Syllabus
III B.Tech I SEM

DATA SCIENCE

Subject Code: UGIT5T0122	**L**	**T**	**P**	**C**
III Year / I Semester	**3**	**0**	**0**	**3**

Prerequisites:

1. Basic skills on statistics and calculus.
2. Programming skill in Python.

Course Objective:

1. Use the numpy library to create and manipulate arrays.
2. Use the pandas module with Python to create and structure data.
3. Learn how to work with various data formats within python, including: JSON, HTML, and MS Excel Worksheets.
4. Create data visualizations using matplotlib module with python.

SYLLABUS:

Unit-I: Numpy and Pandas: (9 hrs)

Introduction of Data Science, Stages in a Data Science Project, Applications of Data Science in various fields, Basic Data Analytics using Python.
Numpy: Introduction to numpy, creating arrays, using arrays and scalars, Indexing Arrays, Array transposition, Universal array function, Array Processing, Array Input and Output, Examples.
Pandas: Exploring Data using Series, Exploring Data using DataFrames, Index objects, Re index, Drop Entry, Selecting Entries, Data Alignment, Rank and Sort, Summary Statistics, Data Munging in Python using Pandas, Index Hierarchy, Example Problem. **[T1]**

Unit-II: Data Loading, Storage and File formats: (8 hrs)
Data Acquisition: Reading and Writing Text Files, Reading JSON, HTML, Microsoft Excel files and, other sources with Python
Data Wrangling: Clean, Transform, Merge, reshape: Handling Missing Data, Combining and Merging Datasets, merging on Index, Concatenate, combining with overlap, Reshaping, Pivoting. **[T1]**

Unit-III: (7 hrs)
Data Transformation: Removing Duplicates in DataFrames, Transforming Data using a Function or Mapping, Replace, Renaming index in pandas, Binning, Outliers in data with pandas, Permutations

Data Aggregation and Group operations: GroupBy Mechanics, Data Aggregation with pandas, Group wise operations and Transformations, Pivot tables and Cross Tabulation with Examples.

Introduction to Statistics: Types of Statistics: Descriptive Statistics, Inferential Statistics, Data Distribution: Binomial Distribution, Poisson Distribution, Normal Distribution, Hypothesis Testing and Confidence Intervals, Chi Square Test and Distribution **[T1]**

Unit-IV: Plotting and Visualization: (8 hrs)

Customizing Plots: Introduction to Matplotlib, Plots, making subplots, controlling axes, adding legends and annotations, and using different plot styles.

Statistical Plot with seaborn: Installing Seaborn, Working with Histograms, Kernel Density Estimates Plots, Scatter plots, Box plots, Regression Plots, Heatmaps and Clustered Matrices. **[T1]**

Unit-V: Model Development: (7 hrs)

Simple and Multiple Regression, Model Evaluation using Visualization, Residual Plot, Distribution Plot, Polynomial Regression and Pipelines, Measures for In-sample Evaluation, Prediction and Decision Making, Feature Engineering.

Performing Prediction with regression: Simple linear regression, training and testing a model, data preparation, building a model, evaluating a model based on test data. **[T1]**

Course Outcomes:

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

- **CO 1:** Comprehend the principles of statistical analysis as they apply to data science**. [L2]**
- **CO 2:** Apply data preprocessing techniques to handle missing data, outliers, and categorical variables in real-world datasets. **[L3]**
- **CO 3:** Analyze data patterns and trends through exploratory data analysis (EDA) techniques, such as data summarization and visualization**. [L4]**
- **CO 4:** Design end-to-end data science project that involves data collection, preprocessing, modeling, and deployment. **[L4]**

Mapping of COs to PO:

POs/ COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	-	-	-	3	-	-	-	-	-	-	-	-	-	3
CO2	-	-	3	-	-	-	-	-	-	-	-	-	-	3
CO3	-	-	-	3	-	-	-	-	-	-	-	-	-	3
CO4	-	-	-	3	-	-	-	-	-	-	-	-	-	3

Text Books:

1. **Python for Data Analysis** by Wes McKinney, Publisher: O'Reilly Media, Inc. ISBN: 9781449323592.
2. **Python Data Science Handbook: Essential Tools for Working with Data** by Jake VanderPlas, 1st Edition, Kindle Edition
3. **Machine Learning for Hackers** by Drew Conway, John White, O'Reilly Media, 2012.

References Books:

1. **An Introduction to Statistical Learning** by Gareth James, Daniela Witten, Trevor Hastie and Robert Tibshirani, Springer Texts in Statistics, 2015.
2. **Learning the Pandas Library: Python Tools for Data Munging, Analysis and Visualization** by Matt Harrison, CreateSpace Independent Publishing Platform, 2016.
3. **Data Science from Scratch: Frist Principles with Python** by Joel Grus, O' Reilly Media, 2015.

Online course materials and Video Lectures:

1. https://www.datacamp.com/courses/introduction-to-data-visualization-with-python.
2. https://www.analyticsvidhya.com/learning-paths-data-science-business-analytics-business-intelligence-big-data/learning-path-data-science-python/
3. Data Science Course by Rafael Irizarry,VerenaKaynig-Fittkau, HardvardUniversityhttp://cs109.github.io/2014/pages/schedule.html.

Course Era Courses:

1. Data Processing using Python by Zhang Li offered by Nanjing University.
2. Understanding and Visualizing Data with Python offered by Michigan University

COMPUTER NETWORKS

Subject Code: UGCS5T0122	**L**	**T**	**P**	**C**
III Year / I Semester	**3**	**0**	**0**	**3**

Prerequisites: Familiarity with Computer Organization and Architecture.

Course Objectives: Students will be able to master in the computer network terminology and concepts of the OSI model and the TCP/IP model, summarize with wired and wireless networking concepts and routing protocols, and solve current issues in networking technologies.

Syllabus:

UNIT I: (9 hrs)

Introduction: Data Communication - Components, Representation of data and its flow; Uses of Computer Networks, Networks – Network Criteria, Physical Structures; Categories of Networks - LAN, WAN, MAN; Protocols and Standards; Network Models - OSI model, TCP/IP Model.

Physical Layer: Transmission media – Guided media, unguided media; Multiplexing - Frequency division, Time division.

UNIT II: (9 hrs)

Data Link Layer: Data link layer design issues – Services provided to the network layer, Framing, Error control, Flow control; Error Detection and Error Correction – Error correcting codes, Error detecting codes; Data link layer protocols - Stop and wait, Sliding window protocols (Go back – N, Selective Repeat); Wired LANs, Wireless LANs, Bridge, Switch.

UNIT III: (10 hrs)

Medium Access Sub Layer: Channel allocation problem, dynamic channel allocation in LANs and MANs; Multiple access protocols - Pure ALOHA, Slotted ALOHA, CSMA/CD; Collision free protocols – A bit map protocol, Binary countdown.

LAN Standards - 802.3, 802.5; Bridges – Transparent bridges, Source routing bridges; Wireless LANs – 802.11, Architecture; MAC sub layer, frame format.

Network Layer-I: Network layer design issues – services provided to the transport layer, virtual circuit and datagram subnets

UNIT IV: **(7 hrs)**

Network Layer-II: Routing algorithms – The optimality principle, shortest path routing, Flooding, Distance vector routing, Link state routing, Hierarchical routing, Broadcast routing, Multicast routing.

Internetworking – Tunneling, fragmentation, firewall, IP Addressing, IPV4 Addressing, IPV6 Addressing, subnets, ICMP; Address mapping – ARP, RARP, BOOTP and DHCP.

UNIT V: **(10 hrs)**

Transport Layer: Services provided to upper layer, Quality of Service, Elements of transport protocols – Establishing connection, Releasing connection; User Datagram Protocol (UDP) and its frame format, Transmission Control Protocol (TCP) and its frame format; TCP congestion control - Leaky Bucket and Token Bucket algorithm.

Application Layer: Domain Name System (DNS), TELNET (Remote Login), EMAIL (SMTP, POP3), File Transfer Protocol (FTP), HTTP.

Course Outcomes:

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

1. Apply how computer networks are organized with the concept of layered approach, congestion control mechanism to handle congestion in the networking environment. [L3]
2. Analyze the design issues, different framing methods and various multiple access protocols. [L4]
3. Evaluate various routing algorithms to find optimum routing path. [L5]
4. Differentiate the functionality of transport layer protocols that are used for various Applications. [L3]

CO-PO Mapping

POs/ COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	3	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-	-	-

TEXT BOOKS:

1. Andrew S. Tanenbaum, Computer Networks, 8th Edition, Pearson New International Edition.
2. Behrouz A. Forouzan, Data Communication and Networking, 4th Edition, McGrawHill.

REFERENCE BOOKS:

1. William Stallings, Data and Computer Communication, 8th Edition, Pearson Prentice Hall India.
2. Douglas Comer, Internetworking with TCP/IP, Volume 1, 6th Edition, Prentice Hall of India.
3. W. Richard Stevens, TCP/IP Illustrated, Volume 1, Addison-Wesley, United States.

ONLINE COUSES AND REFERENCES:

1. Introduction to networking offered by edx. www.edx.org
2. Computer networking free course offered by Georgia Institute of technology udacity.com. NPTEL videos / pdf.

COMPILER DESIGN

Subject Code: UGIT5T0222	**L**	**T**	**P**	**C**
III Year / I Semester	**3**	**0**	**0**	**3**

Prerequisites:
Familiarity with theory of computation and data structures.

Course Objectives:
This course introduces the basic principles of compiler and depicts the phases of the compilation process with implementation approach of each phase.

Syllabus:

UNIT I: (8 hrs)
Overview of language processing, pre-processors, compiler, assembler, interpreters, pre-processors, linkers & loaders, structure of a compiler, Phases of a compiler, Lexical Analysis, Role of Lexical Analysis, Lexical Analysis Vs Parsing, Token, patterns and Lexemes, Lexical Errors, Regular Expressions, Regular definitions for the language constructs, Strings, Sequences, Comments, Transition diagram for recognition of tokens, Reserved words and identifiers, Examples.

UNIT II: (8 hrs)
Syntax Analysis, discussion on CFG, LMD, RMD, parse trees, Role of a parser, classification of parsing techniques, Brute force approach, left recursion, left factoring, Top down parsing, First and Follow, LL(1) Grammars, Non-Recursive predictive parsing, Error recovery in predictive parsing.

UNIT III: (12 hrs)
Bottom-up parsing, Types of Bottom-up approaches, Introduction to simple LR, Why LR Parsers, Model of LR Parsers, Shift Reduce Parsing, Difference between LR and LL Parsers, Construction of SLR Tables

More powerful LR parsers, construction of CLR (1), LALR Parsing tables, Dangling ELSE Ambiguity, Error recovery in LR Parsing, Comparison of all bottom-up approaches with all top-down approaches.

UNIT IV: (10 hrs)
Semantic analysis, SDT Schemes, evaluation of semantic rules. Intermediate code, three address code, quadruples, triples, abstract syntax trees. Types and declarations, type Checking.

Symbol tables: use and need of symbol tables. Runtime Environment: storage organization, stack allocation, access to non-local data, heap management, parameter passing mechanisms, introduction to garbage collection, Reference counting garbage collectors.

UNIT V: (8 hrs)

Code generation: Issues, target language, Basic blocks & flow graphs, Simple code generator, Peephole optimization, Register allocation and assignment.

Machine independent code optimization, semantic preserving transformations, global common subexpression elimination, copy propagation, dead code elimination, constant folding, strength reduction, loop optimization. Instruction scheduling, inter procedural optimization.

Course Outcomes:

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

CO 1: Demonstrate an understanding of the design of a compiler including its phases and components.

CO 2: Distinguish the lexical, syntactic and semantic analysis into meaningful phases for a compiler to undertake language translation.

CO 3: Analyze the runtime structures used to represent language constructs and typical programming languages.

CO 4: Analyze the techniques used for intermediate code generation and optimization.

CO 5: Apply appropriate parsing techniques to design a parser for the given language.

Mapping of COs to POs:

POs/ COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO1	3	2	3	3	-	-	-	-	-	-	-	-	-	-
CO2	3	2	3	2	-	-	-	-	-	-	-	-	-	-
CO3	3	2	3	2	-	-	-	-	-	-	-	-	-	-
CO4	3	2	3	2	-	-	-	-	-	-	-	-	-	-
CO5	3	3	3	2	-	-	-	-	-	-	-	-	-	-

TEXT BOOKS:

1. Alfred V Aho, Monica S Lam, Ravi Sethi, Jeffrey D. Ullman, Compilers Principles Techniques and Tools-,2nd ed, Pearson.
2. Kenneth C Louden, Compiler construction, Principles and Practice, CENGAGE.

REFERENCE BOOKS:

1. K. Muneeswaran, Compiler Design, Oxford.
2. Keith D.Cooper & Lin/da Torczon, Engineering a compiler, 2nd edition, Morgan Kaufman.
3. http://www.nptel.iitm.ac.in/downloads/106108052/
4. V. Raghavan, Principles of compiler design, 2nd ed, TMH.
5. Yunlinsu, Implementations of Compiler, A new approach to Compilers including the algebraic methods, SPRINGER.

EMPLOYABILITY SKILLS

(English, Aptitude and Logical Reasoning)

(Common to All Branches**)**

Subject Code: UGBS5T0122	**L**	**T**	**P**	**C**
III Year / I Semester	**2**	**0**	**2**	**3**

PREREQUISITE : Basic competency in understanding passages and the use of grammar & words correctly

COURSE OBJECTIVES:

- To expose students to enhance their verbal ability and interpersonal skills
- To prepare students to acquire skills in aptitude for careers prospects
- To prepare students to develop logical reasoning for employment

SYLLABUS

UNIT I: (9 Hours)

High frequency words: Selected 101 words with their ***basic*** meaning, commonly used synonyms and 101 words usage in sentences

UNIT II: (9 Hours)

Reading Comprehension passages: Tactics in understanding the given Comprehension passages & Practice tests

UNIT III: (9 Hours)

Interpersonal Skills: Verbal & Non-verbal Communication & Team Work

Percentages -Percentage-Conversion of fraction to percentage and Percentage to Fraction-percentage excess & shortness, Effect of percentage change on a Number-Effect of two step change-Effect of percentage change on product.

UNIT IV: (9 Hours)

Time & Work: Rate of work -Work as a single unit -No. of persons working together – No. of man days.

Time & Distance: Speed - Average Speed - problems on trains – Relative speed - Boats and streams

UNIT V: (9 Hours)

Coding, Decoding, Letter and Number Series: Letter Coding, Direct Letter coding, Number / Symbol coding, Substitution Coding, Deciphering message word

coding and its types, Number series, Letter Series.
Data Analysis and Interpretation: Tabulation- Pie Charts – Bar Diagrams – LineGraphs.

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

CO1: Make effective use of words in receptive as well as productive communication (L3)

CO2: Examine the Reading comprehension passages to understand and later, answer thequestions correctly (L2)

CO3: Develop team work and interpersonal skills with groups as well as the skill of calculating percentages (L3)

CO4: Apply the knowledge of math in distance, time related concepts (L3)

CO5: Develop proficiency in numerical reasoning. (L3)

Mapping of COs to POs:

POs	1	2	3	4	5	6	7	8	9	10	11	12
CO1	-	-	-	-	-	-	-	-	-	3	-	3
CO2	-	-	-	-	-	-	-	-	-	3	-	3
CO3	-	-	-	-	-	-	-	-	3	3	-	3
CO4	-	-	-	-	-	-	-	-	-	-	-	3
CO5	-	-	-	-	-	-	-	-	-	-	-	3

Text Books:

1. Objective English – Hari Mohan Prasad & Uma Rani
2. Professional Communication – Globarena – IEG publications
3. A Modern Approach to Verbal and Non-verbal Reasoning by Dr.R.S.Aggarwal
4. Quantitative aptitude and Reasoning by R V Praveen (3rd edition)

Reference:

1. High frequency 101 word list: https://crunchprep.com/gre/101-high-frequency-gre-words
2. Quantitative Aptitude by Abhijit Guha – TMH Publishers

ADVANCED OPERATING SYSTEMS

(Professional Elective-I)

Subject Code: UGIT5T0322	**L**	**T**	**P**	**C**
III Year / I Semester	**3**	**0**	**0**	**3**

Prerequisite: Operating system design and construction techniques. Concurrent programming, operating system kernels, correctness, deadlock, protection, transaction processing, design methodologies, comparative structure of different kinds of operating systems, and other topics.

Course Objectives: The aim of this module is to study, learn, and understand the main concepts of advanced operating systems (parallel processing systems, distributed systems, real time systems, network operating systems, and open source operating systems); Hardware and software features that support these systems.

SYLLABUS:

UNIT I: (7 hrs)

Architectures of Distributed Systems: System Architecture Types, Distributed Operating Systems, Issues in Distributed Operating Systems, Communication Primitives.

Theoretical Foundations: Inherent Limitations of a Distributed System, Lamport's Logical Clocks, Vector Clocks, Causal Ordering of Messages, Termination Detection.

UNIT II: (8 hrs)

Distributed Mutual Exclusion: The Classification of Mutual Exclusion Algorithms. **Non-Token – Based Algorithms:** Lamport's Algorithm, The Ricart-Agrawala Algorithm, Maekawa's Algorithm.

Token-Based Algorithms: Suzuki-Kasami's Broadcast Algorithm, Singhal's Heurisric Algorithm, Raymond's Heuristic Algorithm.

UNIT III: (7 hrs)

Distributed Deadlock Detection: Preliminaries, Deadlock Handling Strategies in Distributed Systems, Issues in Deadlock Detection and Resolution.

Control Organizations for Distributed Deadlock Detection, Centralized- Deadlock – Detection Algorithms, Distributed Deadlock Detection Algorithms, Hierarchical Deadlock Detection Algorithms

UNIT IV: (8 hrs)

Multiprocessor System Architectures: Introduction, Motivation for multiprocessor Systems, Basic Multiprocessor System Architectures

Multi-Processor Operating Systems: Introduction, Structures of Multiprocessor Operating Systems, Operating Design Issues, Threads, Process Synchronization, Processor Scheduling.

UNIT V: (7 hrs)

Distributed File Systems: Architecture, Mechanisms for Building Distributed File Systems, Design Issues

Distributed Scheduling: Issues in Load Distributing, Components of a Load Distributed Algorithm, Stability, Load Distributing Algorithms, Requirements for Load Distributing, Task Migration, Issues in task Migration

Distributed Shared Memory: Architecture and Motivation, Algorithms for Implementing DSM, Memory Coherence, Coherence Protocols, Design Issues

Course Outcomes:

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

- **CO 1:** Understand the design approaches of advanced operating systems
- **CO 2:** Analyze the design issues of distributed operating systems.
- **CO 3:** Evaluate design issues of multi-processor operating systems.
- **CO 4:** Identify the requirements of Distributed File System and Distributed Shared Memory.
- **CO 5:** Formulate the solutions to schedule the real time applications

POs/ COs	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
CO 1	3													
CO 2		3												
CO 3				3										
CO 4					3									
CO 5	3													

TEXT BOOK:

1 Advanced Concepts in Operating Systems, Mukesh Singhal, Niranjan G. Shivaratri, Tata McGraw-Hill Edition 2001

ARTIFICIAL INTELLIGENCE

(Professional Elective-I)

Subject Code: UGIT5T0422	**L**	**T**	**P**	**C**
III Year / I Semester	**3**	**0**	**0**	**3**

Pre-Requisites:

- Familiarity with Discrete Mathematics, Linear Algebra and Probability.

Course Objectives:

- Know the methodology of Problem solving.
- Implement basic AI algorithms.
- Design and carry out an empirical evolution of different algorithms on problem formalization.

SYLLABUS:

UNIT I: (8 hrs)

Introduction to artificial intelligence: Introduction, history, intelligent systems, foundations of AI, applications, tic-tac-toe game playing, development of AI languages, current trends in AI. **(T1)**

Problem solving: state-space search and control strategies: Introduction, general problem solving, characteristics of problem**. (T2)**

UNIT II: (8 hrs)

Search Strategies: exhaustive searches, heuristic search techniques: A* Algorithm and Hill Climbing, constraint satisfaction. **Problem reduction and game playing:** Introduction, problem reduction, game playing, alpha-beta pruning**. (T1, T3)**

UNIT III: (12hrs)

Logic concepts: Introduction, propositional calculus, propositional logic, natural deduction system, axiomatic system, semantic tableau system in propositional logic, resolution refutation in propositional logic, predicate logic**. (T1)**

Knowledge representation: Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames. **(T1)**

UNIT IV: **(8 hrs)**

Expert system and applications: Introduction phases in building expert systems, expert system versus traditional systems, rule-based expert systems blackboard systems truth maintenance systems, application of expert systems, list of shells and tools. **(T1)**

UNIT V: **(8 hrs)**

Uncertainty measure: probability theory: Introduction, probability theory, Bayesian belief networks, certainty factor theory, dempster-shafer theory. Case Study**. (T1)**

COURSE OUTCOMES:

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

- **CO 1.** Summarize and formulate appropriate logic concepts and AI methods for solving a problem**(L2)**
- **CO 2.** Apply various searching, game playing, and knowledge representation techniques to solve the real world problems**. (L3)**
- **CO 3.** Analyze different expert systems and its applications. **(L4)**
- **CO 4.** Design and carry out an empirical evaluation of different algorithms on a problem formalization, and state the conclusions that the evaluation supports**. (L6)**
- **CO 5.** Evaluate different uncertainty theories for real world applications**(L5)**

Mapping of COs to POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO 2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO 3	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO 4	-	-	3	-	-	-	-	-	-	-	-	-	-	-
CO 5	-	-	-	3	-	-	-	-	-	-	-	-	-	-

Text Books:

1. Artificial Intelligence by Saroj Kaushik, CENGAGE Learning.
2. Artificial intelligence, A modern Approach, by Stuart Russel and Peter Norvig Second Edition, PEA.
3. Artificial Intelligence by Rich, Kevin Knight, Shiv Shankar B Nair, 3rd edition, TMH.

Reference Books:

1. Artificial intelligence, structures and Strategies for Complex problem solving, -George F Lugar, 5thed, PEA.
2. Introduction to Artificial Intelligence, Ertel, Wolf Gang, Springer.
3. Artificial Intelligence, A new Synthesis, Nils J Nilsson, Elsevier.
4. Introduction to Artificial Intelligence by Patterson, PHI.

Online Courses:

1. NPTEL Course: Fundamentals of Artificial Intelligence https://nptel.ac.in/courses/112/103/112103280/
2. NPTEL Course: Introduction to Artificial Intelligence https://nptel.ac.in/courses/106/102/106102220/

DART PROGRAMMING

(Professional Elective-I)

Subject Code: UGIT5T0522	**L**	**T**	**P**	**C**
III Year / I Semester	**3**	**0**	**0**	**3**

Prerequisite:
Student should be familiar with basic programming concepts

Course objective: On completion of this course, the student will be familiar with the object oriented features of Dart programming language and the advantages of asynchronous programming.

UNIT-I **(6 Hrs)**

Programming Fundamentals: Introduction to Dart Programming, Data Types, Variables, Constants, Identifiers, Keywords, Comments, Operators-Arithmetic Operators, Assignment Operators, Logical Operators, Conditional Expressions, Type test Operators, Bitwise Operators [T1]

UNIT-II **(8 Hrs)**

Conditional Statements: if, if else, else of ladder, switch-case statements, Loops: for, While, do-while, break, continue, Labels to Control the Flow. String Handling methods: substring(), startsWith(), split(), replaceAll(), compareTo(), isEmpty(), isNonEmpty(), trim(), padLeft(), padRight(), replaceRange(), indexOf(),length, String concatenation, Regular Expressions. [T1]

UNIT-III **(7 Hrs)**

Functions: Defining, calling, returning, single line functions, Parameterized functions- positional, named parameters, Functions Within Functions
Lambda functions, Recursive functions Data Structures: Lists, Maps, Sets. [T1]

UNIT-IV **(8 Hrs)**

Object Oriented Programming: Defining class, instantiating the class, Accessing the attributes and methods, Getters, Setters, Constructors, static Variables and Methods, this Keyword, Enumerated types. [T1]

UNIT-V **(12 Hrs)**

Inheritance, Abstract Class, Super, Interfaces- Casting, Mixins. [T1]
Exception Handling & Asynchronous programming: The try / on / catch Blocks, The Finally Block, Throwing an Exception, Custom Exceptions. [T1]
Asynchronous programming: futures, async, await. [T2]

Course Outcomes:

Upon the successful completion of the course, the student will be able to:

CO 1: Apply the object oriented programming principles of Dart [L3]

CO 2: Design Dart programs/ applications for a given requirement [L6]

CO 3: Analyze the given Dart program to identify bugs and to write correct code. [L4]

CO 4: Summarize the advantage of asynchronous programming. [L5]

Mapping of COs to POs:

POs/ COs	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
CO 1	3													
CO 2			3											
CO 3		3												
CO 4				3										

TEXT BOOKS:

1. Dart for Absolute Beginners, Authors: David Kopek, Apress.
2. The Dart Programming Language. Author, Gilad Bracha.

REFERENCE BOOKS:

1. Dart By Example, Mitchell Davy.
2. Learning Dart by Ivo Balbaert and DzenanRidjanovic.

ONLINE COURSES &REFERENCES:

1. The Complete 2021 Flutter Development Bootcamp with Dart by Dr Angela Yu - Udemy course.
2. Flutter & Dart - The Complete Flutter App Development Course by Paulo Dichone- Udemy course.
3. https://dart.dev/
4. https://dartpad.dev/

SOFTWARE PROJECT MANAGEMENT

(Professional Elective - 1)

Subject Code: UGIT5T0622	**L**	**T**	**P**	**C**
III Year / I Semester	**3**	**0**	**0**	**3**

Prerequisites:

Familiarity in Software Engineering, Programming Language, Data Base Management Systems, UML.

Course Objectives:

1. At the end of the course the learner will be able to understand the roles of a manager.
2. It gives practical management issues in various domains like quality, people, and risk management.
3. Gives knowledge about project management aspects.

SYLLABUS:

UNIT I: (8 hrs)

Introduction to Software Project Management: Project Stakeholders, Project Management Knowledge Areas, Project Management Tools and Techniques, Program and Project Portfolio Management, the Role of the Project Manager, Project Phases and the Project Life Cycle. **[T1]**

UNIT II: (8 hrs)

Software Project Time and Cost Management: Time management The Importance of Project Schedules, Estimating Activity Durations, Developing the Schedule, Controlling the Schedule

Cost management: The Importance of Project Cost Management, Basic Principles of Cost Management, Estimating Costs **[T1]**

UNIT III: (9hrs)

Human Resources Management: The Importance of Human Resource Management, Keys to Managing People, Developing the Human Resource Plan, Acquiring the Project Team, Developing the Project Team, Managing the Project Team **[T1]**

Risk Management: Introduction, nature and identification of risk, risk analysis, evaluation of risk to the schedule using Z-values, Monitoring and Controlling Risks**[T1]**

UNIT IV: **(7hrs)**

Project Integration: Strategic Planning and Project Selection, Developing a Project Charter, Developing a Project Management Plan, Directing and Managing Project Execution **[T1]**

UNIT V: **(7hrs)**

Monitoring and Controlling: Project Work, Performing Integrated Change Control, Closing Projects or Phases. **[T1]**

Course Outcomes:

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

- **CO 1:** Apply theoretical knowledge on project management and software development into practice.
- **CO 2:** Classify different methods required in project management related to time, cost and human resource management
- **CO 3:** Identify risks in project life cycle and plan for risk management strategies.
- **CO 4:** Analyze project Monitoring and Controlling Activities

Mapping of CO's to PO:

POs/ COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	3	-	-	-	-	-	-	-	-	-	-	-
CO3	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	3	3	-	-	-	-	-	-	-	-	-	-	-

Text Books:

1. INFORMATION TECHNOLOGY PROJECT MANAGEMENT, Kathy Schwalbe,6th edition, Cengage Learning, 2011
2. SOFTWARE PROJECT MANAGEMENT A Unified Framework Walker Royce Pearson Edition.

References:

1. Ramesh, Gopala swamy, "Managing Global Projects", Tata McGraw Hill, 2001.
2. Jalote, "Software Project Management in Practice", Pearson Education, 2002.

Computer Networks & IOT Lab

Subject Code: UGIT5P0722	**L**	**T**	**P**	**C**
III Year / I Semester	**0**	**0**	**3**	**1.5**

Prerequisites:

1. Programming skills in C programming language.
2. Basic skills in networking modules.

Course Objective

1. Apply the concepts of the Internet of Things and its applications.
2. Store the sensor's data in the cloud.
3. Communicate with the sensors through the GSM module.

Computer Networks Lab Experiments

1. Simulate the Cyclic Redundancy Check Algorithm (CRC) algorithm.
2. Implement the data link layer framing methods such as character, character stuffing and bit stuffing.
3. Implement Dijkstra‘s algorithm to compute the Shortest path through a graph.
4. Take an example subnet graph with weights indicating delay between nodes. Now obtain the Routing table art each node using the distance vector routing algorithm
5. Study different types of Network cables and practically implement the cross-wired cable and straight-through cable using a clamping tool.
6. Study of the basic network commands: ipconfig, hostname, ping, tracert, netstat etc
7. Connect two PCs using peer-to-peer communication through cross-wired cable.

IoT Experiments:

1. Exploring the features and components, and installation of an Arduino Board and IDE.
2. Using Arduino IDE write a program to blink LED at timely intervals at specific time intervals.
3. Using IR Sensor find if there is any obstacle, and display the result on Serial Monitor.
4. Using LDR find the amount of light present in the surroundings and based on a threshold value glow an LED or off the LED.
5. Read the values of Temperature and Humidity from the environment and if the temperature is above 40^0C then blink the red LED otherwise green LED

6. Display the values of Temperature and Humidity on an LCD Screen.
7. Using a Soil Moisture Sensor read the moisture level in the soil and display them on a Serial Monitor.

Course Outcomes:

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

CO1: Develop an IOT application to solve a real-world problem.

CO2: Design an IoT device to work with a Cloud infrastructure.

CO3: Explore different types of cables, devices and network commands.

CO4: Analyze protocols, algorithms and their functionalities.

Mapping of COs and POs:

POs/ COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	-	-	-	3	-	-	-	-	-	-	-	-	3
CO2	-	-	3	-	3	-	-	-	-	-	-	-	-	3
CO3	-	-		3	-	-	-	-	-	-	-	-	-	-
CO4	-	-	3	-	-	-	-	-	-	-	-	-	-	3

ONLINE COURSES AND RESOURCES:

1. Introduction to Internet of Things, IIT Kharagpur, NPTEL.
2. An introduction to Programming the Internet of Things (IoT), university of California, Coursera.

DATA SCIENCE LAB

Subject Code: UGIT5P0822	**L**	**T**	**P**	**C**
III Year / I Semester	**0**	**0**	**3**	**1.5**

Prerequisites:

1. Basic skills on statistics and calculus.
2. Programming skill in Python.

Course Objective:

1. Use the numpy library to create and manipulate arrays.
2. Use the pandas module with Python to create and structure data.
3. Learn how to work with various data formats within python, including: JSON, HTML, and MS Excel Worksheets.
4. Create data visualizations using matplotlib module with python.

Experiments:

1. Perform Descriptive statistics of given dataset using Data Analysis Toolbox of Excel
2. Perform the Histogram Analysis of given dataset using Data Analysis Toolbox of Excel.
3. Perform the following operations
    a) Basic Operations on NumPy
    b) Computations on numpy'sArrays
    c) DataFrames in Pandas
    d) Hierarchical Indexing
    e) Vectorized String Operations
4. Write an application to find and Removing Duplicate Records in the given dataset
5. Write an application to handle the Missing Data in the given dataset
6. Write an application to work with pivot table and cross tabulation in Data Frame.
7. Perform following preprocessing techniques on loan prediction dataset a. Feature Scaling b. Feature Standardization c. Label Encoding d. One Hot Encoding
8. Write an application to perform Data Visualization with Python using matplotlib
9. Apply and explore various plotting functions from seaborn library.
10. Write an application to apply regression model on the given data set

Course Outcomes:

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

- **CO 1:** Demonstrate exploratory data analysis, statistics, and various data science libraries presented in the python like numpy, pandas, scikit learn. **[L3]**
- **CO 2:** Apply relevant libraries to represent the data in the form of Graphs and plots **[L3]**
- **CO 3:** Apply the principles of the data science to predict and forecast the outcome of a given problem. **[L3]**

Mapping of COs to PO:

POs/ COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	-	-	-	3	-	-	-	-	-	-	-	-	-	3
CO2	-	-	-	3	-	-	-	-	-	-	-	-	-	3
CO3	-	-	-	3	-	-	-	-	-	-	-	-	-	3

Text Books:

1. Python for Data Analysis by Wes McKinney, Publisher: O'Reilly Media, Inc. ISBN: 9781449323592.
2. Python Data Science Handbook: Essential Tools for Working with Data by Jake VanderPlas, 1st Edition, Kindle Edition
3. Machine Learning for Hackers by Drew Conway, John White, O'Reilly Media, 2012.

References Books:

1. An Introduction to Statistical Learningby Gareth James, Daniela Witten, Trevor Hastie and Robert Tibshirani, Springer Texts in Statistics, 2015.
2. Learning the Pandas Library: Python Tools for Data Munging, Analysis and Visualization by Matt Harrison, CreateSpace Independent Publishing Platform, 2016.
3. Data Science from Scratch: Frist Principles with Python by Joel Grus, O' Reilly Media, 2015.

Online course materials and Video Lectures:

1. https://www.datacamp.com/courses/introduction-to-data-visualization-with-python.
2. https://www.analyticsvidhya.com/learning-paths-data-science-business-analytics-business-intelligence-big-data/learning-path-data-science-python/
3. Data Science Course by Rafael Irizarry,VerenaKaynig-Fittkau, HardvardUniversity http://cs109.github.io/2014/pages/schedule.html.

Course Era Courses:

1. Data Processing using Python by Zhang Li offered by Nanjing University.

Understanding and Visualizing Data with Python offered by Michigan University

SPRING BOOT

(Skill Oriented Course)

Subject Code: UGIT5K0922	**L**	**T**	**P**	**C**
III Year / I Semester	**1**	**0**	**2**	**2**

Prerequisites:

1. A good working knowledge on web application development using any of the popular IDEs like Eclipse or IntelliJ.
2. Experience using Java and build tools such as Maven or Gradle.

Course Objectives:

1. Build a Java application using Spring Initializer from scratch
2. Understand how to use Spring data as an application backend
3. Create RESTful services with Spring Boot

Syllabus

Spring Framework 5: Architecture, A simple Spring web application.

Introduction to Spring Boot: Spring boot configuration, features, Spring boot application model. **[T1]**

Spring boot Framework: Spring Initializer, Spring Boot Properties, Spring Boot Annotations, Spring Boot Dependency Manager, Spring Boot Starters.

Spring boot application design: Creating maven web project, configuring pom.xml file, creating the application class**[T3]**

Web applications with Spring Boot: Spring boot MVC auto-configuration, Spring boot web ToDo App: design, running and testing, overriding defaults. **[T1]**

Data Access with Spring Boot: Spring data with JDBC, Spring Data with JPA, Spring data REST with Spring boot, MongoDB with Spring Boot. **[T1]**

Security with Spring Boot: Spring security, applying basic security with default Login page. **[T1]**

Spring Boot Actuator: Actuator setting in Spring boot application, Custom Actuator Endpoints, Spring boot Actuator Health. **[T1]**

EXPERIMENTS:

1. Write a program to create a simple Spring Boot application that prints a message.
2. Write a program to demonstrate RESTful Web Services with spring boot
3. Demonstrate the integration of JDBC with spring boot.
4. Demonstrate the integration of JPA with spring boot.
5. Demonstrate the integration of MongoDB with spring boot.
6. Demonstrate to use the Actuator end points to monitor the Spring boot application
7. Design a Login page by applying basic security configuration to spring boot

Course Outcomes:

Upon the completion of the course, the student will be able to

CO 1: Design Spring Core and maven building blocks for Spring Boot. **[L3]**
CO 2: Understand the Spring Boot's Web capabilities including REST web services. **[L2]**
CO 3: Design database centric spring boot applications by integrating JDBC API. **[L4]**
CO 4: Manipulate the settings of Actuator endpoints to monitor and manage applications. **[L3]**
CO 5: Apply Spring Security to secure Web and REST endpoints in the cloud. **[L3]**

MAPPING OF COs to POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	-	-	3	-	-	-	-	-	-	-	-	-	3	3
CO2	-		-	3	-	-	-	-	-	-	-	-	3	3
CO3	-	3	-	-	-	-	-	-	-	-	-	-	3	3
CO4	-		-	3	-	-	-	-	-	-	-	-	3	3
CO5		-	3	-	-	-	-	-	-	-	-	-	3	3

TEXT BOOKS:

1. Felipe Gutierrez, Pro Spring Boot 2, II Edition, APress.

REFERENCE BOOKS:

1. Packt, Greg L. Turnquist, Learning Spring Boot 2.0, II Edition
2. Jens Boje, Spring Boot 2: How to Get Started and Build a Microservice - Third Edition, CodeBoje
3. Craig walls, Spring Boot in Action, Manning publisher.
   https://dzone.com/articles/introducing-spring-boot
   https://spring.io/

ONLINE COURSES AND REFERENCES:

1. Building scalable Java micro services with spring bid and spring cloud offered by Google Cloud – Coursera.
2. Master micro Services with Spring Boot & spring cloud by in 2 minutes official – udamy.com.

INTELLECTUAL PROPERTY RIGHTS & PATENTS

(Common to all branches)

Subject Code: UGMB5A0122	**L**	**T**	**P**	**C**
III Year / I Semester	**2**	**0**	**0**	**0**

Course Objectives: This course introduces about intellectual property laws, trademarks, copyrights and patents.

Syllabus:

UNIT-I: (6 Hours)

Intellectual Property Law: Basics, Types, Agencies Responsible for IP Registration, International Organizations, Agencies and Treaties, Importance of IPR.

Trademark Law: Purpose of Trademarks, Types, Acquisition, Common Law Rights, Laws and Treaties Governing Trademarks, Categories, Trade Names and Business Names, Protectable Matter, Exclusions from Trademark Protection, Selecting and Evaluating a Mark, Trademark Search.

UNIT-II: (5 Hours)

Copyright Law: Common Law Rights, Originality of Material, Fixation of Material, Works of Authorship, Exclusions, Compilations, Collections and Derivative Works.

Rights Afforded by Copyright Law: Rights of Reproduction, Derivative Works, Distribution and the First Sale Doctrine, Work Publicly, Rights to Display the Work Publicly, Other Limitations on Exclusive Rights, Moral Rights and the Visual Artists Rights, Compulsory Licenses.

UNIT-III: (7 Hours)

Copyright Ownership and Transfers: Ownership Issues, Joint Works, Ownership in Derivative or Collective Works, Works Made for Hire, Transfers, Termination of Transfers and Duration.

Copyright Infringement: Elements, Contributory and Vicarious Infringement, Defences to Infringement, Infringement Actions.

New Developments: Protection for Computer Programs and Automated Databases, Copyright in the Electronic Age, Entertainment Notes, Recent Developments, Terms of the Trade, Semiconductor Chip Protection.

UNIT-IV: (6 Hours)

Patent Law: Introduction, Patentability, Design Patents, Plant Patents, Double Patenting.

Patent Searches and Application: Searching, Application Process, Prosecuting the Application, Post-issuance Actions, Term and Maintenance of Patents.

Patent Ownership and Transfer: Ownership Rights, Sole and Joint Inventors, Disputes, Inventions made by Employees and Independent Contractors, Assignment of Rights, Licensing, Invention Developers and Promoters.

UNIT-V: (6 Hours)

Patent Infringement: Direct Infringement, Inducement to Infringe, Contributory Infringement, First Sale Doctrine, Indirect Infringement, Infringement Abroad, Claims Interpretation, Defences, Remedies, Resolving a Dispute and Litigation.

New Developments: International Patent Protection, Patent Cooperation Treaty, European Patent Organization, Patent Prosecution Highway, Agreement on Trade-Related Aspects of IPR, Patent Law Treaty, Foreign Filing Licenses.

Intellectual Property Audits: Practical Aspects of Intellectual Property Audits, Conducting the Audit, Postaudit Activity.

Course Outcomes:

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

CO1: Understand the intellectual property law.

CO2: Understand the need of trademark and its use.

CO3: Familiar with copyright laws and its rights, ownership, transfers and copyright Infringement.

CO4: Acquire the knowledge on various aspects of patents.

Mapping of COs to POs:

POs/ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	3	-	-	-	-
CO3	3	3	3	-	-	-	-	3	-	3	-	-
CO4	3	3	3	-	-	3	3	3	-	3	-	-

TEXT BOOKS:

1. Deborah E. Bouchoux, "Intellectual Property", Cengage Learning
2. Asha Vijay, Durafe Dhanashree and K. Toradmalle, "Intellectual Property Rights", Wiley India
3. Neeraj Pandey and Khushdeep Dharni, "Intellectual Property Rights", PHI Learning, 2014.

REFERENCE BOOKS:

1. Kompal Bansal & Parishit Bansal, "Fundamentals of IPR for Engineers", BS Publications.
2. Prabhuddha Ganguli, "Intellectual Property Rights", Tata Mc-Graw Hill, New Delhi.
3. R. Radha Krishnan, S. Balasubramanian, "Intellectual Property Rights", Excel Books. New Delhi.
4. M. Ashok Kumar and Mohd. Iqbal Ali, "Intellectual Property Right", Serials Pub.
5. Robert P. Merges, Peter S. Menell, Mark A. Lemley, "Intellectual Property in New Technological Age", 2016.

6. Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd.
7. T. Ramappa, "Intellectual Property Rights Under WTO", S. Chand.
8. Dr. A. Srinivas, "Intellectual Property Rights (Patents & Cyber Law)", Oxford University Press, New Delhi.

Syllabus
III B.Tech II SEM

MACHINE LEARNING

Subject Code: UGCS6T0322	**L**	**T**	**P**	**C**
III Year / II Semester	**3**	**0**	**0**	**3**

Prerequisites:
Basic programming skills (in Python), algorithm design and basics of probability & statistics.

Course Objectives:
To impart knowledge on

- To discuss different learning techniques.
- To understand various machine learning procedures.
- To learn various algorithms.

Syllabus:

UNIT I: (9 hrs)
Introduction: Overview of machine Learning, Related Areas and applications, Foundations of Learning: Components of learning, learning vs design, Types of learning Models: supervised, unsupervised, reinforcement, Training vs Testing,

Theory of generalization: generalization bound, overfitting, underfitting, approximation-generalization tradeoff, bias and variance, learning curve

UNIT II: Supervised Learning-I (8 hrs)
Introduction to Regression: Regression Vs Classification, Linear regression, single and multivariate regression; Metrics for assessing regression (Mean Squared Error, Root Mean Squared Error, Mean Absolute Error), Logistic Regression, K-Nearest Neighbors, Naïve Bayes Classifiers.
Classification Performance Measures: Confusion Matrix, Accuracy Metrics, Receiver Operator Characteristic (ROC) Curve, Case study on various classification applications

UNIT III: Supervised Learning-II (8 hrs)

Decision Trees: Introduction to Decision Trees, Algorithm for Decision Tree Construction: ID3, C4.5, CART, Truncation and Pruning
Support Vector Machine: Linear SVM Classification, Nonlinear SVM Classification, SVM Regression

UNIT IV: Unsupervised Learning (8 hrs)
Introduction to clustering, K-means clustering, Clustering around medoids, Hierarchical Clustering, Silhouettes, K-d Trees, Case study on various clustering applications.

Dimensionality Reduction: The Curse of Dimensionality, Main Approaches for Dimensionality Reduction, PCA, Using Scikit-Learn, Randomized PCA, Kernel PCA.

UNIT V: Ensemble Methods (8 hrs)

Introduction to Ensemble methods, Bagging, Committee Machines and Stacking, Boosting - Gradient Boosting, Adaptive Boosting, Random Forests-Multi-class Classification.

Course Outcomes:

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

CO 1: Comprehend the importance of types of learnings in model development. **[L2]**

CO 2: Utilize machine learning libraries and frameworks to build and train models on real-world datasets. **[L3]**

CO 3: Analyse the performance of machine learning models by interpreting evaluation metrics and visualization tools. **[L4]**

CO 4: Create custom machine learning models tailored to specific problem domains. **[L4]**

Mapping of COs to POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	-	3	-	-	-	-	-	-	-	-	-	-	3	3
CO 2	3	-	-	-	-	-	-	-	-	-	-	-	3	3
CO 3	-	3	-	-	-	-	-	-	-	-	-	-	3	3
CO 4	-	-	3	-	-	-	-	-	-	-	-	-	3	3
CO 5	-	-	-	3	-	-	-	-	-	-	-	-	3	3

TEXT BOOKS:

1. Stephen Marsland, "Machine Learning - An Algorithmic Perspective" 2nd Edition, CRC Press, 2015
2. EthemAlpaydin, "Introduction to Machine Learning", 3rd Edition, MIT Press, 2014.

REFERENCE BOOKS:

1. Y. S. Abu-Mostafa, M. Magdon-Ismail, and H.-T. Lin, "Learning from Data", AMLBook Publishers, 2012.

P. Flach, "Machine Learning: The art and science of algorithms that make sense of data", Cambridge University Press, 2012

CRYPTOGRAPHY AND NETWORK SECURITY

Subject Code: UGCS6T0222	**L**	**T**	**P**	**C**
III Year / II Semester	**3**	**0**	**0**	**3**

Prerequisites:

1 Computer Networks
2 Computer Hardware

Course Objectives:

The aim of the course is to introduce the students

1 Various cryptographic algorithms and their applications in securing the networking environment
2 Different authentication protocols and applications.
3 The concepts of IP security and web security.
4 The working nature of firewalls and their usage in different organizations.

SYLLABUS:

UNIT I: (7 hrs)

Introduction: Computer Security Concepts, The OSI Security Architecture, Security Attacks- DOS, DDOS, Session Hijacking, Spoofing, Phishing, Security Services, Security Mechanisms, and a Model for Network Security.

Classical Encryption: Symmetric Cipher Model, Substitution Techniques-Caesar Cipher, monoalphabetic, Playfair Cipher, Transportation Techniques-rail fence, Steganography. [T1]

UNIT II: (7 hrs)

Number Theory: Divisibility and the Division Algorithm, The Euclidean Algorithm, Prime and Relatively Prime Numbers, The Chinese Remainder Theorem. [T1]

Symmetric Encryption: Symmetric Encryption **Principles-**Cryptography, Cryptanalysis **Symmetric Block Encryption Algorithms-** Data Encryption Standard (DES), Strength of DES, Advanced Encryption Standard (AES). [T2]

UNIT III: (16 hrs)

Public Key Cryptography and Message Authentication: Approaches to message authentication- Authentication using Conventional Encryption, Message authentication without Message Encryption, Message Authentication Code, One way Hash Function, Secure Hash functions - Hash function requirements, Simple hash function, The SHA-1 Secure Hash Function, The RSA Algorithm Public Key Encryption Algorithm, Diffie-Hellman Key Exchange, Digital signature. [T2]

Authentication Applications: KerberosVersion-4, X.509-Format[T2]

Electronic Mail Security: PGP, S/MIME. [T2]

UNIT IV: **(8 hrs)**

IP Security: Overview, Applications of IPSec, Benefits of IPSec, IP Security Architecture-IPSec Services, Security Associations, Authentication Header, Encapsulating Security Payload, ISAKMP Header format.[T2]

Web Security: Web Security Considerations, Web Security Threats, Secure Sockets Layer and Transport Layer Security, Secure Electronic Transaction. [T2]

UNIT V: **(7 hrs)**

System Security: Intruders- Techniques, Malicious Software – Viruses and Related Threats- Backdoor, Logic Bomb, Trojen Horses, Zombie, Types of Viruses, Virus Countermeasures- Anti Virus Approaches, Worms[T2].

Firewalls: Characteristics, Types of Firewalls, Placement of Firewalls, Firewall Configuration [T2]

Course Outcomes:

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

1. Compare different types of attacks and security mechanisms, and knowing the importance of network security,
2. Apply symmetric and Asymmetric cryptographic algorithms with concepts of number theory for implementing various security protocols.
3. Analyze the security considerations of IP layer and Transport layer to identify different authentication applications for secure transmission
4. Understand various types of malicious software and the importance of Firewalls to prevent attacks.

Mapping of COs to POs

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO1	2	3	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	3	-	-	-	-	-	-	-	-	-	-	-
CO4	2	3	3	3	-	-	-	-	-	-	-	-	-	-

TEXT BOOKS:

1 Cryptography and Network Security: Principles and Practice, William Stallings, Pearson Education,5th edition, 2011

2 Network Security Essentials : William Stallings, Pearson Education,3rd edition, 2011

REFERENCE BOOKS:

1 Fundamentals of Network Security by Eric Maiwald, Dreamtech press.
2 Principles of Information Security, Whitman, Thomson.
3 Introduction to Cryptography, Buchmann, Springer. Applied Cryptography. 2nd Edition, Bruce Schneier, Johnwiley& Sons
4 Cryptography and Network, Behrouz.A.Fourouzan and DebdeepMukhopadhyay, McGraw-Hill,2nd edition, 2010

ONLINECOURSES:

1 Asymmetric Cryptography and Key Management by University of Colorado System
2 Number Theory and Cryptography by University of California San Diego

DATA WAREHOUSING AND DATA MINING

Subject Code: UGIT6T0122	**L**	**T**	**P**	**C**
III Year / II Semester	**3**	**0**	**0**	**3**

Prerequisites: Familiarity with Database Management Systems.

Course Objectives:

The main objective of the course is to

- Introduce basic concepts and techniques of data warehousing and data mining
- Examine the types of data to be mined and apply pre-processing methods to raw data
- Discover interesting patterns, analyze supervised and unsupervised models and estimate the accuracy of the algorithms.

Syllabus:

UNIT I:

Data Warehousing and Online Analytical Processing: Data Warehouse: Basic concepts, Data Warehouse Modelling: Data Cube and OLAP, Data Warehouse Design and Usage, Data Warehouse Implementation, Introduction: Why and What is data mining, what kinds of data need to be mined and patterns can be mined, Which technologies are used, Which kinds of applications are targeted.

UNIT II:

Data Pre-processing: An Overview, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization.

UNIT III:

Classification: Basic Concepts, General Approach to solving a classification problem, Decision Tree.

Induction: Attribute Selection Measures, Tree Pruning, Scalability and Decision Tree Induction, Visual Mining for Decision Tree Induction.

UNIT IV:

Association Analysis: Problem Definition, Frequent Item set Generation, Rule Generation: Confident-based Pruning, Rule Generation in Apriori Algorithm, Compact Representation of frequent item sets, FPGrowth Algorithm.

UNIT V:

Cluster Analysis: Overview, Basics and Importance of Cluster Analysis, Clustering techniques, Different Types of Clusters; K-means: The Basic K-means Algorithm, K-means Additional Issues, Bisecting K Means.

Course Outcomes:

By the end of the course, students will be able to

- **CO1:** Illustrate the importance of Data Warehousing, Data Mining and its functionalities and Design schema for real-time data warehousing applications.
- **CO2:** Demonstrate various Data Preprocessing Techniques viz. data cleaning, data integration, data transformation and data reduction and Process raw data to make it suitable for various data mining algorithms.
- **CO3:** Choose appropriate classification techniques to perform classification, model building and evaluation.
- **CO4:** Make use of association rule mining techniques viz. Apriori and FP Growth algorithms and analysis on frequent item sets generation.
- **CO5:** Identify and apply various clustering algorithms (with open-source tools), interpret, evaluate and report the result.

Mapping of COs to POs:

POs/ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	3	-	3	-	-	-	-	-	-	-	3	-
CO2	3	-	3	-	3	-	-	-	-	-	-	-	3	-
CO3	3	3	3	-	3	-	-	-	-	-	-	-	3	-
CO4	3	-	3	-	3	-	-	-	-	-	-	-	3	-
CO5	-	3	3	-	3	-	-	-	-	-	-	-	3	-

TEXTBOOKS:

1. Data Mining concepts and Techniques, 3/e, Jiawei Han, Michel Kamber, Elsevier,2011.
2. Introduction to Data Mining: Pang-Ning Tan & Michael Steinbach, Vipin Kumar, Pearson,2012.

REFERENCE BOOKS:

1. Data Mining Techniques and Applications: An Introduction, Hongbo Du, Cengage Learning.
2. Data Mining: VikramPudi and P. Radha Krishna, Oxford Publisher.
3. Data Mining and Analysis - Fundamental Concepts and Algorithms; Mohammed J. Zaki, Wagner Meira, Jr, Oxford
4. Data Warehousing Data Mining & OLAP, Alex Berson, Stephen Smith, TMH.
   http://onlinecourses.nptel.ac.in/noc18_cs14/preview (NPTEL course by Prof. Pabitra Mitra)
5. http://onlinecourses.nptel.ac.in/noc17_mg24/preview
   (NPTEL course by Dr. NandanSudarshanam& Dr. BalaramanRavindran)
6. http://www.saedsayad.com/data_mining_map.htm

COMPUTER GRAPHICS
(Professional Elective-II)

Subject Code: UGIT6T0222	**L**	**T**	**P**	**C**
III Year / II Semester	**3**	**0**	**0**	**3**

Prerequisites: Basic knowledge in Mathematics and Computer Organization.

Course Objectives: The objective of this course presents the basic concepts, the tasks of computer graphics and its main algorithms and models. The course examines the principles of functioning of graphic devices and the various limitations, description of the geometric objects and their presentation in the computer, the main functions of graphics package.

Syllabus:

UNIT I: (7 hrs)

Introduction: Application areas of Computer Graphics. **Overview of graphics systems:** video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations, input devices.

UNIT II: (8 hrs)

Output Primitives: Points and lines, line drawing algorithms, mid-point circle algorithm, Brenham's circle algorithm and midpoint ellipse algorithms. **Filled area primitives**: Scan line polygon fill algorithm, boundary-fill algorithm, flood-fill algorithms, Inside-outside tests.

UNIT III: (9 hrs)

2-D Geometric Transformations: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transformations, Other transformations, transformations between coordinate systems, affine transformations.

2-D Viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland –Hodgeman polygon clipping algorithm.

UNIT IV: (10 hrs)

3-D Object Representation: Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-Spline curves, Bezier and B-Spline surfaces.

UNIT V: **(7 hrs)**

3-D Geometric Transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations. **3-D Viewing:** Viewing pipeline, viewing coordinates, projection, view volumes and general projection transformations and clipping.

Course Outcomes:

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

CO 1: Understand the hardware system architecture for computer graphics.
CO 2: Analyze the relationship the basic structures of 2D and 3D graphics systems.
CO 3: Understand the core concepts of computer graphics, including viewing,
CO 4: projection, perspective, modelling and transformation in two and three
CO 5: dimensions.

Mapping of COs to POs:

POs/ COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	3	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	3	-	-	-	-	-	-	-	-	-	-	-

TEXT BOOKS:

1. Donald Hearn and M.Pauline Baker, Computer Graphics *C version,* 2nd edition, Pearson Education.
2. Foley, VanDam, Feiner and Hughes, Computer Graphics Principles & practice, second edition in C, Pearson Education.

REFERENCE BOOKS:

1. Neuman and Sproul, Principles of Interactive Computer Graphics, TMH.
2. Steven Harrington, Computer Graphics,TMH.

CYBER SECURITY AND CYBER LAWS

(Professional Elective – II)

	L	T	P	C
Subject Code: UGIT6T0322				
III Year / II Semester	**3**	**0**	**0**	**3**

Course objectives:

- To understand various types of cyber-attacks and cyber-crimes
- To learn threats and risks within context of the cyber security
- To have an overview of the cyber laws & concepts of cyber forensics
- To study the defensive techniques against these attacks

SYLLABUS:

UNIT –I:

Introduction to Cyber Security: Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, etc., Comprehensive Cyber Security Policy.

UNIT - II:

Cyberspace and the Law & Cyber Forensics: Introduction, Cyber Security Regulations, Roles of International Law. The INDIAN Cyberspace, National Cyber Security Policy. Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics

UNIT – III:

Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era.

Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Organizational security Policies and Measures in Mobile Computing Era, Laptops.

UNIT- IV:

Cyber Security: Organizational Implications: Introduction, cost of cybercrimes and IPR issues, web threats for organizations, security and privacy implications, social media marketing: security risks and perils for organizations.

Privacy Issues: Basic Data Privacy Concepts: Fundamental Concepts, Data Privacy Attacks, Data linking and profiling, privacy policies and their specifications, privacy policy languages, privacy in different domains- medical, financial.

UNIT- V: Cybercrime: Examples and Mini-Cases Examples: Indian Banks Lose Millions of Rupees, Parliament Attack, e-mail spoofing instances. Mini-Cases: The Indian Case of online Gambling, An Indian Case of Intellectual Property Crime, Financial Frauds in Cyber Domain.

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

CO1: Analyse cyber-attacks, types of cybercrimes, cyber laws and also how to protect them self and ultimately the entire Internet community from such attacks.
CO2: Interpret and forensically investigate security incidents
CO3: Apply policies and procedures to manage Privacy issues
CO4: Design and develop secure software modules

Mapping of COs to POs:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	3	-	-	-	-	-	-	-	-	-	-	-	3	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-	3	-
CO3	3	-	-	3	-	-	-	-	-	-	-	-	3	-
CO4	-	-	3	-		-	-	-	-	-	-	-	3	-

TEXT BOOKS:

1. 1.Nina Godbole and SunitBelpure, Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley
2. 2.B.B.Gupta, D.P.Agrawal, HaoxiangWang, ComputerandCyberSecurity: Principles, Algorithm, Applications, and Perspectives, CRC Press, ISBN 9780815371335, 2018

REFERENCES:

1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRCPress.
2. Introduction to Cyber Security, Chwan-Hwa(john) Wu,J. David Irwin, CRC Press T&FGroup.

ONLINE COURSES:

1. The Complete Cyber Security Course: Hackers Exposed! by Udemy

DESIGN PATTERNS

(Professional Elective – II)

Subject Code: UGIT6T0422	**L**	**T**	**P**	**C**
III Year / II Semester	**3**	**0**	**0**	**3**

Pre-Requisites:

Students must have knowledge of object-oriented analysis using UML.

Course Objectives:

The Students will learn the following

1. Infer the knowledge of design patterns through their organization and classification.
2. Interpret underlying object-oriented design Principles while implementing the pattern.
3. Compare different patterns functionality in executing real-time problems.
4. Implement patterns based on their applicability to different problems

SYLLABUS:

UNIT I: (7 hrs)

Introduction: What Is a Design Pattern? Design Patterns in Smalltalk MVC, Describing Design Patterns, The Catalogue of Design Patterns, Organizing the Catalogue, How Design Patterns Solve Design Problems, How to Select a Design Pattern, How to Use a Design Pattern. **[T1]**

UNIT II: (9 hrs)

Creational Patterns: Abstract Factory, Builder, Factory Method, Prototype, Singleton, Double Checked Locking Pattern, Object Pool Pattern Management of Objects. **[T1]**

UNIT III: (9 Hrs)

Structural Patterns: Adapter, Bridge, Composite, Decorator, Façade, Flyweight, Proxy. **[T1]**

Behavioral Patterns - 1: Chain of Responsibility, Command, Interpreter, Iterator, Mediator. **[T1]**

UNIT IV: (9 Hrs)

Behavioral Patterns - 2: Memento, Observer, State, Strategy, Template Method, Visitor. **[T1]**

UNIT V: **(7 Hrs)**

A Case Study: Designing a Document Editor: Design Problems, Document Structure, Formatting, Embellishing the User Interface, Supporting Multiple Look-and-Feel Standards, Supporting Multiple Window Systems, User Operations Spelling Checking and Hyphenation. **[T1]**

COURSE OUTCOMES:

Upon the successful completion of the course, the student will be able:

1. Understand the need for proper implementation of the application design and resolve issues in application design tasks. **[L2]**
2. Interpret the patterns usage based on their applicability and known uses. **[L5]**
3. Utilize the design patterns to create object-oriented applications that are scalable and easily maintainable. **[L3]**
4. Examine the patterns to ensure their reliability in solving design problems. **[L4]**

Mapping of COs to POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-	-	-
CO4	-	3		-	-	-	-	-	-	-	-	-	-	-

TEXTBOOKS:

1. Design Patterns, Erich Gamma, Pearson Education

REFERENCES:

1. Pattern's in JAVA Vol-I, Mark Grand, Wiley DreamTech.
2. Pattern's in JAVA Vol-II, Mark Grand, Wiley DreamTech.
3. JAVA Enterprise Design Patterns Vol-III, Mark Grand, WileyDreamTech.
4. Design Patterns Explained, Alan Shalloway, Pearson Education.
5. Head First Design Patterns, Eric Freeman-Oreilly-spd.

ONLINE COURCES AND REFERENCES:

1. Design patterns offred by University of Alberta –coursera.

INFORMATION SECURITY AND MANAGEMENT

(Professional Elective - II)

Subject Code: UGIT6T0522	**L**	**T**	**P**	**C**
III Year / II Semester	**3**	**0**	**0**	**3**

Prerequisites:

Familiarity with Computer Networks.

Course Objectives:

The students learn different types of threats and attacks, data leakage, prevent them by applying policies, roles and responsibilities of information security, in addition to that security audits, mechanisms for auditing, generating of audit reports and post audit actions to be taken, and social engineering.

SYLLABUS:

UNIT I: (15 hrs)

Information Security Management: Information Security Overview, Threats and Attack Vectors, Types of Attacks, Common Vulnerabilities and Exposures (CVE), Security Attacks, Computer Security Concerns, Information Security Measures etc., Key Elements of Networks, Logical Elements of Network, Critical Information Characteristics, Information States. [T1]

Data Leakage: What is Data Leakage and statistics, Data Leakage Threats, Reducing the Risk of Data Loss, Key Performance Indicators (KPI), and Database Security. [T2]

UNIT II: (7 hrs)

Information Security Policies, Procedures and Audits: Information Security Policies necessity key elements & characteristics, Security Policy Implementation, Configuration Security Standards-Guidelines & Frameworks. Security Roles & Responsibilities, Accountability, Roles and Responsibilities of Information Security Management, team-responding to emergency situation-risk analysis process. [T2]

UNIT III: (9 hrs)

Information Security Performance Metrics and Audit: Security Metrics and Reporting, Common Issues and Variances of Performance Metrics.

Introduction to Security Audit, Servers and Storage devices, Infrastructure and Networks, Communication Routes, Information Security Methodologies (Black-box, White-box, Grey-box), Phases of Information Security Audit and Strategies, Ethics of an Information Security Auditor. [T2]

UNIT IV: (8 hrs)

Information Security Audit Tasks, Reports and Post Auditing Actions: Pre-audit checklist, Information Gathering, Vulnerability Analysis, External Security Audit, Internal Network Security Audit, Firewall Security Audit, IDS Security Auditing, Social Engineering Security Auditing, Web Application Security Auditing, Information Security Audit Deliverables & Writing Report, Result Analysis, Post Auditing Actions, Report Retention. [T2]

UNIT V: (10 hrs)

Vulnerability Management: Information Security Vulnerabilities – Threats and Vulnerabilities, Human-based Social Engineering, Computer-based Social Engineering, Social Media Countermeasures, Vulnerability Management – Vulnerability Scanning, Testing, Threat management, Remediation etc. [T2]

Course Outcomes:

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

- **CO 1:** Identify and analyze the types of threats and vulnerabilities, security policies and data leak. [L2]
- **CO 2:** Critically evaluate security audits methodologies and post audit actions to be taken. [L5]
- **CO 3:** Analyze and identify the threats and vulnerabilities of the system at network and web application levels. [L3]
- **CO 4:** Classify protection mechanisms for different types of social engineering. [L2]
- **CO 5:** Make use of vulnerability management to protect the website from attacks. [L3]

Mapping of COs to POs:

POs / COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	-	-	-	-	-	-	-	-	-	-	3	-
CO2	-	3	3		-	-	-	-	-	-	-	-	3	-
CO3	-	-	3	3	-	-	-	-	-	-	-	-	3	-
CO4	-	-	3	3	-	-	-	-	-	-	-	-	3	-
CO5	-	-	3	2	-	-	-	-	-	-	-	-	3	-

TEXT BOOKS:

1. Management of Information Security by Michael E.Whitman and Herbert J.Mattord
2. Assessing Information Security (strategies, tactics, logic and framework) by A Vladimirov, K.Gavrilenko, and A.Michajlowski
3. "The Art of Computer Virus Research and Defense" by Peter Szor.

REFERENCES:

1. http://www.iso.org/iso/home/standards/management-standards/iso27001.htm
2. http://csrc.nist.gov/publications/nistpubs/800-55-Rev1/SP800-55-rev1.pdf
3. https://www.sans.org/reading-room/whitepapers/threats/implementing-vulnerability-management-process-34180
4. http://csrc.nist.gov/publications/nistpubs/800-40-Ver2/SP800-40v2.pdf

ONLINE COURSES AND REFERENCES:

1. Cybersecurity Roles, Processes & Operating System Security(Offered by IBM)
2. Introduction to Cybersecurity Tools & Cyber Attacks (Offered by IBM)

CLOUD COMPUTING

(Job Oriented Elective-II)

Subject Code: UGIT6T0622	**L**	**T**	**P**	**C**
III Year / II Semester	**2**	**0**	**2**	**3**

Prerequisites: Familiarity with Operating Systems, Computer Networks and Database Management Systems.

Course Objectives: To provide students with the comprehensive and in-depth knowledge of Cloud Computing concepts, technologies, architecture and applications.

UNIT I: (8 Hrs)

Computing Paradigms: High-Performance Computing, Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Cloud Computing, Bio computing, Mobile Computing, Quantum Computing, Optical Computing, Nano computing.

Cloud Computing Fundamentals: Motivation for Cloud Computing, The Need for Cloud Computing, Defining Cloud Computing, Definition of Cloud computing, Cloud Computing Is a Service, Cloud Computing Is a Platform, Principles of Cloud computing, Five Essential Characteristics

UNIT II: (8 Hrs)

Cloud Computing Architecture and Management: Cloud architecture, Layer, Anatomy of the Cloud, Network Connectivity in Cloud Computing, Applications, on the Cloud, Managing the Cloud, Managing the Cloud Infrastructure, Managing the Cloud application, Migrating Application to Cloud-Phases of Cloud Migration, Approaches for Cloud Migration.

UNIT III: (10 Hrs)

Cloud Deployment Models: Introduction, Private Cloud, Characteristics, On-Premise Private Cloud, Outsourced Private Cloud, advantages and disadvantages, Public Cloud Characteristics, Suitability, Issues, Advantages, Disadvantages, Community Cloud, Characteristics, Suitability, On-Premise Community Cloud Issues, Outsourced Community Cloud, Issues, Advantages, disadvantages, Hybrid Cloud, Characteristics, Suitability, Issues, Advantages, Disadvantages

Cloud Service Models: Infrastructure as a Service, Characteristics of IaaS. Suitability of IaaS, Pros and Cons of IaaS, Platform as a Service, Characteristics of PaaS, Suitability of PaaS, Pros and Cons of PaaS, Software as a Service, Characteristics of SaaS, Suitability of SaaS, Pros and Cons of SaaS

UNIT IV: (8 Hrs)

Virtualization, Introduction. Virtualization Opportunities-Processor Virtualization, Memory, Virtualization, Storage Virtualization, Network Virtualization, Data Virtualization, Application Virtualization, Approaches to Virtualization, Full Virtualization, Para virtualization, Hardware-Assisted Virtualization, Hypervisors, Types of Hypervisors, Security Issues and Recommendations

UNIT V: (8 Hrs)

Security in Cloud Computing: Introduction, Cloud in Information Technology, Cloud General Challenges, Security Aspects Security Issues in Cloud Service Models, Software-as-a-Service Security Issues, Platform-as-a-Service Security, Infrastructure-as-a-Service Security Issues

COURSE OUTCOMES:

CO 1: Distinguish the different models and computing paradigms.
CO 2: Analyze the reasons for migrating into cloud
CO 3: Apply the services in the cloud for real world scenarios
CO 4: Make use of cloud services effectively in terms of infrastructure, platform and software
CO 5: Explain the levels of virtualization and resources virtualization

Mapping of COs to POs

CO/PO's	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	-	-	3	-	-	-	-	-	-	-	-	3	3
CO2	-	-	-	3	-	-	-	-	-	-	-	-	3	3
CO3	-	-	3	-	-	-	-	-	-	-	-	-	3	3
CO4	-	-	-	3	-	-	-	-	-	-	-	-	3	3
CO5	-	3	-	-	3	-	-	-	-	-	-	-	3	3

TEXT BOOKS:

1. Essentials of cloud Computing: K. Chandrasekhran, CRC press

REFERENCE BOOKS:

1. Cloud Computing: Principles and Paradigms by RajkumarBuyya, James Broberg and Andrzej M. Goscinski, Wiley, 2011.
2. Distributed and Cloud Computing, Kai Hwang, Geoffery C. Fox, Jack J. Dongarra, Elsevier, 2012.
3. Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, Tim Mather, Subra Kumaraswamy, Shahed Latif, O'Reilly, SPD, rp2011.

Lab Experiments:

1. Demonstrate the creation of the Amazon VPC using the VPC Wizard
2. Demonstrate the following components of a VPC:

    a. Public and private subnets
    b. Route tables and routes
    c. NAT Gateways
    d. Network ACLs
    e. Elastic IPs

3. Demonstrate the following with respect to EC2

    a. Launch a web server with termination protection enabled
    b. Monitor the EC2 instance created
    c. Modify the security group that your web server is using to allow HTTP access
    d. Resize the Amazon EC2 instance to scale and EC2 limits
    e. Terminate the EC2 instance

Storage: Introduction to Elastic Block Store - EBS, EBS Snapshots, EBS Volume Types Introduction to Simple Storage Service (S3), Object Storage Vs. Block Storage, Static Website Hosting

1. Demonstrate the following with respect to Amazon S3

    a. Create a bucket in Amazon S3
    b. Add an object to a bucket
    c. Manage access permissions on an object and a bucket
    d. Use bucket versioning
    e. Static Website Hosting
    f. Store images and show them in the browser

Elastic Load Balancers: Understanding High Availability Configuration, ELB Configuration Auto Scaling

1. Demonstrate the following with respect to Elastic Load Balancers
    a. Create a Network Load Balancer and use the two web servers as Elastic Load Balancer targets
    b. Test the default functionality of the load balancer
    c. Enabled Cross-Zone load balancing and test how the load balancer behaves
    d. Test the behavior of your load balancer during a failure of one of the web servers
    e. Test the behavior of your load balancer after the web server has recovered from the failure

Identity & Access Management: Root Account Vs IAM user, Multi-Factor Authentication for Users, IAM Password Policies, Creating Customer Managed Policies - Groups, Roles

1. Exploring pre-created IAM Users and Groups

2. Inspecting IAM policies as applied to the pre-created groups
3. Following a real-world scenario, adding users to groups with specific capabilities enabled
4. Locating and using the IAM sign-in URL
5. Experimenting with the effects of policies on service access

Database Services: Amazon RDS, DynamoDB

1. Demonstrate the following with respect to Amazon RDS

    a. Create an Amazon Relational Database Service (RDS) instance
    b. Creating a MySQL DB instance
    c. Connecting to a database on a DB instance running the MySQL database engine
    d. Enter data into the MySQL database
    e. Query the MySQL database table
    f. Deleting a DB instance

2. Demonstrate the following with respect to DynamoDB

    a. Create an Amazon DynamoDB table
    b. Enter data into an Amazon DynamoDB table
    c. Query an Amazon DynamoDB table
    d. Delete an Amazon DynamoDB table

GAME DEVELOPMENT
(Job Oriented Elective-II)

	L	T	P	C
Subject Code: UGIT6T0722				
III Year / II Semester	**2**	**0**	**2**	**3**

PREREQUISITE

To learn this, course an exposure to 3D graphics principles and animation techniques are the prerequisite.

OBJECTIVE

To get subsequent understanding of game design and development, which includes the processes, mechanics, issues in game design, game engine development, modeling, techniques, handling situations, and logic. At the end, the student will be in a position to create interactive games.

UNIT I: INTRODUCTION TO GAME PROGRAMMING (7hrs)

Overview of game programming, game industry, Game Engine Architecture: Engine Support, Resource Management, Real Time Game Architecture. [T1]

UNIT II: 3D GRAPHICS FOR GAME PROGRAMMING (7 hrs)

Coordinate Systems, Ray Tracing, Modeling in Game Production, Vertex Processing, Rasterization, Fragment Processing and Output Merging. [T2]

UNIT III: GAME DESIGN PRINCIPLES (8 hrs)

Character development, Story Telling, Narration, Game Balancing, Core mechanics, Principles of level design, Genres of Games.

Collision Detection, Game Logic, Game AI, Path Finding. [T1]

UNIT IV: GAMING ENGINE DESIGN (7hrs)

Renderers, Software Rendering, Hardware Rendering, and Controller based animation, Spatial Sorting, Level of detail, collision detection, standard objects, and physics. [T1]

UNIT V: (8 hrs)

GAMING PLATFORMS AND FRAMEWORKS

Flash, DirectX, OpenGL, Java, Python, XNA with Visual Studio, Mobile Gaming for the Android, iOS, Game engines - Adventure Game Studio, DX Studio, Unity. [T1]

Developing 2D and 3D interactive games using OpenGL, DirectX – Isometric and Tile Based Games, Puzzle games, Single Player games [T2]

COURSE OUTCOMES:

- **CO 1:** Learn about game programming in industries and engine architecture.
- **CO 2:** Create and produce 3D graphics for game programming
- **CO 3:** Design the graphics based games and learn to manage the graphics devices.
- **CO 4:** Construct the game design principles using artificial intelligence and physics based modeling.
- **CO 5:** Analyze various gaming platform for android and ios game engines.
- **CO 6:** Develop, test, and evaluate procedures of the creation, design and development of games.

Mapping of COs to POs

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	-	3	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-
CO3	-	3	-	-	-	-	-	-	-	-	-	-
CO4	-	-	3	-	-	-	-	-	-	-	-	-
CO5	-	-	-	3	-	-	-	-	-	-	-	-
CO6	-	-	3	-	-	-	-	-	-	-	-	-

TEXT BOOKS:

1. David H. Eberly, "3D Game Engine Design, Second Edition: A Practical Approach to Real-Time Computer Graphics" Morgan Kaufmann, 2 Edition, 2006.
2. JungHyun Han, "3D Graphics for Game Programming", Chapman and Hall/CRC, 1st edition, 2011.
3. Mike McShaffrfy, "Game Coding Complete", Third Edition, Charles River Media, 2009.
4. Jonathan S. Harbour, "Beginning Game Programming", Course Technology PTR, 3 edition, 2009.

RUST PROGRAMMING
(Job Oriented Elective-II)

Subject Code: UGIT6T0822	**L**	**T**	**P**	**C**
III Year/ II Semester	**2**	**0**	**2**	**3**

Prerequisites:
An intermediate level of skill in and a solid knowledge of a high-level programming language like Java, Python or C is essential.

Course Objectives:
This course is designed to let the student explore how to code in an organized and efficient way using Rust modules. Learn how to build bug-free, memory safe applications and programs.

SYLLABUS:

UNIT I: (8 hrs)
Getting Started with Rust: Installation, creating a Project Directory, Writing and Running a Rust Program, creating a Project with Cargo, Storing Values with Variables, Printing Values with println Placeholders. [**T1]**

UNIT II: (8 hrs)
Common Programming Constructs: Variables and Mutability, Data Types, Functions, Comments, Control Flow. **[T1]**

UNIT III: (8 hrs)
Using Structs to Structure Related Data: Defining and Instantiating Structs, An Example Program Using Structs.

Adding Useful Functionality with Derived Traits, Method Syntax.**[T1]**

UNIT IV: (8 hrs)
Enums and Pattern Matching and Modules: Defining an Enum, the match Control Flow Operator, Concise Control Flow with if let, mod and the File system. **[T1]**

UNIT V: (8 hrs)
Common Collections: Storing Lists of Values with Vectors, Storing UTF-8 Encoded Text with Strings, Storing Keys with Associated Values in Hash Maps.

Error Handling: Unrecoverable Errors with panic, Recoverable Errors with Result. [**T1]**

COURSE OUTCOMES:

Upon the completion of the course, the student will be able to

- **CO 1:** Build the applications using rust programming environment and rust programming constructs. (L-3)
- **CO 2:** Implement applications using structs and Enum for Structuring the data. (L-3)
- **CO 3:** Analyze different pattern matching and common collections to operate on different data elements. (L-4)
- **CO 4:** Design the applications using Trait component and handling different errors and exceptions.

MAPPING OF COs TO POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	-	-	-	3	-	-	-	-	-	-	-	3	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-	3	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-	3	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-	3	-

TEXT BOOKS:

1. THE RUST PROGRAMMING LANGUAGE by Steve Klabnik and Carol Nichols, with contributions from the Rust Community.
2. The Complete Rust Programming Reference Guide Design, develop, and deploy effective software systems using the advanced constructs of Rust, Rahul Sharma VesaKaihlavirta Claus Matzinger.

REFERENCE BOOKS:

1. Programming Rust Fast, Safe Systems Development Jim Blandy and Jason Orendorff.
2. https://doc.rust-lang.org/stable/book/

List of Experiments:

1. Installation of Rust and Cargo tool and setting up the Rust in VS Code environment
2. Creating and running a Rust Project with Cargo tool.
3. Create an application of Guessing a number using common programming constructs of Rust
4. Create Rectangle structure with length and breadth and add the method to calculate area of rectangle.
5. Create IPAddress Kind enum to represent IPv4, IPv6 addresses and create IP Address structure with IP Address Kind as a member and use this structure in the application
6. Create an application to demonstrate Vector collection object
7. Create an application to demonstrate String and its operations
8. Create an application to demonstrate HashMap collection object
9. Create an application to handle the Panic exceptions while opening Files.

JULIA PROGRAMMING

(Job Oriented Elective-II)

Subject Code: UGIT6T0922	**L**	**T**	**P**	**C**
III Year/ II Semester	**2**	**0**	**2**	**3**

Prerequisites: Familiarity with programming language constructs of any programming language

Course Objectives:

A course in Julia programming aims to familiarize students with the language syntax, data structures, and libraries, as well as cover performance optimization techniques and real-world applications. The objectives include understanding how to effectively use Julia for tasks such as data analysis, visualization, and scientific computing, and writing optimized, high-performance code.

Syllabus:

Unit- I: (6 hrs)

Introduction to Julia: The Way of the Program, what is a Program, Running Julia, the First Program, Arithmetic Operators, Values and Types.

Unit-II: (8 hrs)

Variables, Expressions and Statements: Data types, Assignment Statements, Variables Names, Expressions and Statements, conditions statements, loops.

Unit-III: (8 hrs)

Functions: Basic Function Definitions and Uses Flow of Execution. Parameters and Arguments.

Unit-IV: (8 hrs)

Interface Design: Turtles, Simple repetition, Exercises, Encapsulation, Generalization, Interface Design, Conditionals and Recursion.

Unit-V: (10 hrs)

Collection and Higher-order functions: Strings, Arrays, Map, Filter and Reduce.
Dictionaries, Tuples: Arrays and Tuples, Dictionaries and Tuples.

Course Outcomes:

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

CO 1. Implement the basic programming constructs using Julia.

CO 2. Apply the concepts multiple dispatch and Dynamic programming.

CO 3. Develop applications by using concepts of arrays, strings and Dictionaries.

Mapping of COs to POs:

PO / CO	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
CO 1	3	3	3	-	-	-	-	3	3	-	-	3	3	-
CO 2	3	3	3	-	-	-	-	3	3	-	-	3	3	-
CO 3	3	3	3	-	-	-	-	3	3	-	-	3	3	-

TEXT BOOKS:

1. Ben Lauwens, Allen Downey, "Think Julia: How to Think Like a Computer Scientist", 1st Edition, O'reilly
2. Malcolm Sherrington, "Mastering Julia 1.0", 1st Edition, Packt.

REFERENCE BOOKS:

1. Sandeep Nagar,"Beginning Julia Programming" : For Engineers and Scientists, 1st Edition, Apress.

Lab Experiments:

1. Write a program to print a given string on the screen.
2. Write an application to use Variable names, Expressions, Operators and Script Mode.
3. Write programs to demonstrate Floor Division, Modulus Division and Boolean Expressions.
4. Write a program to demonstrate looping constructs.
5. Write a program to demonstrate User defined function and build-in functions.
6. Develop an application to recursion.
7. Write a program to demonstrate Encapsulation.
8. Develop an application to design an Interface and to use Generalization.
9. Develop an application to demonstrate on string manipulations.
10. Write a program to demonstrate Arrays and its manipulations.
11. Develop applications to demonstrate Dictionaries.
12. Develop applications to demonstrate tuples.

MICROPROCESSORS AND INTERFACE

(Job Oriented Elective-II)

Subject Code: UGIT6T1022	**L**	**T**	**P**	**C**
III Year/ II Semester	**2**	**0**	**2**	**3**

Prerequisites:
Required knowledge on both combinational and sequential digital logic circuits.

Course Objectives:
This course is designed to let the student to become familiar with 8085 & 8086 Microprocessor Architecture, Instructions, Operating Modes and Programming, use of 8086 microprocessor for various applications and to study various peripherals for microprocessor based systems.

SYLLABUS:

UNIT - I:
Introduction to 8085 Microprocessor: Development of microprocessors, 8085 Microprocessor - Architecture, Organization, Instruction set, Addressing modes, Basic Timing Diagrams, Interrupts and Simple Programs.

UNIT – II:
Introduction to 8086 Microprocessor: 8086 Microprocessor - Architecture, Organization, Instruction set, Addressing modes, Interrupt system. Pin diagram, Minimum mode 8086 system and timings, Maximum mode 8086 system and timings.

UNIT – III:
Assembly Language Programming: Assembler directives, Assembly language programs (8086) with Assembler directives for addition, subtraction, multiplication, division etc.,

Sorting and searching, bit manipulation, look-up tables, string manipulations, Macros and Delay subroutines, Debugging.

UNIT – IV:
Data transfer schemes and Peripheral Interfacing: Synchronous, Asynchronous, Interrupt driven and DMA type schemes, 8255 PPI and its interfacing, Programmable Communication Interface (8251 USART) and its interfacing, Programmable Interval Timer (8254) and its interfacing, Programmable interrupt controller (8259) and its interfacing, Programmable DMA controller (8257) and its interfacing.

UNIT – V:

Memory and I/O Interfacing to 8086: Address decoding techniques, Interfacing Static RAM and ROM chips, ADC and DAC Interfacing.

Case studies: Traffic light controller, Stepper motor control, Data acquisition, Temperature measurement and control.

Course Outcomes:

Upon the completion of the course, the student will be able to

CO1: Define various components and list out various features of microprocessors and peripherals.

CO2: Describe the internal block diagram of microprocessors and peripherals, addressing modes, instruction set and data transfer schemes.

CO3: Develop algorithm and assembly language programs to solve problems.

CO4: Apply an appropriate algorithm, program and peripheral for the application.

CO5: Design the microprocessor based system to solve real time problems. (Prepare a case study model to get a first prototype)

MAPPING OF COs TO POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	1	1									1	2	
CO2	2		2									2	2	
CO3	2	2			2							2	2	
CO4	2	2	2		2							3	2	
CO5	2	3	3		2							3	2	

TEXT BOOKS:

1. Ramesh S. Gaonkar, "Microprocessor architecture, programming and its applications with 8085", Penram Interantional Publications, 4th Edition.

2. A. K. Ray and K.M. Bhurchandi, "Advanced Microprocessors and Peripherals", TMH.

3. Douglas V. Hall, "Microprocessors and Interfacing: Programming and Hardware", 2nd Edition, Tata McGraw-Hill.

4. Barry B. Brey, "The Intel Microprocessors-Architecture, Programming and Interfacing", 8th Edition, PHI

REFERENCE BOOKS:

1. Raj Kamal, Microcontrollers Architecture, Programming, Interfacing and System Design , Pearson Education, 2005.
2. Steve Furbur, ARM System onchip Architecture, 2nd Edition, Addison Wesley, 2000.
3. Y. Liu and Glenn A. Gibson, "Microcomputer Systems: 8086/8088 Family Architecture, Programming and Design", 2nd Edition, PHI.
4. Y. Liu and Glenn A. Gibson, "Microcomputer Systems: 8086/8088 Family Architecture, Programming and Design", 2nd Edition, PHI.

Lab Experiments:

1. Arithmetic operation – Multi byte Addition and Subtraction, Multiplication and Division – Signed and unsigned Arithmetic operation, ASCII – arithmetic operation.
2. Logic operations – Shift and rotate – Converting packed BCD to unpacked BCD, BCD to ASCII conversion.
3. By using string operation and Instruction prefix: Move Block, Reverse string, Sorting, Inserting, Deleting, Length of the string, String comparison.
4. Reading and Writing on a parallel port.
5. Timer in different modes.
6. Serial communication implementation.
7. 8259 – Interrupt Controller: Generate an interrupt using 8259 timer.
8. 8279 – Keyboard Display: Write a small program to display a string of characters.

Interfacing:

1. Dual DAC interface (waveform generation).
2. Stepper motor control.
3. Display of flags using logic controller.
4. Traffic light controller.

MACHINE LEARNING USING PYTHON LAB

Subject Code: UGCS6P1022	**L**	**T**	**P**	**C**
III Year / II Semester	**0**	**0**	**3**	**1.5**

Prerequisites:

Familiarity with Linear Algebra, statistics, Probability Theory and Python programming language.

Course Objectives:

- To implement the applications using machine learning algorithms for solving practical problems.
- To be familiar with a set of well-known supervised and unsupervised learning algorithms

Lab Experiments:

1. Write a program to implement the **Linear Regression algorithm** in order to predict the required data point. Select appropriate data set for the experiment and draw graphs.
2. Write a program to implement two-class **logistic regression model** on the given dataset to classify the datapoints in the dataset.
3. Write a program to demonstrate the working of the **decision tree algorithm**. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
4. Write a program to implement **support vector machine algorithm** on the given dataset to classify the datapoints in the dataset.
5. Write a program to implement **k-Nearest Neighbor algorithm** to classify the given data set. Print both correct and wrong predictions.
6. Write a program to implement the **naïve Bayesian classifier** for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
7. Write an application to apply **K-Means Algorithm** to cluster a set of data stored in a .CSV file.

Course Outcomes:

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

- **CO 1:** Build various machine learning models in a range of real-world applications. **[L3]**
- **CO 2:** Evaluate the machine learning models through various accuracy metrics in python programming. **[L5]**
- **CO 3:** Distinguish supervised and unsupervised machine learning algorithms according to their functionalities **[L4]**

Mapping of COs to POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	-	-	-	-	-	-	-	-	-	-	-	-	3	3
CO2	-	-	3	-	-	-	-	-	-	-	-	-	3	3
CO3	-	3	-	-	-	-	-	-	-	-	-	-	3	3

Text Books:

1. Machine Learning in Action, Peter Harington, 2012, Cengage
2. Machine Learning, Tom M. Mitchell, McGraw Hill, FIRST EDITION

Reference Books:

1. Introduction to Machine Learning, Ethem Alpaydin, PHI, 2004
2. Introduction to Machine Learning with Python, Oreilly, Andreas.C.Mullar, Sarah Guido

Practical Machine Learning with Python, Apress, Dipanjan Sarkar, Raghav Bali

MOBILE APPLICATION DEVELOPMENT LAB

Subject Code: UGIT6P1122	**L**	**T**	**P**	**C**
III Year / II Semester	**0**	**0**	**3**	**1.5**

Prerequisites: Basic knowledge in Operating Systems and programming**.**

Course Objectives:

This course covers the fundamentals of programming using Android SDK/IOS/Cross Platform.

Software Required: Android Studio/IOS/ Reactive Native/Flutter.

List of Experiments:

1. Develop an application program that displays Hello World.
2. Develop an application program that accepts a name from the user and displays the hello name to the user in response as output.
3. Develop an application program that demonstrates different layouts
4. Develop an application program that converts the temperature in Celsius to Fahrenheit.
5. Develop a calculator application.
6. Develop an application that uses GPS location information.
7. Develop an application that handles internal Database and perform CRUD operations
8. Develop an application that handles external Database and perform CRUD operations
9. Develop an application that fetches that data from an API and display

Course Outcomes:

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

CO1: Develop user Interfaces for mobile applications using GUI components

CO2: Implement various database operations.

CO3: Develop mobile applications that handles APIs

Mapping of COs to POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	-	-	3	-	3	-	-	-	-	-	-	-	3	-
CO2	-	-	3	-	3	-	-	-	-	-	-	-	3	-
CO3	-	-	3	-	3	-	-	-	-	-	-	-	3	-

Reference TextBook:

1. Android Cookbook, 2nd Edition by Ian F. Darwin, O'Reilly Media, Inc Publication

NOSQL DATABASE

Subject Code: UGIT6P1222	**L**	**T**	**P**	**C**
III Year / II Semester	**0**	**0**	**3**	**1.5**

Prerequisites:

1. Proficiency in understanding database query language.
2. Basic understanding of command line interfacing

Laboratory Objectives:

To perform hands-on NoSQL database experiments that will allow students to interact with NoSQL database interface via MongoDB and Google Firebase

Experiments:

1. Installation and setup of MongoDB Client and Server
2. Demonstrate the mongo Shell environment and Create database with collections and documents in JSON format
3. Demonstrate the commands of MongoDB – Insert, Query, Update, Delete, Projection, Index
4. Demonstrate various MongoDB queries such as displaying all the records, displaying selected records with conditions, sort, and aggregates.
5. Demonstrate how the operations like comparison and logical query operators - $gt, $gte, $lt, $lte, $in, #nin, $ne, $and, $or, $not, $nor are performed in MongoDB
6. Demonstrate how to Perform the operations on MongoDB database using element, array based and evaluation query operators -$exists, $type, $mod, $regex, $where
7. Demonstrate how to handle datasets in MongoDB and Import various collections and apply some queries to get specified output.
8. Demonstrate the CRUD Operations on Google Firebase

Course Outcomes:

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

CO 1: Illustrate the installation and setup of necessary NoSQL components (L4)
CO 2: Apply the database querying operations on NoSQL databases (L3)
CO 3: Analyze various operations like Indexing, importing and Aggregation in NoSQL databases (L4)

Mapping of COs to POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	-	-	3	-	-	-	-	-	-	-	-	-	3	3
CO2	-	3	-	-	-	-	-	-	-	-	-	-	3	3
CO3	-	-	3	-	-	-	-	-	-	-	-	-	3	3

TEXT BOOKS:

1) NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, Sadalage, P. &Fowle, Pearson Education.

REFERENCES BOOKS:

1) A Guide to Modern Databases and the NoSQL Movement Edition, Redmond, E. &Wilson, 1st Edition.
2) Professional NoSQL, Shashank Tiwari, John Wiley and Sons. ISBN: 978-0-470-94224-6.

ONLINE RESOURCES:

1) An Article on Why NoSQL is required https://www.couchbase.com/resources/why-NoSQL
2) https://www.mongodb.com/
3) https://firebase.google.com/
4) Coursera Course on NoSQL DB driven applications https://www.coursera.org/learn/dynamodb-NoSQL-database-driven-apps
5) Coursera course on using MongoDB with NoSQL https://www.coursera.org/projects/crud-operations-using-mongodb-NoSQL
6) Coursera course on creating first NoSQL database with MongoDB https://www.coursera.org/projects/NoSQL-database-with-mongodb-and-compass

ADVANCED COMMUNICATION SKILLS

Subject Code: UGBS6K0122	**L**	**T**	**P**	**C**
III Year / II Semester	**1**	**0**	**2**	**2**

Prerequisite: Basic competency skills in English for effective communication at work place.

Course Objectives:

- To expose students to LSRW skills at an advanced level.
- To prepare students to acquire correct body language for better oral communication.
- To prepare students to develop debatable skills, presentation as well as interview skills.

Syllabus:

UNIT-I :	Business E-mail Writing	(9 Hours)
UNIT-II :	Presentation skills	(9 Hours)
UNIT-III :	Group Discussion	(9 Hours)
UNIT-IV :	Resume Writing	(9 Hours)
UNIT-V :	Interviews	(9 Hours)

Course Outcomes:

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

CO1: Develop the skill of writing business e-mails. (L3)
CO2: Apply presentation skills for effective presentations. (L3)
CO3: Employ various aspects of group discussion and apply in discussions. (L3)
CO4: Develop the skill of writing resumes contextually and effectively. (L3)
CO5: Discover techniques for various types of interview for facing career interviews. (L3)

Mapping of COs to POs:

POs/ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12
CO1	-	-	-	-	-	-	-	-	-	3	-	3
CO2	-	-	-	-	-	-	-	-	-	3	-	3
CO3	-	-	-	-	-	-	-	-	3	3	-	-
CO4	-	-	-	-	-	-	-	-	3	3	-	-
CO5	-	-	-	-	-	-	-	-	3	3	-	-

TEXT BOOKS:

1. Soft Skills – Key to Success in Workplace and Life – Meenakshi Raman & Shalini UpadhyayCengage publications
2. Interact – Orient BlackSwan

REFERENCE BOOKS:

1. Fluency Development Course – Kev Nair (Kerala)
2. Speaking English Effectively – Krishna Mohan & N P Singh – Macmillan Indian Ltd. Group Discussion for Admissions & Jobs – Anand Ganguly – Pustak Mahal Publishers, New Delhi

INTERNET SOURCES:

1. BBC Learning English at work:
   http://www.bbc.co.uk/learningenglish/features/english-at-work/18-writing-an-email

2. Talkenglish.com:
   https://www.google.com/search?client=firefox-b-&q=talk+english.com
   Actual English – Jennifer (Video lessons)

ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE

(Common to all branches)

Subject Code: UGBS6A0222	**L**	**T**	**P**	**C**
III Year / II Semester	**2**	**0**	**0**	**0**

Course Objectives:

This course offers an introduction to Indian philosophy, tradition of Indian Science and Mathematics, holistic approach to health and gender sensitization.

Syllabus:

UNIT-I: INDIAN PHILOSOPHY

Origin of Indian philosophy- philosophy of Charvaka, Samkhya, Nyaya, Mimensa, Buddist and Jaina.

UNIT-II: TRADITION OF INDIAN SCIENCE

Historical evolution of medical tradition in ancient India.
Ayurveda: Principles of Ayurvedic Healing -Treating diseases to restore health.
Environmental Knowledge: Nature, flora and fauna, Manusmriti.

UNIT-III: TRADITION OF INDIAN MATHS

Early Historical period, Classical period, Vedic mathematics, Baskaracharya, Lilavati Bijaganitha, Srinivasa Ramanujan - Magic squares.

UNIT-IV: HOLISTIC HEALTH

History, Holistic approach: Enhance living – Mind fullness skills- Spirituality and Healing, Stress Management - Food—Work and Life style.
Yoga –Healthy Body: Introduction to Yoga, - Pranayamam, Surya Namaskara and Personality Development.

UNIT-V: GENDER SENSITIZATION

Basic Gender concepts and terminology, Exploring attitudes towards Gender, Making Women, Making Men, Preparing for Womanhood.
Struggles with discrimination, Gender Roles and Relations, Gender and Human Rights, Types of Gender-based violence, Gender-based violence from a Human Rights perspective, Sexual Harassment, Gender and Media.

Course Outcomes:

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

CO 1. Summarize the essence of Indian philosophy.
CO 2. Outline the tradition of Indian Science and Mathematics.
CO 3. Make use of holistic health practices, spirituality, stress management techniques for healthy life Style and Yoga practices to attain good personality.
CO 4. Develop awareness with regard to issues of gender.

Mapping of COs to POs:

POs/ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	3	-	3	-	-	-	-
CO2	-	-	-	-	-	3	-	-	-	-	-	3
CO3	-	-	-	-	-	3	-	-	-	-	-	3
CO4	-	-	-	-	-	3	-	3	-	-	-	-

TEXT BOOKS:

1. "Traditional Knowledge System in India" by Amit Jha, 2009.
2. "Traditional Knowledge System and Technology in India", Basanta Kumar Mohantra, Vipin Kumar Singh, Pratibha Prakashan publisher, 2012.
3. "Towards a World of Equals: A Bilingual Textbook on Gender" written by A. Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu and published by Telugu Akademi.
4. "Gender Sensitization" by C. Rajya Lakshmi Kalyani, D.S. Vittal, published by Himalaya Publishing House Pvt. Ltd.

REFERENCES:

1. "Knowledge Traditions and Practices of India", Kapil Kapoor, Michel Danino.
2. S. Radhakrishna, Indian Philosophy, Vol. 1 (London: George Allen and Unwin,1962), 287.
3. J. P. Jain, Religion and Culture of the Jains (Delhi: Bhartiya Jnanpith, 1977) 168
4. D. P. Sen Gupta, Current Science, 78 (12), 1569 (2000)
5. C.N.Srinivasa Iyengar, History of Indian Mathematics, World Press, Calcutta, 1967.
6. G. H Hardy, Ramanujan (Cambridge, 1940).
7. Nutritive Value of Indian Foods, C.Gopalan, B.V.Raman Sastri & S.C. Balasubramanian.
8. George Feuerstein: The Yoga Tradition (Its history, literature, philosophy and practice)
9. Swami Sivananda, Practice of Karma Yoga (The Divine Life Society, Shivananda Nagar, P.O., U.P., Himalayas, India)
10. Menon, Nivedita. Seeing like a Feminist. New Delhi: Zubaan-Penguin Books, 2012
11. IGNOU : Gender Sensitization: Society, Culture and Change (2019) BGSE001, New Delhi IGNOU
12. Jane Pilcher and Imelda Whelehan (2005) : Fifty Key Concepts in Gender Studies