concurrency mechanism
- To understand the Java database connectivity architecture

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Solve real-world problems using Object Oriented Programming paradigm
CO-2: Apply code reusability through inheritance, packages and interfaces
CO-3: Solve problems using Java collection framework and I/O classes
CO-4: Develop applications by generics for better performance use multithreading
CO-5: Build applications using the JDBC API to access the database

COURSE ARTICULATION MATRIX:
(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)**

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)			
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	**PSO-1**	**PSO-2**	**PSO-3**	**PSO-4**
CO-1	3	2	3	3	2	2	2	2	2	-	1	3	2	3	2	2
CO-2	3	2	2	2	2	-	-	2	1	1	1	2	3	3	2	3
CO-3	3	2	3	2	2	-	-	-	-	-	-	2	2	2	2	3
CO-4	3	3	2	2	2	2	-	1	1	1	-	2	3	2	2	2
CO-5	3	3	2	2	3	-	2	1	-	-	1	2	3	2	2	2

UNIT-I:
Object Oriented Programming Paradigm: Introduction to OOP Paradigm, Evolution of Java, Difference between JDK, JRE, and JVM, Classes, Objects, Data Types, Variables, Comments, Type Conversion and Casting, Operators, Symbolic Constants, Control Statements, Scope of Variables, Constructors, this keyword, Overloading, Command line Arguments, Arrays, String Class, Wrapper classes.

UNIT-II:
Inheritance, Packages, Interfaces and Other Topics: Understanding static, Introducing Nested and Inner classes, Access Modifiers,
Varargs: variable-Length Arguments, Lambda Expressions, garbage collection-finalize.

Inheritance: Basics, Using super, creating a multi level hierarchy, when constructors are executed, method overriding, polymorphism - dynamic method dispatch, using abstract class, final with Inheritance, object class.

Packages and Interfaces: Packages, Access protection, Importing Packages, Interfaces, Default Interfaces, Default interface methods, Use static methods in an Interface,

UNIT-III:

Exception Handling: Exception handling Fundamentals, Exception Types, Using try and catch, throw, throws, finally, Java Custom Exception, Catch Multiple Exceptions, Try-with Resources, Exceptions propagation, Chained Exceptions.

I/O, Generics and Other Topics: The Streams (Byte, Character, and Standard), Output Stream and InputStream classes, Reading and Writing Files, Random access file operations, Generics: The general form of a generics class, creating a generic method, generics interfaces, Serialization, Annotations,, Auto Boxing.

UNIT-IV:

Multithreaded Programming: Java Thread life cycle model – Thread creation - Thread Exceptions - Thread Priority – Synchronization - Runnable Interface - Interthread Communication - Deadlock - Suspending, Resuming and stopping threads.

Java AWT: AWT Hierarchy, Event Delegation Model, Adapter classes, Listeners, Layout management, AWT Components, Simple UI for Email registration.

UNIT-V:

The Collection Framework: Collection Objects – Sets, Lists, Queues, Maps – ArrayList-LinkedList - Vector– HashSet– LinkedHashSet– TreeSet– HashMap– Hashtable. Retrieving Elements from Collections – Enumeration, Iterator, List Iterator – String Tokenizer and Arrays Class – Sorting using Comparable and Comparator.

Java Database Connectivity: Introduction to JDBC, Types of Drivers, Basic steps in developing JDBC applications, JDBC classes and Interfaces, CRUD operations with JDBC, Transaction Management, Stored Procedures.

TEXT BOOKS:
1. Java The Complete Reference, Herbert Schildt, 9th Edition, McGraw-Hill Education
2. Java How to Program, Paul Dietel, Harvey Dietel, 10th Edition, Pearson Education

REFERENCES:
1. Core Java Volume-1 Fundamentals, Cay S. Horstmann, Pearson Education
2. Java Programming for Core and Advanced Learners, Sagayaraj, Dennis, Karthik and Gajalakshmi, University Press
3. Introduction to Java Programming, Y. Daniel Liang, Pearson Education
4. Object Oriented Programming through Java, P. Radha Krishna, University Press

ONLINE RESOURCES:
1. https://www.w3schools.com/java/java_oop.asp
2. http://peterindia.net/JavaFiles.html

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. III Semester

(22PC1AM201) DATABASE MANAGEMENT SYSTEMS

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

COURSE PRE-REQUISITES: Basic Computer Programming Skills

COURSE OBJECTIVES:
- To introduction of data base management concepts and to give the description of structure of data base systems
- To understand concepts of ER model and model the data base for the given scenarios and prepare the database through normalization
- To know the features of various models of data and query representations
- To introduce the concepts and protocols related to transaction management and understand the concepts of data storage

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Appreciate the underlying concepts of database system architecture and design E-R models to represent simple database application scenarios
CO-2: Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data
CO-3: Improve the database design by normalization
CO-4: Apply and relate the concept of transaction, concurrency control and recovery in database
CO-5: Familiar with basic database storage structures and access techniques using Indexing, hashing including B tree methods

COURSE ARTICULATION MATRIX:
*(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial**)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3	1	3	2	3	2	2	-	1	-	-	-	2	-	2	3
CO-2	2	2	3	3	3	2	3	-	1	-	-	-	2	2	2	-
CO-3	2	3	1	3	1	-	2	-	1	-	-	-	2	-	2	2
CO-4	3	2	1	1	1	-	3	-	-	-	-	-	1	1	1	2
CO-5	2	2	1	1	1	-	3	-	-	-	-	-	2	2	2	2

UNIT – I:
Introduction to Databases and Database Management System: Database system Applications, Advantages of DBMS over File System, Data Models, Instances and schema, View of Data, Database Languages –DDL, DML, DCL, Database Users and Administrator, Database System Architecture.

Database Design and ER Diagrams: Attributes and Entity Sets, Relationships and Relationship Sets, Constraints, Keys, Design Issues, Entity-Relationship Diagram, Extended E-R Features, Database Design with ER model, Database Design for a schema.

UNIT – II:
Introduction to the Relational Model: Structure of RDBMS, Integrity Constraints over Relations, Querying Relational Data, Relational Algebra and Relational Calculus.
Introduction to SQL: Data Definition commands, Data Manipulation Commands, Basic Structure, Set operations, Aggregate Operations, Join Operations, Sub queries and correlated queries, views, Triggers, Cursors

UNIT – III:
Functional Dependencies: Introduction, Basic Definitions, Trivial and Non trivial dependencies, closure of a set of dependencies, closure of attributes, irreducible set of dependencies.
Schema Refinement in Database Design: Problems Caused by Redundancy, Decompositions – Problem Related to Decomposition, Lossless Join Decomposition, Dependency Preserving Decomposition, FIRST, SECOND, THIRD Normal Forms, BCNF, Multivalued Dependencies, FOURTH Normal Form.

UNIT – IV:
Transaction Management: Transaction state, Implementation of atomicity and Durability, Concurrent executions – Serializability, Recoverability.
Concurrency Control: Lock Based Protocols, Timestamp Based Protocols, Validation Based Protocols, Multiple Granularity, Dead Lock Handling
Recoverability: Failure Classification, Storage Structure, Recovery and Atomicity- Log Based recovery, Recovery with concurrent transactions, Checkpoints.

UNIT – V:
File Organization: Organization of records in file, Data Dictionary Storage.
Indexing and Hashing: Basic Concepts, Ordered Indices, B tree Index files, B+ tree index files, Static Hashing, Dynamic Hashing – Comparison of Indexing with Hashing.

TEXT BOOKS:
1. Database System Concepts, Silberschatz, Korth, Sudarshan, 7th Edition, McGraw-Hill
2. Introduction to Database Systems, C. J. Date, Pearson Education

REFERENCES:
1. Database Management Systems, Raghu Ramakrishnan, Johannes Gehrke, Tata McGraw-Hill
2. Fundamentals of Database Systems, Elmasri Navathe, Pearson Education
3. Database Systems Design, Implementation, and Management, Peter Rob & Carlos Coronel, 7th Edition, Cengage Learning

ONLINE RESOURCES:
1. https://www.w3schools.com/sql/default.asp
2. https://www.javatpoint.com/dbms-tutorial

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. III Semester

(22PC2IT201) OBJECT ORIENTED PROGRAMMING THROUGH JAVA LABORATORY

TEACHING SCHEME		
L	**T/P**	**C**
0	2	1

EVALUATION SCHEME					
D-D	**PE**	**LR**	**CP**	**SEE**	**TOTAL**
10	10	10	10	60	100

COURSE OBJECTIVES:
- To understand OOP principles
- To understand the Exception Handling mechanism
- To understand Java collection framework
- To understand multithreaded programming
- To understand Java database connectivity in Java

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Write the programs for solving real world problems using Java OOP principles
CO-2: Write programs using Exceptional Handling approach
CO-3: Write multithreaded applications
CO-4: Build application using Java collection framework
CO-5: Develop java application connect database using JDBC

COURSE ARTICULATION MATRIX:
(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial***)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)			
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	**PSO-1**	**PSO-2**	**PSO-3**	**PSO-4**
CO-1	3	3	2	3	-	2		-	2	-	1	2	2	3	2	2
CO-2	3	2	3	2	-	-	-	-	2	1	-	2	3	3	2	2
CO-3	3	3	2	3	-	-	-	-	2	-	2	2	2	2	2	2
CO-4	2	2	3	2	2	2	2	-	2	1	2	2	3	2	2	3
CO-5	2	2	2	2	2	3	2	1	2	1	1	2	3	2	2	2

LIST OF PROGRAMS / EXPERIMENTS / EXERCISES:

WEEK 1:
a. Installation of Java software, study of any integrated development environment, Use Eclipse or Netbean platform and acquaint 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 java program to find prime numbers between 1 to n.
b. Write a Java program that prints all real solutions to the quadratic equation ax^2+bx+c. Read in a, b, c and use the quadratic formula.
c. Write a Java program to multiply two given matrices.

WEEK 2:

a. Write Java program on use of inheritance, preventing inheritance using final, abstract classes.

b. Write Java program on dynamic binding, differentiating method overloading and overriding.

c. Develop a java application to implement currency converter (Dollar to INR. EURO to INR, Yen) using Interfaces.

WEEK 3:

a. Write a Java program to create a package named "com.mycompany.math" that contains a class named "Calculator" with methods to add, subtract, multiply and divide two numbers. Write a test program to use this package.

b. Create a package named "com.mycompany.util" that contains a class named "StringUtils" with a method named "reverseString" that takes a string as input and returns the reverse of the input string. Write a test program to use this package.

WEEK 4:

a. Write a Java program to implement user defined exception handling.

b. Write a Java program to throw an exception "Insufficient Funds" while withdrawing the amount in the user account.

c. Write a Java program to implement Try-with Resources, Multi-catch Exceptions, and Exception Propagation Concepts?

WEEK 5:

a. Write a java program to split a given text file into n parts. Name each part as the name of the original file followed by .part where n is the sequence number of the part file.

b. Write a Java program that reads a file name from the user, displays information about whether the tile exists, whether the file is readable, or writable. The type of tile and the length of the file in bytes.

WEEK 6:

a. Write a Java program on Random Access File class to perform different read and write operations.

b. Create a class called Employee with properties name(String), dateofbirth (java.util.Date), department(String), designation(String) and Salary(double). Create respective getter and setter methods and constructors (no-argument constructor and parameterized constructor) for the same. Create an object of the Employee class and save this object in a file called "data" using serialization. Later using deserialization read this object and prints the properties of this object.

WEEK 7:

a. Create a generic class called Box that can hold any type of object. Implement the following methods: 1) void set(T obj): sets the object stored in the box 2) T get(): retrieves the object stored in the box 3) boolean isEmpty(): returns true if the box is empty, false otherwise

b. Implement a generic Stack class that can hold any type of object. Implement the following methods: 1) void push(T obj): pushes an object onto the top of the stack ,2) T pop(): removes and returns the object at the top of the stack 3) boolean isEmpty(): returns true if the stack is empty, false otherwise

WEEK 8:
a. Write a Java program to implement Autoboxing and Unboxing?
b. Write a Java program to implement Built-In Java Annotations?

WEEK 9:
a. Write a Java program that creates three threads. First thread displays —Good Morning every one second, the second thread displays —Hello every two seconds and the third thread displays —Welcome every three seconds.
b. Write a Java program that correctly implements producer consumer problem using the concept of inter thread communication.
c. Create a Email registration Form using Java AWT. The UI should have fields such as name, address, sex, age, email, contact number, etc.,
d. Demonstrate various Layout Managers in Java AWT. Display the output in card layout wheareas each card exhibits different layout.

WEEK 10:
a. Write a Java program to create a Vector and add some elements to it. Then get the element at a specific index and print it.
b. Write a Java program to create a BitSet and set some bits in it. Then perform some bitwise operations on the BitSet and print the result.
c. Write a Java program to read the time intervals (HH:MM) and to compare system time if the system Time between your time intervals print correct time and exit else try again to repute the same thing. By using String Tokenizer class.

WEEK 11:
a. Write a Java program to demonstrate the working of different collection classes. [Use package structure to store multiple classes].
b. Write a Java program to create a TreeMap and add some elements to it. Then get the value associated with a specific key and print it.
c. Write a Java program to create a PriorityQueue and add some elements to it. Then remove the highest priority element from the PriorityQueue and print the remaining elements.

WEEK 12:
a. Deve1op a Java application to establish a JDBC connection, create a table student with properties name, register number, mark 1, mark2, mark3. Insert the values into the table by using the java and display the information of the students at font end.
b. Write a program to perform CRUD operations on the student table in a database using   JDBC

TEXT BOOKS:
1. Java for Programmers, P. J. Deitel and H. M. Deitel, 10th Edition, Pearson Education
2. Thinking in Java, Bruce Eckel, Pearson Education
3. Understanding Object-Oriented Programming with Java, T. Budd, Pearson Education

REFERENCES:
1. Java Programming, D. S. Malik and P. S. Nair, Cengage Learning
2. Core Java, Volume 1, Cay S. Horstmann and G. Cornell, 9th Edition, Pearson
3. Programming in Java, S. Malhotra, S. Choudhary, 2nd Edition, Oxford University Press

4. Java Programming and Object-Oriented Application Development, R. A. Johnson, Cengage Learning

ONLINE RESOURCES:
1. https://www.w3schools.com/java/java_oop.asp
2. http://peterindia.net/JavaFiles.html

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. III Semester

(22PC2AM201) DATABASE MANAGEMENT SYSTEMS LABORATORY

TEACHING SCHEME		
L	**T/P**	**C**
0	2	1

EVALUATION SCHEME					
D-D	**PE**	**LR**	**CP**	**SEE**	**TOTAL**
10	10	10	10	60	100

COURSE PRE-REQUISITES: Basic Computer Programming Skills

COURSE OBJECTIVES:
- To provide the fundamental concepts of database creation
- To implement the concepts of data manipulation
- To develop procedures for querying multiple tables
- To understand the concepts of PL / SQL

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Understand the given scenario, design it through ER model and normalize the schema
CO-2: Use the basics of SQL and construct queries using SQL in database creation and interaction
CO-3: Apply integrity constraints for creating consistent RDBMS environment
CO-4: Applying PL/SQL for processing database
CO-5: Develop solutions using database concepts for real time requirements

COURSE ARTICULATION MATRIX:
*(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial**)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)			
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	**PSO-1**	**PSO-2**	**PSO-3**	**PSO-4**
CO-1	3	1	3	3	2	1	2	-	-	2	2	-	2	2	3	3
CO-2	3	1	3	3	1	1	2	-	-	-	-	-	3	2	3	2
CO-3	2	1	2	3	1	1	2	-	-	2	-	-	3	2	3	2
CO-4	3	2	2	3	1	1	2	-	-	-	-	-	3	2	3	2
CO-5	3	2	3	3	1	1	3	-	-	3	-	2	3	3	3	2

LIST OF PROGRAMS / EXPERIMENTS / EXERCISES:

WEEK 1:
Implement the following using DUAL table: a) Character functions, b) Numeric functions c) Date functions and d) Conversion functions.

WEEK 2:
Practice DDL and DML commands on a basic table without integrity constraints.

WEEK 3:
Practice DDL and DML commands on a Relational Database, specifying the Integrity constraints. (Primary Key, Foreign Key, CHECK, NOT NULL)

WEEK 4:
Apply the concepts of Joins, SET operations and SQL functions on any two relational schemas

WEEK 5-7:
Apply the concepts of Joins, SET operations and SQL functions on the following schema:

a)   Employee:

Name	Datatype	width	Constraint	Description
Empno	Integer	4	Primary Key	Employee Number
Ename	Varchar	20		Employee Name
Job	Char	12		Designation
Mgr	Integer	4		Manager Number
Hiredate	Date			
Sal	Number	(8,2)		Salary
Comm	Number	(6,2)		Commission
Deptno	Integer	2	Foreign Key	Department Number

b)   Dept:

Name	Datatype	width	Constraint	Description
Deptno	Integer	2	Primary Key	Department Number
Dname	Varchar	12		Department Name
Loc	Char	10		Location

c)   Salgrade:

Name	Datatype	width	Constraint	Description
Grade	Integer	1		Grade
Hisal	Integer	4		Upper
Losal	Integer	5		Lower

WEEK 8 – 11:
End to end implementation of a schema for a specific system along with the illustrations of querying.
A system is described by specifying the functional and non-functional requirements. Based on this description, the major entities are identified and modelled. Further the relationships are modelled to form the initial schema. The schema is further refined by removing redundancies through normalization. Also based on the query requirements, the schema is remodeled to facilitate querying. Finally an illustration of various queries to extract required information from the system is shown using SQL / MYSQL.
The five major workflows to be implemented are:
1. System Specification
2. Design of Initial Schema

3. Schema refinement using functional dependencies and normalization
4. Schema refinement using query requirements
5. Illustration of querying the system using SQL / MYSQL.

WEEK 12:
Implementation of PL / SQL concepts

WEEK 13:
Creating and executing CURSORS.

WEEK 14:
Creation and application of TRIGGERS on a Relational schema.

TEXT BOOKS:
1. Database System Concepts, Silberschatz, Korth, Sudarshan, 7th Edition, McGraw-Hill
2. Introduction to Database Systems, C. J. Date, Pearson Education

REFERENCES:
1. Database Management Systems, Raghu Ramakrishnan, Johannes Gehrke, Tata McGraw-Hill
2. Fundamentals of Database Systems, Elmasri Navathe, Pearson Education
3. Database Systems Design, Implementation, and Management, Peter Rob & Carlos Coronel, 7th Edition, Cengage Learning

ONLINE RESOURCES:
1. https://www.w3schools.com/sql/default.asp
2. https://www.javatpoint.com/dbms-tutorial

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. III Semester

(22SD5DS201) DATA VISUALIZATION

TEACHING SCHEME		
L	T/P	C
0	2	1

EVALUATION SCHEME						
D-D	PE	LR	CP	VV	SEE	TOTAL
10	10	10	10	10	-	50

COURSE OBJECTIVES:
- To install and run the R studio for data analysis
- To understand principles and techniques for data visualization
- To visualize the data that can improve comprehension, communication, and decision making
- To implement various tools and methods for easy interpretation of data

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Understand the importance of data visualization in analytics
CO-2: Gain knowledge in the principles of data visualization
CO-3: Apply the principles of data visualization on toy datasets using R
CO-4: Analyze data towards decision making using visualization
CO-5: Identify appropriate/suitable visualization for particular requirements imposed by the data type and analytics algorithms

COURSE ARTICULATION MATRIX:
(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial***)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	2	2	2	3	3	-	-	-	-	-	-	2	3	2	-	3
CO-2	1	1	2	2	3	-	-	-	-	-	-	1	2	2	-	2
CO-3	2	2	1	1	3	-	-	-	-	-	1	1	3	2	2	3
CO-4	2	2	1	1	2	-	-	-	-	-	1	1	2	3	3	2
CO-5	1	1	2	2	1	-	-	-	-	-	2	1	1	2	2	2

LIST OF EXERCISES:

EXERCISE 1: Basics
Introduction to basic components of R programming, overview of visualization, data types, basics of plotting graphs, different types of graphs in analytics

EXERCISE 2: Importance of visualizations
Principles of communicating data, Principles of encoding data to make visualizations, Importance of color in visualizations

EXERCISE 3: Plots using basic R

Exercise 3.1: Plots with one categorical, continuous variable

Functions in R for plotting, plots with one categorical variable, plots with one continuous variable, plots with one categorical and one continuous variable

Exercise 3.2: Plots with 2 continuous variables

Plots with two continuous variables, controlling various aesthetics of the graph.

EXERCISE 4: ggplot2 in R

Group manipulation and data reshaping in R, understanding the philosophy of ggplot2, bar plot, pie chart, histogram, boxplot, scatter plotand regression plots

EXERCISE 5: ggplot2 in R

Controlling aesthetics like colour, size, legend and facets.

EXERCISE 6: Data Visualization

Importing the data, Dimensions and measures, color code for various types of variables

EXERCISE 7: Working with sheets

Understanding the worksheet, row and column shelves, showme card, filter and pages shelf

EXERCISE 8: Calculations

Working with different measures, creating new calculated fields, Quick table calculations, parameters and groups

EXERCISE 9: Graphs for Analytics

Calculate Proportions and percentages, Comparing current to historical and Actual to Target

EXERCISE 10: Normal Distribution Variation

Calculate Mean and Median – Normal Distribution Variation and Uncertainty

EXERCISE 11: Reporting and Visualizing variation

Reporting and Visualizing variation, Control Charts Multiple Quantities – Scatter Plots, Stacked bars, Regressions and trend lines

EXERCISE 12: Depicting changes over time

Depicting changes over time, Line Chart, Dual Axis Line Chart, scatterplot

EXERCISE 13: Reporting

Introduction to dashboard, use of filters in dashboard, Imbedding pictures, Insert live webpage, story

TEXT BOOKS:
1. Microsoft Power BI, Marco Russo
2. R for everyone, Jarad P Lander
3. Statistics: An Introduction using R, Michael J. Crawley

REFERENCES:
1. Think Python, Allen Downey, Green Tea Press
2. Core Python Programming, W. Chun, Pearson
3. Introduction to Python, Kenneth A. Lambert, Cengage

ONLINE RESOURCES:
1. https://www.tableau.com/learn
2. https://tableauacademy.substack.com/p/tableau-training-and-learning-2021

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. III Semester

(22PW4IT201) DESIGN THINKING

TEACHING SCHEME		
L	T/P	C
1	2	2

EVALUATION SCHEME		
CIE	SEE	TOTAL
40	60	100

COURSE OBJECTIVES:
- To instill a sense of significance towards applying creativity to product and service design
- To teach a systematic approach to identifying and defining a problem before brainstorming for a solution
- To inculcate core design principles and applied creativity to develop innovative strategies that better connect engineers and technologies with their end users
- To build a mindset leading to flow of creative ideas, validating those ideas and prioritizing the best ones among them
- To motivate students to apply design thinking while implementing projects focusing on local, regional or global societal problems

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Demonstrate the understanding of design principles from a technology perspective
CO-2: Validate problem statements through user empathisation with societal, cultural, global and environmental consciousness
CO-3: Use specific and relevant ideation and brainstorming techniques to find innovative solutions
CO-4: Prototype a solution to address user challenges
CO-5: Investigate the cultural, emotional, environmental, technological and business factors relevant to developing new product or service design concept

COURSE ARTICULATION MATRIX:
(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial***)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	-	-	2	-	-	2	-	-	3	3	1	1	-	2	1	2
CO-2	-	-	3	2	1	3	-	-	3	2	1	1	2	1	3	1
CO-3	-	-	2	-	-	2	-	-	2	2	3	-	-	-	2	-
CO-4	-	-	3	-	2	-	-	-	2	3	1	-	-	1	2	3
CO-5	-	-	-	3	-	3	1	-	1	-	1	-	-	-	2	-

UNIT-I:
Design Overview and Doing Design: Various perspectives of design; Good and Bad Design; Introduction to the Design Double Diamond: Discover-Define-Develop-Deliver; Discover Phase- Looking for problems; Identifying Stakeholders and Defining User Personas; User Empathization; Data collection, creating and conducting surveys

and Empathy Tools – What/How/Why, Five Why method, Empathy Maps, AEIOU method, Story Share and Capture

UNIT-II:
Need Analysis: Types of Users, Types of Needs; Market Size; Value Proposition to the Users; Identifying Addressable Needs and Touch points; Structuring Need Statements; Customer Experience (CX) Design; Service Design and Development Process; Customer Journey Map (CJM), Service Experience Cycle.

UNIT-III:
Ideation Process: Introduction to creativity and closed-world solutions, Idea generation techniques: Brainstorming, Mind Maps, SCAMPER, Systematic Inventive Thinking methods (Subtraction, Multiplication, Division, Task Unification and Attribute Dependency);
Strategic Innovation for Competition in Future: Linear Innovation vs. Non-linear innovation, Understanding and identifying weak signals, 3-box thinking, 3-Box framework and Box-3 ideation, Four-Action Framework (Eliminate-Reduce-Raise-Create, or ERRC Matrix).

UNIT -IV:
Building Prototypes: Building Conceptual model of product/service using various prototype methods, test a business model or business case to support the viability of the solution using MVP.
Design for Sustainability: Concern for Environment and Sustainability in Design, Case Studies to understand good Design For Environment (DFE) Decisions; Sustainable Design Approaches in the five stages of the Product Life Cycle.

UNIT -V:
Capstone Project (Interdisciplinary): Applying design thinking principles and methods for problem definition, ideation, prototyping, testing, refining and taking the solution to the users, using visual representation tools to indicate problem, User persona, needs, empathisation, ideas and prototype that leads to chosen solution, creating presentation.

TEXT BOOKS:
1. Change by Design, Tim Brown, Harper Business, 2012
2. The Design of Everyday Things, Donald A. Norman, MIT Press, 2013

REFERENCES:
1. The Art of Innovation, Tom Kelly, Jonathan Littman, Harper Collins Business, 2002
2. Design Thinking: Integrating Innovation, Customer Experience, and Brand Value, Thomas Lockwood, Allworth Press, 2009
3. Design Thinking for Start-ups: A Handbook for Readers and Workbook for Practitioners, Jimmy Jain, Notion Press, 2018

ONLINE RESOURCES:
1. https://www.ideou.com/pages/design-thinking
2. https://www.ibm.com/design/thinking/page/framework
3. https://onlinecourses.nptel.ac.in/noc20_mg38/preview
4. https://nptel.ac.in/courses/110106124

5. https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. III Semester

(22MN6HS102) ENVIRONMENTAL SCIENCE

TEACHING SCHEME		
L	T/P	C
2	0	0

EVALUATION SCHEME			
SE-I	SE-II	SEE	TOTAL
50	50	-	100

COURSE PRE-REQUISITES: Basic Knowledge of Environmental Issues

COURSE OBJECTIVES:
- To recognize the impacts of human interventions towards environment
- To list out the benefits in creating a sustainable world
- To sketch out various activities in achieving a cleaner environment
- To emphasize the role of frontier technologies for a better planet to live

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Gain a variety of experiences & acquire a basic knowledge about the environment & its allied problems
CO-2: Interpret the key components in safeguarding the environment
CO-3: Appraise the quality of environment in order to create a healthy atmosphere
CO-4: Familiarize with the importance of emerging technologies towards green revolution

COURSE ARTICULATION MATRIX:
(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial***)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3	2	1	-	-	1	1	-	2	1	-	2	-	-	3	-
CO-2	3	2	2	1	-	1	1	-	2	1	-	2	-	-	3	-
CO-3	3	2	2	-	-	1	1	-	2	1	-	2	-	-	3	-
CO-4	3	2	1	1	-	1	1	-	2	1	-	2	-	-	3	-

MODULE 1:
Introduction to Environmental Science: Importance of Environmental Science, Overview of the environment & its components, Human intervention in destruction or sustenance of environment. Relationship between environmental science & society - Influence of Industry, Innovation & infrastructure on environment

MODULE 2:
Synergy With Environment: Health & Well Being-ensuring healthy lives and promoting wellbeing at all ages. Reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination. Life under water and on land-conservation & sustainable usage, measures to protect marine & coastal ecosystems from various impacts. Protect and restore terrestrial ecosystems, sustainably managing forests, combat desertification. Biodiversity a valuable

resource- biological diversity as a support for food, water, medicine, shelter, cleaning of air and water and other material goods for sustaining life and increase resilience

MODULE 3:
Climate Change: Science behind climate change-factors responsible for climate change, Scientific evidence about past climate and present. Expected consequences of climate change- Impacts of climate change on growth and development. Role of greenhouse gases- Global temperature rise & its impact on environment & human health. Carbon footprint-Briefing on Paris agreement, Identify key sectors for low carbon footprint. Climate change mitigation & adaptation strategies

MODULE 4:
Moving Towards Sustainability: Eco-Audit and its importance. Sustainable agriculture-Organic farming and hydroponics. Role of AI & IOT for efficient management of environmental issues-Health, air, water, and soil. Sustainable living practices-minimizing waste, limited use of earth's natural resources, wise use of environment and ensuring quality working/living environments

MODULE 5:
Innovations in Environmental Science: Sustainable cities and communities-case study, Responsible consumption & production- Refuse, Reduce, Reuse and Recycle with examples. Innovative approaches to waste management-smart waste management, Plastic recycling-innovative ideas.

TEXTBOOKS:
1. Environmental Studies for UG Courses, Erach Bharucha, UGC Publications, 2004
2. Environmental Studies, Rajagopalan, Oxford University Press
3. Introduction to Climate Change, Andreas Schmittner, Oregon State University, 2018

REFERENCES:
1. Green Development: Environment and Sustainability in a Developing World, Bill Adams, 4th Edition, Routledge Publishers, 2021
2. Fixing Climate, Robert Kunzig & Wallace S. Broecker, Main Edition, Profile Books Publisher, 2009
3. Plastic Waste and Recycling-Environmental Impact, Societal Issues, Prevention and Solutions, 1st Edition, Academic Press, 2020

ONLINE RESOURCES:
1. https://www.coursera.org/learn/beyond-the-sustainable-development-goals-addressing-sustainability-and-development
2. https://www.coursera.org/specializations/climatechangeandsustainableinvesting

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. IV Semester

(22HS1MG201) ENGINEERING ECONOMICS AND ACCOUNTANCY

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

COURSE OBJECTIVES:
- To understand the basic concepts of economics and different forms of business organizations
- To create awareness on basics of business economics and to analyze the concepts of demand and supply
- To describe each stage of product life cycle with the help different costs and their role in maintaining optimum cost of production and overall profitability by considering different market competitions
- To acquaint with the basic accounting knowledge and financial accounting process
- To evaluate the performance of the organization using various ratios

COURSE OUTCOMES: After completion of the course, the student should be able to

CO-1: Perform decision making function effectively in an uncertain framework by applying the based concepts of economics and select suitable form of business organization which meets the requirements of business

CO-2: Take the right decisions towards buying and selling of goods and services based on the demand and supply dynamics in the markets

CO-3: Fix the right price based upon production cost which can best meet the pre-determined objectives of the business under different market conditions

CO-4: Prepare book of accounts and understand overall position of the business

CO-5: Interpret the firm's financial performance using various ratios

COURSE ARTICULATION MATRIX:
(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	-	-	-	-	-	-	-	1	2	1	3	1	-	-	-	-
CO-2	-	-	-	-	-	-	-	1	2	1	3	1	-	-	-	-
CO-3	-	-	-	-	-	-	-	1	2	1	3	1	-	-	-	-
CO-4	-	-	-	-	-	-	-	1	2	1	3	1	-	-	-	-
CO-5	-	-	-	-	-	-	-	1	2	1	3	1	-	-	-	-

UNIT-I:
Introduction to Economics: Definition, nature, scope and types of Economics. National Income (NI) & types of Inflation.

Forms of Organizing Private and Public-Sector Business Enterprises:
Private Sector Business Enterprises: (i) Sole Proprietorship – Definition, features, merits, limitations & suitability. (ii) Partnership – Definition, Partnership Act, features, types, merits, limitations, suitability. (iii) Joint-Stock Company – Definition, Companies Act, features, types, merits, limitations, suitability.
Public Sector Business Enterprises: Definition, features, objectives, merits, problems

UNIT-II:
Business Economics: Definition, nature and scope, linkages with other disciplines.
Demand Analysis: Law of Demand, Factors affecting demand; Elasticity of Demand-Types Measurement, Factors affecting and Significance,
Demand Forecasting: Characteristics of Good Demand Forecasting, Steps in Demand Forecasting, Methods of Demand Forecasting.
Supply Analysis: Determinants of Supply, Supply function and Law of Supply.

UNIT-III:
Production, Cost, Market Structures & Pricing:
Production Analysis: Factors of Production, Production Function, Production Function with one variable input, two variable inputs, Returns to Scale, Different Types of Production Functions - Cobb-Douglas.
Cost Analysis: Types of Costs, Short run and long run Cost Functions.
Market Structures: Nature of Competition, Features of Perfect competition, Monopoly, Oligopoly, Monopolistic Competition.
Pricing: Types of Pricing, Product Life Cycle based Pricing, Break Even Analysis (Simple problems)

UNIT-IV:
Introduction to Financial Accounting: Definition, basic principles and double-entry book-keeping, practice of accounting process-Journal, ledger, trial balance and final accounts (simple problems)

UNIT-V:
Ratio Analysis: Meaning, computation of ratios (i) Liquidity Ratios: Current Ratio and Quick Ratio, (ii) Solvency Ratios: Interest Coverage Ratio and Debt-Equity Ratio, (iii) Activity Ratios: Stock/Inventory Turnover Ratio and Debt Turnover Ratio, (iv) Profitability Ratios: Gross Profit Ratio, Net Profit Ratio & Earning Per Share (EPS) Ratio

TEXT BOOKS:
1. Managerial Economics, D. M. Mithani, 9th Edition, Himalaya Publishing House, 2022
2. Managerial Economics, Satya P. Das & J. K. Goyal, 2nd Edition, Sage Publications, 2022
3. Financial Accounting, S. N. Maheswari, 6th Edition, Vikas Publications, 2018

REFERENCES:
1. Managerial Economics, Dominick Salvatore, Siddhartha K. Rastogi, 9th Edition, Oxford Publications, 2020
2. Financial Accounting for Management: An Analytical Perspective, Ambrish Gupta, 6th Edition, Pearson Education, 2018
3. Business Economics, H. L. Ahuja, 13th Edition, S. Chand, 2019

4. Principles of Marketing: A South Asian Perspective, Kotler Philip, Gary Armstrong, Prafulla Y. Agnihotri, and Eshan-ul Haque, 13th Edition, Pearson Education/ Prentice Hall of India, 2010

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. IV Semester

(22PC1CS202) DESIGN AND ANALYSIS OF ALGORITHMS

TEACHING SCHEME		
L	T/P	C
3	1	4

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

COURSE PRE-REQUISITES: Programming, Data Structures, Discrete Mathematics

COURSE OBJECTIVES:
- To reinforce algorithms analysis methods
- To analyse running time of an algorithm
- To understand different algorithm design strategies
- To apply algorithms design techniques to solve computational problems

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Analyse running time of an algorithm using asymptotic analysis
CO-2: Apply appropriate algorithm design techniques to develop efficient algorithms for solving computational problems
CO-3: Compare different algorithms for their efficiency and choose an appropriate data structure
CO-4: Employ graphs to model engineering problems, when appropriate and analyse time complexity
CO-5: Describe and identify the classes P, NP, NP-Hard and NP Complete problems and formulate solutions using standard approaches

COURSE ARTICULATION MATRIX:
*(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial**)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	2	2	2	3	-	-	-	2	-	-	-	2	-	3	-	3
CO-2	3	2	3	3	3	2	2	3	2	1	3	3	3	-	3	3
CO-3	2	2	2	3	-	-	-	2	-	-	-	2	-	3	-	-
CO-4	3	3	2	3	1	1	1	2	1	1	1	3	2	3	3	2
CO-5	3	3	3	3	-	-	-	1	1	1	2	2	-	3	-	2

UNIT-I:
Performance Analysis: Characteristics of Algorithm. Analysis of Algorithm: Best, Average and Worst-Case behaviour, Asymptotic Analysis– Big oh, Omega, Theta notations and Little oh, Little omega notations, Time and Space Trade-Offs, Analysis of Recursive Algorithms through Recurrence Relations, Substitution Method, Recursion Tree Method and Masters' Theorem.

UNIT-II:
Fundamental Algorithmic Strategies: Divide and conquer General method, applications-Binary search, Quick sort, Merge sort, Strassen's matrix multiplication. Greedy method: General method, applications- Job sequencing with deadlines, 0/1 knapsack problem, Minimum cost spanning trees,   Single source shortest path problem, Huffman Codes.
Brute force, KMP Pattern Matching Algorithms.

UNIT-III:
Dynamic Programming: General method, Principle of optimality, applications-Multistage graphs, Matrix chain multiplication, Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Travelling sales person problem, Reliability design.

UNIT-IV:
Backtracking Method: Applications- N-Queen problem, Sum of subsets problem, Graph coloring, Hamiltonian cycles. Branch and Bound Method: Applications - Travelling sales person problem,0/1 knapsack problem- LC Branch and Bound solution, FIFO Branch and Bound solution

UNIT-V:
Graph Algorithms: Depth First Search (DFS) and Breadth First Search (BFS), Topological sorting, Connected and Bi Connected Components, Network Flow Algorithm. Tractable and Intractable Problems: P, NP, NP-complete and NP-hard. Cook's theorem, Randomized Algorithms.

TEXT BOOKS:
1. Fundamental of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharam, 2nd Edition, Galgotia Publications
2. Introduction to Algorithms, Thomas H. Cormen, Charles E. Lieserson, Ronald L. Rivest and Clifford Stein, 4th Edition, MIT Press/McGraw-Hill

REFERENCES:
1. Algorithm Design, Jon Kleinberg and EvaTardos, 1st Edition, Pearson
2. Algorithm Design: Foundations, Analysis, and Internet Examples, Michael T. Goodrich and Roberto Tamassia, 2nd Edition, Wiley
3. Introduction to the Design and Analysis of Algorithms, Anany Levitin, 3rd Edition, Pearson Publications
4. The Design and Analysis of Computer Algorithms, A. Aho, J. Hopcroft and J. Ullman

ONLINE RESOURCES:
1. http://nptel.ac.in/courses/106101060/
2. https://www.cmi.ac.in/~madhavan/teaching.html
3. https://www.ics.uci.edu/~eppstein/161/960312.html
4. https://ocw.mit.edu/courses/6-006-introduction-to-algorithms-spring-2020/

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. IV Semester

(22PC1IT202) OPERATING SYSTEMS

TEACHING SCHEME		
L	**T/P**	**C**
3	0	3

EVALUATION SCHEME				
SE	**CA**	**ELA**	**SEE**	**TOTAL**
30	5	5	60	100

COURSE OBJECTIVES:
- To understand operating system overview, functions and service
- To analyse process concept, inter process communication and synchronization
- To understand memory management and file system interface
- To understand secondary storage management
- To understand protection and security

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Understand operating system overview, functions and service
CO-2: Analyze process concept, inter process communication and synchronization
CO-3: Understand memory management and file system interface
CO-4: Understand secondary storage management
CO-5: Understand protection and security

COURSE ARTICULATION MATRIX:
(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial***)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)			
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	**PSO-1**	**PSO-2**	**PSO-3**	**PSO-4**
CO-1	3	1	2	1	1	1	1	1	-	1	3	2	3	1	3	2
CO-2	3	1	2	1	1	1	1	1	-	1	3	2	3	1	3	2
CO-3	3	1	2	1	1	1	1	1	-	1	3	2	3	1	3	-
CO-4	3	1	2	1	1	1	1	1	-	1	3	2	3	1	3	-
CO-5	3	1	2	1	1	1	1	1	-	1	3	2	3	1	3	2

UNIT-I:
Operating System Overview: Overview of Computer Operating Systems, Operating System Functions, Operating System Services and Systems Calls, System Programs.
Process Concept: Process Concepts, process states. Threads, multithreading.

UNIT-II:
Process Management: Scheduling-Criteria, CPU Scheduling, Algorithms Evaluation, Thread Scheduling.
Process Synchronization: Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Producer – consumer problem, Dining philosophers problem, Readers – Writers Problem, Monitors, Synchronization examples

UNIT-III:
Inter Process Communication: Message passing, shared memory
Deadlock: Deadlock System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery from Deadlock.

UNIT-IV:
Memory Management: Memory Management Swapping, Contiguous Memory Allocation, Paging, Page-Table Structure, Segmentation, Virtual Memory, Demand Paging, Page-Replacement Algorithms, Frames Allocation, Thrashing.
File System Interface: File Concepts, Access Methods and Directory Structure, File System Mounting, File Sharing and Protection, Allocation Methods, Free-Space Management, Efficiency and Performance

UNIT-V:
Mass Storage: Overview Mass-Storage Structure, Disk Structure, Disk Attachment, Disk Scheduling, Swap-Space Management, RAID Structure
Protection: Protection Goals of Protection, Principles of Protection, Domain of Protection Access Matrix, Implementation of Access Matrix,
Security: Security Problem, Program Threats, System and Network Threats
Case Study: Windows Operating system, Linux Operating System.

TEXT BOOKS:
1. Operating System Concepts, Abraham Silberchatz, Peter B. Galvin, Greg Gagne, 7th Edition, John Wiley
2. Operating Systems- A Concept based Approach, D. M. Dhamdhere, 2nd Edition, Tata McGraw-Hill

REFERENCES:
1. Operating Systems-Internal and Design Principles, Stallings, 5th Edition, Pearson Education/PHI, 2005
2. UNIX: Concepts and Applications, Sumitabha Das, 4th Edition, Tata McGraw-Hill
3. Operating System: A Design-Oriented Approach, Charles Patrick Crowley
4. Operating Systems: A Modern Perspective, Gary J. Nutt
5. Design of the Unix Operating Systems, Maurice J. Bach

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. IV Semester

(22PC1CS201) SOFTWARE ENGINEERING

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

COURSE OBJECTIVES:
- To identify the importance of software engineering principles and software process framework
- To understand contemporary approaches for design models and requirements validation
- To explore various metrics and quality assurance strategies
- To analyze different strategies for testing and risk management

COURSE OUTCOMES: After completion of the course, the student should be able to

CO-1: Analyze software engineering framework activities that can be tailored with appropriate methods for developing the projects

CO-2: Design relevant software system models from the available software requirements and validate desired user models with realistic constraints.

CO-3: Understand the Requirements Engineering Process and model the system using the perception of UML.

CO-4: Deliver quality software products by applying software testing strategies and product metrics over the entire system life cycle

CO-5: Specify contemporary issues of handling risk management and quality management in Software development.

COURSE ARTICULATION MATRIX:
(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial***)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3	3	2	2	2	2	1	1	1	1	2	2	1	3	3	3
CO-2	3	3	3	2	3	2	1	1	1	1	2	3	1	3	3	2
CO-3	3	3	2	2	2	2	1	1	1	1	2	3	1	3	3	2
CO-4	3	3	2	2	3	2	3	1	1	1	2	3	1	3	3	2
CO-5	3	3	2	2	3	2	3	1	1	1	2	3	1	3	3	3

UNIT – I:
Introduction to Software Engineering: Software characteristics, changing nature of software, software myths.

A Generic View of Process: Software engineering-A layered technology, process framework, The Capability Maturity Model Integration (CMMI)

UNIT – II:
Process Models: The waterfall model, spiral model, Incremental process model, evolutionary process model, agile process
Software Requirements: Functional and non-functional requirements, the software requirements document.
Requirements Engineering Process: Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management, and forward and reverse engineering.

UNIT – III:
Modeling with UML: Modeling Concepts and Diagrams - Use Case Diagrams - Class Diagrams - Interaction Diagrams - State chart Diagrams – Activity Diagrams - Package Diagrams - Component Diagrams – Deployment Diagrams -Diagram Organization-Diagram Extensions.
Design Engineering: The design process and design quality, design concepts, and design model.

UNIT – IV:
Testing Strategies: A strategic approach to software testing, verification and validation, Testing Strategies, Black box, and White box testing, and deployment.
Product Metrics: Metrics for analysis model, Metrics for design model, Metrics for source code, Metrics for testing, Metrics for maintenance
Metrics for Process and Projects: Software measurement, Metrics for software quality

UNIT – V:
Risk Management: Reactive vs. Proactive risk strategies, Software risks, Risk identification, Risk projection, RMMM plan
Quality Management: Quality concepts, Software quality assurance, Formal technical reviews, ISO 9000 Quality standards.

TEXT BOOKS:
1. Software Engineering - A Practitioner's Approach, Roger S. Pressman, 6th Edition, McGraw-Hill, 2001
2. Software engineering, Ian Sommerville, 7th Edition, Pearson Education Asia, 2000
3. The Unified Modeling Language User Guide, Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson Education

REFERENCES:
1. An Integrated Approach to Software Engineering, Pankaj Jalote, Springer Verlag, 1997
2. Software Engineering – An Engineering Approach, James F. Peters and Witold Pedryez, John Wiley and Sons, 2000
3. Software Engineering Fundamentals, Ali Behforooz and Frederick J. Hudson, Oxford University Press, 1996

ONLINE RESOURCES:
1. https://www.guru99.com/what-is-software-engineering.html
2. https://www.tutorialspoint.com/software_engineering/index.htm

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. IV Semester

(22PC1CS203) COMPUTER ORGANIZATION

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

COURSE OBJECTIVES:
- To understand the functional blocks of computer and instruction set architecture
- To describe micro programming and addressing modes of Central Processing Unit
- To perform arithmetic micro operations on integers and floating-point numbers
- To discuss the different ways of communicating with I/O devices
- To design techniques to enhance the performance using pipelining, parallelism

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Understand the basic components and the design of CPU, instruction set
CO-2: Understand the micro programming, instruction formats and addressing modes
CO-3: Implement arithmetic operations on integer and floating type values
CO-4: Analyze and understand the input organization and memory organization
CO-5: Explore pipeline processing, vector processing and array processing

COURSE ARTICULATION MATRIX:
(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial)**

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	2	3	-	-	-	2	-	-	-	-	-	2	1	2	3	2
CO-2	2	3	2	3	2	2	-	-	-	-	2	3	1	3	3	2
CO-3	3	3	-	3	-	-	-	-	-	-	-	3	1	3	3	-
CO-4	2	3	-	2	3	2	2	-	-	-	-	3	1	2	3	2
CO-5	2	3	-	2	3	2	2	-	-	-	3	3	1	3	3	3

UNIT-I:
Functional Blocks of a Computer: Introduction, Block Diagram, Definition of Computer Organization, Computer Design and Computer Architecture
Instruction Set Architecture: Register Transfer language, Register Transfer, Arithmetic Micro operations, logic micro-operations, shift micro-operations, Arithmetic logic shift unit. Instruction codes, Computer Registers Computer instructions, Timing and Control, Instruction cycle, Memory Reference Instructions, Register Reference and Input – Output.

UNIT-II:
Central Processing Unit: General Register Organization, Instruction Formats, Addressing modes, Data Transfer and Manipulation.
Microprogrammed Control: Control memory, Address sequencing, micro program example, design of control unit.

UNIT-III:
Data Representation: Data types, Complements, Fixed Point Representation, Floating Point Representation.
Computer Arithmetic: Addition and subtraction, multiplication Algorithms, Division Algorithms, Restoring and Non-restoring, floating – point Arithmetic operations.

UNIT-IV:
Input-Output Organization: Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Program Controlled, Priority, Interrupt, Direct memory Access. Privileged and Non-Privileged Instructions.
Memory Organization: Memory Hierarchy, Main Memory, Auxiliary memory, Associate memory, Cache Memory, Mapping Techniques, Replacement Algorithms, Write Policies, Memory interleaving.

UNIT-V:
Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processor.

TEXT BOOKS:
1. Computer System Architecture, M. Morris Mano, 3rd Edition
2. Computer Organization and Embedded Systems, Carl Hamacher, 6th Edition, McGraw-Hill

REFERENCES:
1. Computer Organization and Design: The Hardware/Software Interfaces, David A. Patterson and John L. Hennessy, 5th Edition, Elsevier
2. Computer Architecture and Organization, John P. Hayes, 3rd Edition, WCB/McGraw-Hill
3. Computer Organization and Architecture: Designing for Performance, William Stallings, 10th Edition, Pearson Education
4. Computer System Design and Architecture, Vincent P. Heuring and Harry F. Jordan, 2nd Edition, Pearson Education

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. IV Semester

(22PC2IT202) OPERATING SYSTEMS LABORATORY

TEACHING SCHEME		
L	T/P	C
0	2	1

EVALUATION SCHEME					
D-D	PE	LR	CP	SEE	TOTAL
10	10	10	10	60	100

COURSE OBJECTIVES:
- To understand the basic system calls related to process
- To implement various CPU scheduling algorithms
- To implement memory management and virtual memory techniques
- To implement file management and disk scheduling algorithms

COURSE OUTCOMES: After completion of the course, the student should be able to

CO-1: Know the basic system calls related to process

CO-2: Simulate CPU scheduling algorithms

CO-3: Understand memory management and virtual memory techniques

CO-4: Analyse the various disk scheduling algorithms

CO-5: Understand file management techniques

COURSE ARTICULATION MATRIX:
*(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial**)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3	2	1	1	1	-	-	-	3	1	1	-	3	-	1	2
CO-2	3	2	1	1	1	-	-	-	3	1	1	-	3	-	1	2
CO-3	3	2	1	1	1	-	-	-	3	1	1	-	3	-	1	-
CO-4	3	2	1	1	1	-	-	-	3	1	1	-	3	-	1	-
CO-5	3	2	1	1	1	-	-	-	3	1	1	-	3	-	1	2

LIST OF PROGRAMS / EXPERIMENTS / EXERCISES:

1. Simulate the following CPU scheduling algorithms a) FCFS b)SJF
2. Simulate the following CPU scheduling algorithms a) Priority b) Round robin
3. Simulate Bankers Algorithm for Deadlock Avoidance.
4. Implementation of the following Memory Allocation Methods for fixed partition
   a) First Fit b) Worst Fit c) Best Fit
5. Implementation of Paging Technique of Memory Management
6. Implementation of the following Page Replacement Algorithms a) FIFO b) LRU c) optimal
7. Simulate frame allocation Methods.
   a) minimum number of frames b) equal allocation c) proportional allocation
8. Simulate the following Disk scheduling algorithms.

a) FCFS b) SSTF c) SCAN
9. Simulate the following Disk scheduling algorithms.
    a) C-SCAN b) LOOK c) C-LOOK
10. Simulate all file allocation strategies.
    a) Sequential b) Indexed c) Linked.

TEXTBOOKS:
1. Operating System Concepts, Abraham Silberchatz, Peter B. Galvin, Greg Gagne, 7th Edition, John Wiley
2. UNIX: Concepts and Applications, Sumitabha Das, 4th Edition, Tata McGraw-Hill

REFERENCES:
1. Operating Systems-A Concept Based Approach, D. M. Dhamdhere, 2nd Edition, Tata McGraw-Hill
2. Operating Systems: A Modern Perspective, Gary J. Nutt
3. Operating System Concepts, Abraham Silberchatz, Peter B. Galvin, Greg Gagne, 7th Edition, John Wiley

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. IV Semester

(22PC2CS201) SOFTWARE ENGINEERING LABORATORY

TEACHING SCHEME		
L	T/P	C
0	2	1

EVALUATION SCHEME					
D-D	PE	LR	CP	SEE	TOTAL
10	10	10	10	60	100

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

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Identify or create a problem statement and translate end-user requirements into system and software requirements to solve real-world problems
CO-2: Analyse the application by following the design life cycle and develop a High-level design document
CO-3: Design the application and develop the Low-level design document using various UML diagrams
CO-4: Develop the application for identified scenarios using CASE tools
CO-5: Demonstrate the application through presentation after thorough testing using testing techniques

COURSE ARTICULATION MATRIX:
(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial***)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3	3	2	2	3	3	3	2	2	2	2	3	1	3	3	3
CO-2	3	3	2	2	3	3	3	2	2	2	2	3	1	3	3	2
CO-3	3	3	3	2	3	3	3	2	2	2	2	3	1	3	3	2
CO-4	3	3	2	2	3	3	3	2	2	2	2	3	3	3	3	3
CO-5	2	2	2	2	2	2	2	2	3	3	3	3	1	1	1	3

LIST OF PROGRAMS / EXPERIMENTS / EXERCISES:

Do the following 8 exercises for any two projects given in the list of sample projects or any other projects:

1. Development of problem statement.
2. Preparation of Software Requirement Specification Documents by understanding the requirements w.r.t the problem statement.
3. Preparation of High-Level Design Documents from the SRS document.

4. Model the system using various UML diagrams and concepts- Use Case Diagrams - Class Diagrams.
5. Model the system using various UML diagrams and concepts- Use Case Diagrams - Class Diagrams interaction Diagrams - State chart Diagrams – Activity Diagrams - Package Diagrams - Component and deployment Diagram.
6. Preparation of a Low-Level Design document based on HLD.
7. Study and usage of any Design phase CASE tool
8. Preparation of Software Configuration Management and Risk Management-related documents.
9. Development of test cases for unit testing and integration testing and demonstration.

SAMPLE PROJECTS:
- Online Food Delivery System
- vehicle booking System.
- Online Course Learning Platform
- Online Shopping application
- E-ticketing
- Home Services Booking
- Online Medicine Delivery System.
- E-book Management System.
- Recruitment system
- OTT Application
- Mobile Banking
- Digital Payment Platform

TEXT BOOKS:
1. Software Engineering - A Practitioner's Approach, Roger S. Pressman, 6th Edition, McGraw-Hill International Edition, 2001
2. Software Engineering, Ian Sommerville, 7th Edition, Pearson Education Asia, 2000
3. The Unified Modeling Language User Guide, Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson Education

REFERENCES:
1. An Integrated Approach to Software Engineering, Pankaj Jalote, Springer Verlag, 1997
2. Software Engineering – An Engineering Approach, James F. Peters and WitoldPedryez, John Wiley and Sons, 2000
3. Software Engineering Fundamentals, Ali Behforooz and Frederick J. Hudson, Oxford University Press, 1996

ONLINE RESOURCES:
1. https://www.guru99.com/what-is-software-engineering.html
2. https://www.tutorialspoint.com/software_engineering/index.htm

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. IV Semester

(22SD5IT201) WEB APPLICATION DEVELOPMENT

TEACHING SCHEME		
L	**T/P**	**C**
0	2	1

EVALUATION SCHEME					
D-D	**PE**	**LR**	**CP**	**SEE**	**TOTAL**
10	10	10	10	60	100

COURSE PRE-REQUISITES: Object Oriented Programming through Java, HTML Basics

COURSE OBJECTIVES:
- 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: After completion of the course, the student should be able to
CO-1: Build a custom website with HTML, CSS, and Bootstrap and little JavaScript
CO-2: Demonstrate advanced features of JavaScript and learn about JDBC
CO-3: Develop server – side implementation using Java technologies like
CO-4: Develop the server – side implementation using Node JS
CO-5: Design a single page application using React

COURSE ARTICULATION MATRIX:
(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial***)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)			
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	**PSO-1**	**PSO-2**	**PSO-3**	**PSO-4**
CO-1	3	3	2	2	3	3	3	2	2	2	2	3	3	3	3	3
CO-2	2	2	2	2	3	-	-	2	2	2	2	3	2	2	2	2
CO-3	2	3	3	2	2	2	3	2	2	-	2	3	1	2	2	2
CO-4	2	2	2	2	-	3	2	2	2	2	-	3	3	3	2	3
CO-5	2	2	2	2	2	2	2	2	3	3	3	3	2	1	1	2

LIST OF 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.

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

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. IV Semester

(22SD5IT202) FIELD PROJECT

TEACHING SCHEME		
L	T/P	C
0	2	1

EVALUATION SCHEME		
CIE	SEE	TOTAL
50	-	50

COURSE OBJECTIVES:
- To identify, analyze and solve industry / technical / societal problems creatively through sustained critical investigation
- To practice the skills, elegance and commitment to excellence needed to engage in lifelong learning
- To demonstrate an awareness and application of appropriate personal, social and professional ethical standards

COURSE OUTCOMES: After completion of the course, the student should be able to

CO-1: Understand the formulated industry / technical / societal problems

CO-2: Apply fundamental and disciplinary concepts and methods in ways appropriate to their principal areas of study

CO-3: Demonstrate skills and knowledge of current information, technological tools and techniques specific to the professional field of study

CO-4: Analyze and / or develop models for providing solution to industry / technical / societal problems

CO-5: Use effectively oral, written and visual communication

COURSE ARTICULATION MATRIX:
*(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial**)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	2	-	-	-	-	3	3	-	3	-	1	3	-	-	-	-
CO-2	3	3	2	2	3	2	-	-	3	-	2	3	-	-	-	-
CO-3	-	-	3	-	3	2	-	2	3	3	3	3	-	-	-	-
CO-4	2	3	3	3	3	3	3	3	3	-	3	3	-	-	-	-
CO-5	-	-	-	-	2	-	-	3	3	3	-	3	-	-	-	-

COURSE OUTLINE:
Filed project-based learning offers students real world opportunities to research issues, think critically, gain new perspectives, solve problems and develop written and oral communication skills all within the framework of a team environment and guided by engaged and involved faculty

- A student shall undergo a one credit Field Project course in II year.

- It shall be a project based course involving the student to undertake issues for industries, companies, and any organizations which they encounter in their day-to-day work.
- Evaluation of the field project shall consist of Continuous Internal Evaluation (CIE) only for 50 marks.
- CIE shall be done by a Project Review Committee (PRC) consisting of the Head of the Department, faculty supervisor and a senior faculty member of the specialization / department.
- The internal evaluation shall be on the basis of two seminars for 50 marks one before SE-I and the other before SE-II as per the calendar dates and evaluation format.
- CIE shall be carried out for 50 marks on the basis of review presentation as per the calendar dates and evaluation format.
- The field project report shall be accepted for submission to the PRC only upon meeting the prescribed similarity index of less than 25%.

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. IV Semester

(22MN6HS201) INTELLECTUAL PROPERTY RIGHTS

TEACHING SCHEME

L	T/P	C
2	0	0

EVALUATION SCHEME

SE-I	SE-II	SEE	TOTAL
50	50	-	100

COURSE OBJECTIVES:
- To familiarize students with the nuances of Intellectual Property Rights (IPR) to help them integrate the IPR process in their research activities
- To make the students capable of identifying their own protectable innovations and realizing the process of taking it from bench to market

COURSE OUTCOMES: After completing this course the student should be able to

CO-1: Get an adequate knowledge on patent and copyright for their innovative research works and academic projects

CO-2: Understand and acquire the knowledge of trademarks and registration aspects

CO-3: Interpret various forms of Intellectual Property on Design, Geographical Indication (GI), Plant Variety and Layout Design Protection and their registration aspects

CO-4: Obtain useful insights from the information in patent documents, especially on novelty of their idea from state-of-the art search, during their research career. This provides further way for developing their idea or innovations

CO-5: Get awareness about current trends in IPR and Govt. steps in fostering IPR

COURSE ARTICULATION MATRIX:
(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial***)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	-	-	-	-	-	2	-	3	-	-	-	2	-	-	-	-
CO-2	-	-	-	-	-	2	-	3	-	-	-	2	-	-	-	-
CO-3	-	-	--	-	-	2	-	3	-	-	-	2	-	-	-	-
CO-4	-	-	-	-	-	2	-	3	-	-	-	2	-	-	-	-
CO-5	-	-	-	-	-	2	-	3	-	-	-	2	-	-	-	-

UNIT – I:
Overview of Intellectual Property: Introduction and the need for Intellectual Property Right (IPR) - Kinds of Intellectual Property Rights: Patent, Copyright, Trade Mark, Design, Geographical Indication, Plant Varieties and Layout Design – Genetic Resources and Traditional Knowledge – Trade Secret - IPR in India : Genesis and development – IPR in abroad - Major International Instruments concerning Intellectual Property Rights: Paris Convention, 1883, the Berne Convention, 1886, the Universal Copyright Convention, 1952, the WIPO Convention, 1967,the Patent Co-operation Treaty, 1970, the TRIPS Agreement, 1994

UNIT – II:
Patents: Patents - Elements of Patentability: Novelty, Non-Obviousness (Inventive Steps), Industrial Application - Non - Patentable Subject Matter - Registration Procedure, Rights and Duties of Patentee, Assignment and licence, Restoration of lapsed Patents, Surrender and Revocation of Patents, Infringement, Remedies & Penalties - Patent office and Appellate Board

UNIT – III:
Copyrights: Nature of Copyright - Subject matter of copyright: original literary, dramatic, musical, artistic works; cinematograph films and sound recordings - Registration Procedure, Term of protection, Ownership of copyright, Assignment and licence of copyright - Infringement, Remedies & Penalties – Related Rights - Distinction between related rights and copyrights

UNIT – IV:
Trademarks:
Concept of Trademarks - Different kinds of marks (brand names, logos, signatures, symbols, well known marks, certification marks and service marks) - Non Registrable Trademarks - Registration of Trademarks - Rights of holder and assignment and licensing of marks - Infringement, Remedies & Penalties - Trademarks registry and appellate board

UNIT – V:
Design: meaning and concept of novel and original - Procedure for registration, effect of registration and term of protection
Geographical Indication (GI): meaning, and difference between GI and trademarks - Procedure for registration, effect of registration and term of protection
Plant Variety Protection: meaning and benefit sharing and farmers' rights – Procedure for registration, effect of registration and term of protection
Layout Design Protection: meaning – Procedure for registration, effect of registration and term of protection
Current Contour: India`s New National IP Policy, 2016 – Govt. of India step towards promoting IPR – Govt. Schemes in IPR – Career Opportunities in IP - IPR in current scenario with case studies

TEXTBOOKS:
1. Intellectual Property Rights: Protection and Management Nithyananda, K V, India, IN: Cengage Learning India Private Limited, 2019
2. Intellectual Property Rights, Neeraj, P., & Khusdeep, D, India, IN: PHI learning Private Limited, 2014
3. Intellectual property right, Deborah, E. Bouchoux, 4th Edition, Cengage learning

REFERENCE:
1. Law relating to Intellectual Property Rights, Ahuja, V K, India, IN: Lexis Nexis, 2017

ONLINE RESOURCES:
1. Intellectual Property Rights – An Overview, Subramanian, N., & Sundararaman, M. Retrieved from http://www.bdu.ac.in/cells/ipr/docs/ipr-eng-ebook.pdf, 2018
2. WIPO Intellectual property Handbook, World Intellectual Property Organisation, Retrieved from

https://www.wipo.int/edocs/pubdocs/en/intproperty/489/wipo_pub_489.pdf, 2004