

M.Sc. Information Technology

Department of Information Technology

SYLLABUS

(For Students admitted in the Academic year 2020 – 2021)



Bishop Heber College (Autonomous)

Affiliated to Bharathidasan University

(Reaccredited with 'A' Grade by NAAC with a CGPA of 3.58 out of 4)

Recognized by UGC as "College of Excellence"

Tiruchirappalli – 620 017

South India

**DEPARTMENT OF INFORMATION TECHNOLOGY
BISHOP HEBER COLLEGE (AUTONOMOUS)
TIRUCHIRAPPALLI – 620 017**

VISION

The Department aims to produce globally competent and value oriented Information Technology Professionals equipped with quality education to meet the needs of the digital era and to serve the society at large.

MISSION

The Department provides effective teaching and training in a conducive learning environment with relevant curriculum and state-of-the-art infrastructure to meet the needs of IT Sector and for the betterment of humanity.

OBJECTIVES

- To reach the heights of excellence in IT education by providing an environment conducive for learning with state-of-the-art infrastructure.**
- To raise individuals equipped and motivated to face the challenges of the competitive world and to serve for the betterment of humanity with commitment.**

**DEPARTMENT OF INFORMATION TECHNOLOGY
BISHOP HEBER COLLEGE (AUTONOMOUS)
TIRUCHIRAPPALLI – 620 017**

PROGRAMME OUTCOMES

PO1 – Extensive Knowledge

Disseminate and demonstrate advanced knowledge in Information Technology and related disciplines by creating relevant real-time applications.

PO2 – Analytical and Scientific Reasoning

Exhibit aptitudes to analyze, synthesize and interpret domain specific facts or data scientifically to determine the appropriate course of action.

PO3 – Critical Thinking

Critically think and develop new techniques, evaluate practices and theories by following scientific approach to knowledge development.

PO4 – Problem Solving

Use the acquired academic competencies to solve diversified real time problems related with the area of study and its interlinked fields.

PO5 – Research Aptitude

Ability to identify and define problems; organize, test, analyze, interpret and draw conclusions from the available data; in order to plan, execute and report the results of scientific experiments or investigations.

PO6 – Employability Skills and Team Work

Able to work effectively by providing coordinated effort and act together as a team employing suitable communication, reliability and adaptability.

PO7 – Entrepreneurial and Leadership Qualities

Exhibit suitable managerial skills to influence and lead the people in the right direction smoothly and efficiently.

PO8 – Ethical and Social Responsibilities

Appreciate and embrace moral values in life and follow ethical practices in every social and professional ventures.

PO9 – Self-Directed and Lifelong Learning

Aptitude to handle every professional or personal role independently and efficiently by diligent acquisition of knowledge and skills throughout life.

PROGRAMME SPECIFIC OUTCOMES

PSO1 – Domain Specific Knowledge

Enhance understanding in the principles and techniques employed for acquiring, storing, retrieving, processing and disseminating Information with the aid of core knowledge in Object Oriented Techniques, Operating Systems, Networking and Database Concepts.

PSO2 – Application Design and Development Expertise

Apply the concepts of Programming along with Database, Networking and Operating Systems to design and develop variety of Web and Mobile based Applications with suitable Programming Languages, tools and techniques for diversified platforms with the aid of software blueprints by integrating the concepts of Unified Modeling Language, Software Engineering and Object Oriented Approach.

PSO3 – Research Oriented Exposure

Predict the possible threats or problems and recommend remedial measures for various issues related with Network Security, Protocols and Architecture and also to provide integrated solutions for real time oriented problems involving Internet of Things, Cloud Computing, Data Science, Artificial Intelligence and Machine Learning.

PSO4 – Current Technical Aptitude

Familiarize and enhance the knowledge in recent technologies such as Network Security, Cyber Crimes, Computer Forensics, Cyber laws, Internet of Things, Cloud Computing, Data Science, Artificial Intelligence, Human Computer Interaction and Machine Learning.

Department of Information Technology
Bishop Heber College (Autonomous), Tiruchirappalli – 620 017
M. Sc. (Information Technology)
(Syllabus applicable to the students admitted in the academic year 2020 – 2021)

Eligibility: B.C.A. or B. Sc. Computer Science or B. Sc. Information Technology or B. Sc. Software Development or any other degree with Mathematics as an allied/major subject or with Mathematics or Computer Science or Business Mathematics or Statistics at + 2 level.

Sem	Course	Course Title	Course COURSE CODE	Prerequisite	Hours Per Week	Credits	Marks		
							CIA	ESE	TOTAL
I	Core I	Object Oriented Programming with Java	P19IT101		5	5	25	75	100
	Core II	Relational Database Systems	P19IT102		5	5	25	75	100
	Core III	Advanced Operating Systems	P19IT103		5	5	25	75	100
	Core Prac.-I	Java Programming Lab	P19IT1P1	P19IT101	6	4	40	60	100
	Core Prac.-II	Relational Database Systems Lab	P19IT1P2	P19IT102	5	3	40	60	100
	Elective-I	Multimedia Technologies	P19IT1:1		4	4	25	75	100
Computer Graphics		P19IT1:A							
Digital Image Processing		P19IT1:B							
II	Core IV	Data Communication Networks	P19IT204		4	4	25	75	100
	Core V	Web Programming	P19IT205		4	4	25	75	100
	Core VI	Mobile Technologies	P19IT206		4	4	25	75	100
	Core Prac.-III	Web Programming Lab	P19IT2P3	P19IT205	4	2	40	60	100
	Core Prac.-IV	Mobile Applications Development Lab	P19IT2P4	P19IT206	4	2	40	60	100
	Elective-II	Unified Modeling Language /	P19IT2:2		4	4	25	75	100
		Object Oriented Analysis and Design /	P19IT2:A						
		Principles of User Experience Design	P19IT2:B						
	Elective - III	Cryptography and Network Security /	P19IT2:3		4	4	25	75	100
		Cyber Crimes and Computer Forensics /	P19IT2:C						
	Cyber Laws and its Applications	P19IT2:D							
VLO	RI/MI	P17VL2:1 P17VL2:2		2	2	25	75	100	
III	Core VII	Programming with Python	P19IT307	P19IT101	5	5	25	75	100
	Core VIII	Internet of Things	P19IT308	P19IT204	5	5	25	75	100
	Core IX	Cloud Computing	P19IT309		5	5	25	75	100
	Core Prac.- V	Python Programming Lab	P19IT3P5	P19IT307	6	4	40	60	100
	Core Prac.-VI	Internet of Things Lab	P19IT3P6	P19IT308	5	3	40	60	100
	Elective-IV	Software Engineering /	P19IT3:4		4	4	25	75	100
Software Testing /		P19IT3:A							
Software Project Management		P19IT3:B							
IV	Core X	Big Data Analytics	P19IT410		6	5	25	75	100
	Elective-V	Machine Learning	P19IT4:5		4	4	25	75	100
		Soft Computing	P19IT4:A						
		Human Computer Interaction	P19IT4:B						
Core Project	PROJECT WORK	P19IT4PJ		--	5	40	60	100	

Core Theory : 10 Electives: 5 Total Credits : 9
Core Practical : 6 Core Project 1 Value Education : 1

Programme Articulation Matrix

CO. No.	Course Name	Course COURSE CODE	Correlation with Programme Outcomes and Programme Specific Outcomes															
			P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P S O 1	P S O 2	P S O 3	P S O 4			
1	Object Oriented Programming with Java	P19IT101	✓	✓	✓	✓	✓	✓				✓	✓	✓				
2	Relational Database Systems	P19IT102	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓				
3	Advanced Operating Systems	P19IT103	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓			
4	Java Programming Lab	P19IT1P1	✓	✓	✓	✓	✓	✓				✓	✓	✓				
5	Relational Database Systems Lab	P19IT1P2	✓	✓	✓	✓	✓	✓				✓	✓	✓				
6	Multimedia Technologies	P19IT1:1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
7	Computer Graphics	P19IT1:A	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓				
8	Digital Image Processing	P19IT1:B	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
9	Data Communication Networks	P19IT204	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓				
10	Web Programming	P19IT205	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓				
11	Mobile Technologies	P19IT206	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓			
12	Web Programming Lab	P19IT2P3	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓			
13	Mobile Applications Development Lab	P19IT2P4	✓	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓			
14	Unified Modeling Language	P19IT2:2	✓	✓	✓	✓	✓	✓				✓	✓	✓				
15	Object Oriented Analysis and Design	P19IT2:A	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓			
16	Principles of User Experience Design	P19IT2:B	✓	✓	✓	✓	✓	✓				✓	✓	✓				
17	Cryptography and Network Security	P19IT2:3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
18	Cyber Crimes and Computer Forensics	P19IT2:C	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
19	Cyber Laws and its Applications	P19IT2:D	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
20	Programming with Python	P19IT307	✓	✓	✓	✓	✓	✓				✓	✓	✓				
21	Internet of Things	P19IT308	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓			
22	Cloud Computing	P19IT309	✓	✓	✓	✓	✓	✓				✓	✓	✓				
23	Python Programming Lab	P19IT3P5	✓	✓	✓	✓	✓	✓				✓	✓	✓				
24	Internet of Things Lab	P19IT3P6	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓				
25	Software Engineering	P19IT3:4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
26	Software Testing	P19IT3:A	✓	✓	✓	✓	✓	✓				✓	✓	✓				
27	Software Project Management	P19IT3:B	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
28	Big Data Analytics	P19IT410	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
29	Machine Learning	P19IT4:5	✓	✓	✓	✓	✓	✓				✓	✓	✓				
30	Soft Computing	P19IT4:A	✓	✓	✓	✓	✓	✓				✓	✓	✓				
31	Human Computer Interaction	P19IT4:B	✓	✓	✓	✓	✓	✓				✓	✓	✓				

Core I: OBJECT ORIENTED PROGRAMMING WITH JAVA

SEMESTER: I

COURSE CODE: P19IT101

CREDITS : 5

HOURS/WEEK : 5

1. COURSE OUTCOMES

After the successful completion of this course, the student will be able to

CO. No.	Course Outcomes	Level	Unit
CO1	Illustrate the concepts of Object-Oriented Programming.	K2	I
CO2	Develop Packages and Interfaces	K3	I
CO3	Experiment with the methods for handling Events and Exceptions.	K3	II
CO4	Classify and Compare the Collection classes and interfaces	K4	III
CO5	Interpret and Compare the Applet class with AWT and swing controls.	K5	IV
CO6	Build Java based Applications with Database Connectivity	K6	V

2. A. SYLLABUS

UNIT I: Fundamentals of Object-Oriented Programming **15 Hours**

Fundamentals of Object-Oriented Programming – Overview of JAVA Language – Introduction to Classes – Class Fundamentals – Declaring Objects – Constructors – Methods – Overloading Methods – Inner Classes – Inheritance – Method Overriding – Packages – Interfaces

UNIT II: Exception Handling **15 Hours**

Exception Handling – Types of Exceptions – Try and Catch – Nested Try – Throw and throws – Multithreading – Thread Priorities – Main thread – Synchronization.

UNIT III: The Collections Framework **15 Hours**

The Collections Framework: The Collection Interfaces-The collection Classes –Accessing a Collection via an Iterator - Storing User-Defined Classes in Collections - Working with Maps - The Legacy Classes and Interfaces.

UNIT IV: Applet class **15 Hours**

Applet class – Applet Architecture – The HTML Applet tag – Passing parameters in Applets-AWT classes – Window fundamentals – AWT controls – Layout Managers - Menus. Swing: JApplet-Icons and Labels-Text Fields-Buttons-Combo Boxes-Tabbed Panes-Scroll Panes-Tables-Trees.

UNIT V: Java Database Connectivity **15 Hours**

Java Database Connectivity – Java Remote Method Invocation (RMI) – Java Servlets: JSDK – The Servlet API – Life Cycle of a Java Servlet – Creating Servlets.

2. B. Topics for Self Study:

S. No.	Topics	Web Links
1	Java Bean and Advantages of Java Bean	https://www.tutorialspoint.com/jsp/jsp_java_beans.htm
2	Introspection	http://www.brainkart.com/article/Introspection---Java-Beans_10768/
3	Bound and constrained properties	http://www.brainkart.com/article/Bound-and-Constrained-Properties---Java-Beans_10769/
4	Java Bean API	http://www.brainkart.com/article/The-Java-Beans-API_10771/

2. C. Text Book(s):

- Herbert Schildt, “**JAVA 2 Complete Reference**”, 4th Edition, TMH Publications, 2001.
(for Units 1 to 4)
- Ivan Bayross, “**JAVA 2.0 (Web enabled commercial application development)**”, 4th Edition, BPB Publications, 2000. (for Unit 5)

2. D. Reference Books:

- Kathy Sierra, Bert Bates, “**Head First Java**”, 2nd Edition, O’Reilly Media, 2005.
- E. Balagurusamy, “**Programming with Java A Primer**”, 5th Edition, McGraw Hill, 2014.

2. E. Web Links:

- www.tutorialspoint.com
- <https://www.studytonight.com/java/>
- <https://www.youtube.com/watch?v=grEKMHGyyns>

3. SPECIFIC LEARNING OUTCOMES (SLO):

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom’s Taxonomic Level of Transaction
I	Fundamentals of Object-Oriented Programming		
1.1	Overview of JAVA Language – Fundamentals of OOPS – Control Statements – Java Class Libraries	Define OOPS (K1)	K2
		List the Control Statements(K1)	
		Compare branching and looping constructs(K2)	
		Recall Java Class Libraries(K1)	
Explain the importance of Class Libraries(K5)			
	Introduction to Classes - Class Fundamentals – Declaring Objects	Formulate the structure of Java Program(K6)	

1.2	Constructors – Methods – Overloading Methods – Inner Classes – Inheritance – Method Overriding	Label to declare the objects(K1)	
		Recall Inheritance from OOPs(K1)	
		Build the structure of Inheritance(K3)_	
		Categorize the types of Inheritance(K4)	
		Compare method overloading and method overriding(K5)	
		Develop Inheritance program with constructor(K6)	
1.3	Packages and Interfaces Packages – Access Protection – Importing Packages – Interfaces – Defining an interfaces – Implementing interfaces – Applying interfaces	Define Package(K1)	
		Identify packages and CLASSPATH (K3)	
		Construct the structure of Interface (K6)	
		Build programs on Packages and Interfaces (K3)	
II	Exception Handling		
2.1	Exception Handling - Types of Exceptions – Try and Catch – Nested Try – Throw and throws	Define Exception Handling (K1)	K3
		Classify the types of Exception Handling(K2)	
		Outline the structure of Exception handling mechanism (K2)	
		Apply the structure to Try and catch blocks. (K3)	
		Compare and examine throw and throws statements. (K5)	
2.2	Multithreading - Thread Priorities – Main thread – Synchronization	Define Java threads(K1)	
		Create multiple threads(K6)	
		Name the thread priorities(K1)	
		Explain synchronization using synchronized methods and statements(K5)	
III	The Collections Framework		
3.1	The Collection Interfaces – The collection Classes –Accessing a Collection via an Iterator – Storing User – Defined Classes in Collections – Working with Maps – The Legacy Classes and Interfaces.	Classify the collection interfaces and the methods(K2)	K4
		Develop programs using collection interfaces(K3)	
		Categorize the collection classes(K4)	
		Distinguish between the map interfaces and classes(K4)	
		Develop program using vector (K6)	
IV	Applet Class		

4.1	Applet Architecture – The HTML Applet tag – Passing parameters in Applets-	Define Applet (K1)	K5
		Construct applet architecture(K3)	
		Explain attributes of applet tag(K5)	
		Name the parameters used in applets(K1)	
		Develop simple programs using applet(K6)	
4.2	AWT Classes - Window fundamentals – AWT controls – Layout Managers – Menus	Define frame and windows(K1)	
		List the controls in AWT(K1)	
		Interpret programs using AWT controls(K5)	
		Explain menu bars and menus(K2)	
4.3	Swing - JApplet – Icons and Labels – Text Fields – Buttons – Combo Boxes – Tabbed Panes – Scroll Panes – Tables – Trees.	Define swing(K1)	
		Name the controls in swing(K1)	
		Explain the swing controls with sample programs(K2)	
		Compare tabbed panes and scroll panes(K4)	
		Illustrate tables and trees with sample programs(K2)	
V	Java Database Connectivity		
5.1	JDBC Architecture – Connecting to a Database – SQL Commands – Connection Class – Command Class – Resultset class	Define Java Database Connectivity(K1)	K6
		Illustrate Java Database Connectivity(K2)	
		Develop program using JDBC (K6)	
		Inspect JDBC (K4)	
5.2	Java Remote Method Invocation (RMI) - Introduction to RMI – RMI Architecture – Example using RMI	Explain RMI Architecture (K5)	
		Build programs using RMI concepts(K6)	
5.3	Java Servlets - JSDK – The Servlet API – Life Cycle of a Java Servlet – Creating Servlets.	Define JSDK (K1)	
		Formulate the lifecycle of a java Servlet (K6)	
		Create Servlet programs (K6)	

MAPPING (CO, PO, PSO)

P19IT101	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	H	H	H	M	H	M	M	M	H	H	H	H	H
CO2	H	M	H	H	H	H	H	H	M	M	M	M	M
CO3	H	M	H	H	H	M	M	L	M	M	M	M	H
CO4	H	M	M	M	M	H	M	M	M	M	M	M	M
CO5	H	H	H	M	M	H	M	M	M	M	M	M	L
CO6	H	H	H	M	H	M	H	H	H	H	M	H	M

L – Low

M – Moderate

H – High

5. COURSE ASSESSMENT

METHODS DIRECT:

1. Continuous Assessment Test: T1, T2 (Theory & Practical Components): Closed Book
2. Assignment, Group Discussion, Project Report, Seminar, Quiz.
3. Pre-Semester & End Semester Theory Examination

INDIRECT:

1. Course end survey (Feedback)

Core II: RELATIONAL DATABASE SYSTEMS

SEMESTER: 1

COURSE CODE: P19IT102

CREDITS: 5

HOURS/WEEK: 5

1. COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

CO. No.	Course Outcomes	Level	Unit
CO1	Choose the popular relational database for real life applications, models and database system concepts and techniques	K1	I
CO2	Demonstrate SQL Queries and compare different SQL statements	K2	II
CO3	Identify Domain Constraints and Integrities.	K3	III
CO4	Analyze different normal forms and their issues	K4	III
CO5	Criticize File Organization, File storage and structure and Indexing and Hashing	K5	IV
CO6	Build Transaction Management mechanism for efficient data transfer in SQL.	K6	V

2. A. SYLLABUS

UNIT I: Introduction: Database system Applications

15 Hours

Introduction: Database system Applications – Database systems Vs File Systems – View of data – Data models – Database languages – Database users & Administrators – Transaction Management – Database system structure – Application Architectures. Entity – Relationship model: Basic concepts – constraints – keys – Design issues – Entity – Relationship Diagram – Weak entity sets – Extended E-R Features – Design of an E-R Database schema – Reduction of an E-R schema to Tables.

UNIT II: Relational Model

15 Hours

Relational Model: Structure of Relational Databases – The Relational Algebra – Extended relational algebra operations – Modification of the Database – Views – Relational Databases : SQL – Background – Basic structure – set operations – Aggregate functions – Null Values – Nested subqueries – Views – Complex Queries – Modification of the Database – Joined relations – Data – Definition Language – Embedded SQL – Dynamic SQL – other SQL features.

UNIT III: Integrity and security

15 Hours

Integrity and security: Domain constraints Referential Integrity – Assertions – Triggers – Security and Authorization – Authorization in SQL – Encryption and Authentication. - Relational Database Design: First Normal form – pitfalls in Relational Database Design – Functional Dependencies – Decomposition – Desirable properties of Decomposition – Boyce – Codd Normal form – Third Normal Form – Fourth Normal Form – More normal forms – overall Database Design process.

UNIT IV: Storage and file structure**15 Hours**

Storage and file structure: Overview of physical storage media – Magnetic Disks – RAID – Tertiary storage – Storage Access – File organization – organization of records in files – Dictionary storage. - Indexing & Hashing: Basic concepts–ordered Indices – B+-Tree Index files–Static Hashing–Dynamic Hashing–Comparison of ordered indexing & Hashing–Index definition in SQL–Multiple–key access.

UNIT V: Transaction Management**15 Hours**

Transaction Management: Transactions: Concept – Transaction state – Implementation of Atomicity and Durability – Concurrent executions – Serializability – Recoverability – Implementation of Isolation – Transaction Definition in SQL – Testing for serializability. - Concurrency control: Lock – Based Protocols – Timestamp – Based protocols – Validation – Based Protocols – Multiple Granularity – Multiversion schemes – Deadlock handling – Insert and Delete operations – Weak levels of consistency – Concurrency in Index structures.

2.B. Topics for Self Study:

S.No	Topics	Web Links
1	Multimedia Database	https://www.youtube.com/watch?v=ubwn1QK3Sns
2	Document – oriented Database	https://www.youtube.com/watch?v=wjRGF650zVI
3	Distributed Database	https://www.youtube.com/watch?v=0_m5gPzfzEYQ
4	Embedded Database	https://www.youtube.com/watch?v=hv3AH6lDjEY

2.C. Text Book(s):

1.Abraham Silbercharz, Henry F.Korth and S. Sudharshan- **“Database System Concepts”** McGraw Hill International -4th edition 2006. (Chapters: 1,2,3,4,6,7,11,12,15,16)

2.D. Reference Books:

1.Atul Kahate, **“Introduction to Database Management Systems”**, 1st Indian Reprint, Pearson Education, Delhi, 2004.

2.E. Web Links:

1. <https://www.w3schools.in/dbms>
2. <https://www.tutorialspoint.com/dbms>
3. <https://www.studytonight.com/dbms>
4. <https://www.youtube.com/watch?v=kMJR5gexfs8>
5. <https://www.youtube.com/watch?v=MjwaP18s0Xs>

3.SPECIFIC LEARNING OUTCOMES (SLO):

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
I	Applications and Data Models, Languages and Structures		
1.1	Introduction-Database Applications-Database systems Vs file systems - Data Abstraction-Instances and Schemas- E-R Model-Relational Model.	Define Database.(K1)	K1
		Recall File systems.(K1)	
		Explain various data abstraction levels.(K2)	
1.2	Database Languages, Users and Administrators: DDL-DML-Access from application programs-Different type of users and functions of administrators	Choose the correct syntax to create a statement.(K3)	
		Recall database languages.	
		Explain the functions of DBA.(K2)	
1.3	Transaction Management Database system structure-Application architectures: Storage manager-components-query processor components.	Define Transaction Management.(K1)	
		Interpret Storage Manager.(K2)	
		Explain Application Architecture of DBMS with a neat diagram.(K5)	
1.4	Entity – Relationship model: Basic concepts – constraints – keys – Design issues – Entity – Relationship Diagram – Weak entity sets – Extended E-R Features Design of an E-R Database schema – Reduction of an E- R schema to Tables-Keys.	Define Entity.(K1)	
		Explain ER model.(K2).	
		Match the symbols with corresponding attributes in ER Model.(K1)	
		Relate ER schema to table.(K1)	
II	Relational Model and Relational Algebra, Joins and DDLs		
2.1	Relational Model and Relational Algebra: Database Schema-Schema diagram-Fundamental Operations-Generalized and Aggregate functions-Modification of the Database – Views	Demonstrate a schema diagram for banking.(K2)	
		Explain fundamental operations in relational algebra.(K2)	
		List out aggregate functions in DBMS.(K1)	

		Examine the importance of View Table.(K4)	K2
2.2	Relational Databases: select from and where clause-set operations- Nested subqueries and Complex queries.	Distinguish Delete and Truncate statement.(K4)	
		Explain a select statement.(K2)	
		List out various Set operations in DBMS.(K1)	
2.3	Modification of the Database and Joined relations: Insertion-updation and deletion-Join Types & conditions	Distinguish delete and drop statements(K4).	
		Classify the types of join operations.(K2)	
2.4	Data Definition Languages, Embedded SQL – Dynamic SQL – other SQL features: Domain Types and schemas-JDBC -ODBC -schema -catalogs and stored Procedures	Discuss the use of stored procedures.(K6)	
		Compare ODBC and JDBC connectivity.(K4)	
		Illustrate domain type constraints in SQL.(K2)	
III	Integrity and Security, Relational Data base Design, Normal forms		
3.1	Integrity and Security: Domain constraints-Referential Integrity- Assertions, Triggers-Security and Authorization- Authorization in SQL- Encryption and Authentication	Make use of the properties of encryption techniques.(K3)	K4
		Explain referential integrity constraints.(K2)	
		Apply domain constraints in a relation.(K3)	
3.2	First Normal Form-Pitfalls in Relational Database Design-Functional Dependencies-Decomposition - Desirable properties in Decomposition	Categorize the different normal forms in dbms.(K4)	
		Discuss the desirable properties of decomposition.(K6)	
		Justify the need of normalization in Relational database.(K5)	
		Analyze the concepts of normalization to design an optimal database.(K4)	
3.3	Boyce – Codd Normal form – Third Normal Form – Fourth Normal Form – More normal forms – overall Database Design process.	Examine the overall database design process.(K4)	
		Discuss the disadvantages of BCNF over 3NF.(K6)	
		List the importance of normalization.(K4)	

IV	Storage and file structure, file organization, Indexing and Hashing		
4.1	Storage and file structure: Overview of physical storage media – Magnetic Disks – RAID – Tertiary storage – Storage Access	Label the importance of storage media access.(K1)	K5
		Discuss various RAID levels in dbms.(K6)	
		Compare the advantage of optical disks and magnetic tapes storage media.(K4)	
4.2	organization of records in files – Dictionary Storage-Basic concepts– ordered Indices – B+-Tree Index files	Explain the benefits of Dictionary Storage.(K5)	
		Interpret the advantage of B+ tree.(K2)	
		Explain the various file organization methods.(K5)	
4.3	Static Hashing–Dynamic Hashing–Comparison of ordered indexing & Hashing– Index definition in SQL– Multiple–key access.	Interpret the advantages of multiple key accesses.(K3)	
		Criticize indexing mechanisms for efficient retrieval of information from a database.(K5)	
		Compare the advantages of static and dynamic hashing.(K4)	
V	Transaction Management, concurrency Control		
5.1	Concept – Transaction state – Implementation of Atomicity and Durability	Elaborate the transaction states.(K6)	K6
		Discuss the properties of Transaction.(K6)	
5.2	Concurrent executions – Serializability – Recoverability – Implementation of Isolation – Transaction Definition in SQL – Testing for serializability	Construct a database for storing the data about bus ticket reservation using a concurrency mechanism.(K6)	
		Illustrate Serializability and recoverability. (K2)	
		Discuss the demerits of concurrent execution.(K6)	
5.3	Lock – Based Protocols – Timestamp – Based protocols – Validation – Based	Elaborate implicit and explicit locking.(K6)	

	Protocols-Multiple Granularity: Multiversion schemes – Deadlock handling – Insert and Delete operations – Weak levels of consistency – Concurrency in Index structures	Explain the reason for the use of degree –two consistency.(K5)	
		Discuss the techniques for managing concurrency control.(K6)	

4.MAPPING (CO, PO, PSO)

P19IT10 2	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	H	H	H	M	M	M	L	L	L	H	M	M	L
CO2	H	H	H	M	M	M	L	L	L	H	M	M	L
CO3	M	M	M	M	H	H	H	L	L	M	H	H	L
CO4	M	M	M	M	H	H	H	L	L	M	H	H	L
CO5	M	M	M	M	H	H	H	L	L	M	H	H	L
CO6	L	L	L	L	L	L	H	H	H	L	L	L	H

L-Low
M-Moderate
H- High

5.COURSE ASSESSMENT

METHODS DIRECT:

1. Continuous Assessment Test: T1, T2(Theory & Practical Components): Closed Book.
2. Cooperative Learning Report, Assignment, Group Presentation, Group Discussion, Project Report, Field Visit Report, Seminar, Quiz(written).
3. Pre-Semester & End Semester Theory Examination.

INDIRECT:

1. Course-end survey(FeedBack)

COURSE – III: ADVANCED OPERATING SYSTEM

SEMESTER: 1
CREDITS: 5

COURSE CODE: P19IT103
HOURS/WEEK:5

1. COURSE OUTCOMES

After the successful completion of this course, the student will be able to

CO. No.	Course Outcomes	Level	Unit
CO1	Classify different types of operating system and its pros and cons.	K2	I
CO2	Analyze the various algorithms and comment about performance of various algorithms used for CPU scheduling of a process.	K3	II
CO3	Examine various concepts related with Deadlock to solve problems related with Resource's allocation, to find whether a system is in safe state or not.	K4	II
CO4	Inspect various memory management techniques and the necessity of virtual memory.	K4	III
CO5	Explain the design issues of distributed operating systems and discuss various communication mechanisms.	K5	IV
CO6	Discuss Real time Operating System and its applications and classify scheduling algorithms.	K6	V

2. A. SYLLABUS

UNIT I: Operating System Overview

15 Hours

Operating System Overview: - Operating system overview-objectives and functions- Evolution of Operating System.- OS Generation – Types of operating System- Batch Processing System- Multiprocessor System-Distributed System- Clustered System- Real Time System- Time Sharing System-Feature Migration- Computing Environments.

UNIT II: Process Management

15 Hours

Process Management: - Processes – Process Concept and Life cycle- Process Scheduling- Inter-process Communication- CPU Scheduling – Scheduling algorithms- Process Synchronization – Critical-Section Problem- Semaphores- Critical regions - Deadlock –Methods for handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery.

UNIT III: Memory Management

15 Hours

Memory Management: - Basic Memory Management: - Definition- Address map- Memory allocation- Internal and External fragmentation and Compaction- Paging: Principle of operation – Page allocation. - Virtual Memory: Basics of Virtual Memory – Locality of reference, Page fault - Demand paging – Page Replacement policies.

UNIT IV: Distributed Operating System

15 Hours

Distributed Operating System: - Introduction: - Distributed Computing Systems – Models - Issues in Designing - Message Passing: Introduction, Features - Issues in IPC- Synchronization- Buffering, Process Addressing, Failure Handling, Group

Communication-Remote Procedure Calls: Model- , Implementation-Case Study: Sun Network File System.

UNIT V: Real Time Operating System

15 Hours

Real Time Operating System: - Real Time Systems: Introduction- -Examples- Architectures, RTOS building blocks Classification-Safety and Reliability- Design issues-CPU Scheduling, scheduling criteria-scheduling algorithms-real-time garbage collection- Case study Linux POSIX system- Traffic Light Controller System.

2.B. Topics for Self Study:

CO. No	Topics	Web Links
1	Android- Architecture	https://www.tutlane.com/tutorial/android/android-architecture
2	Environmental setup	https://www.tutlane.com/tutorial/android/android-development-environment-setup
3	Fragments	https://www.tutlane.com/tutorial/android/android-fragments-with-examples
4	UI controls & Themes	https://www.tutlane.com/tutorial/android/android-ui-controls-textview-edittext-radio-button-checkbox

2.C. Text Book(s):

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Concepts”, 9th Edition, John Wiley and Sons Inc., 2012.
2. Pradeep K. Sinha, “Distributed Operating Systems Concepts and Design”, PHI, 2007.
3. Jane W. S. Liu, “Real-time systems”, Prentice Hall, 2000.

2.D. Reference Books:

1. Andrew S. Tanenbaum, “Modern Operating Systems”, 2nd Edition, Pearson Education, 2004.
2. Andrew S Tannebaum, “Distributed Operating Systems”, Pearson Education, 2009.
3. J. J. Labrosse, “MicroC/OS-II: The Real –Time Kernel”, Newnes, 2002.

2.E. Web Links:

1. https://www.tutorialspoint.com/operating_system/index.html
2. <http://digitalthinkerhelp.com/distributed-operating-system-tutorial-with-their-types-examples/>
3. <http://digitalthinkerhelp.com/real-time-operating-system-rtos-examples-applications-functions/>
4. <https://omscs.gatech.edu/cs-6210-advanced-operating-systems>
5. <https://www.youtube.com/watch?v=GTObrKKbRww>

3.SPECIFIC LEARNING OUTCOMES (SLO):

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Levels of Transaction
I	Operating Systems Overview		
1.1	Operating system overview-objectives and functions- Evolution of Operating System.- OS Generation	Recall computer resources (K1)	K2
		List the necessity of resources (K1)	
		Recall the generation of computers (K1)	
		Recognize resource used in various generation of computer (K1)	
1.2	Types of operating System- Batch Processing System- Multiprocessor System-Distributed System- Clustered System-Real Time System- Time Sharing System-Feature Migration- Computing Environments	Identify Operating system used in real time (K1)	
		Explain Pros and Cons of OS types (K1)	
		Reproduce OS generation (K1)	
		Explain various types of operating system (K2)	
II	Process Management		
2.1	Process Management Processes – Process Concept and Life cycle- Process Scheduling- Inter-process Communication- CPU Scheduling – Scheduling algorithms- Process Synchronization – Critical-Section Problem-Semaphores- Critical regions	Recall program, process (K1)	K3
		Explain state of a process (K2)	
		Explain life cycle of a process (K2)	
		Classify CPU scheduling algorithm (K2)	
		Demonstrate CPU scheduling algorithm (K2)	
		Apply scheduling algorithm for process utilization (K3)	
		Relate scheduling algorithms (K1)	
		Analyze criticality of an algorithm (K1)	
Examine solution to critical section (K4)			
2.2	Deadlock –Methods for handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery	Recall real time application of deadlock (K1)	K4
		Outline deadlock (K2)	
		Explain Banker’s algorithm (K2)	
		Illustrate safe state of a process (K2)	
		Estimate number of resources needed to avoid deadlock (K5)	
III	Memory Management		

3.1	Memory Management Basic Memory Management: Definition- Address map- Memory allocation- Internal and External fragmentation and Compaction- Paging: Principle of operation – Page allocation.	Recall OS functionalities (K1)	K4
		Explain memory allocation techniques (K2)	
		Explain fragmentation (K2)	
		Illustrate paging techniques (K2)	
		Compare internal and external fragmentation (K4)	
		Compare fragmentation problem (K5)	
3.2	Virtual Memory: Basics of Virtual Memory – Locality of reference, Page fault - Demand paging – Page Replacement policies.	Define virtual memory (K1)	K4
		Relate VMware (K1)	
		Illustrate demand paging (K2)	
		Solve and Establish page fault (K6)	
		Compare and Conclude best paging algorithm (K5)	
IV	Distributed Operating Systems		
4.1	Distributed Operating Systems: Introduction: Distributed Computing Systems-Models-Issues in Designing	Recall types of OS (K1)	K5
		Recall OS functionalities (K1)	
		Explain design issues of DOS (K2)	
	Message Passing: Introduction, Features - Issues in IPC- Synchronization- Buffering, Process Addressing, Failure Handling, Group Communication-Remote Procedure Calls: Model- , Implementation- Case studies, The Sun Network File Systems.	Define the concepts of Message passing (K1)	K5
		Explain Inter Process Communication (K2)	
		Identify issues in IPC (K3)	
		Make use of group communication (K3)	
		Construct RPC (K3)	
		Compare SNFS with DOS features (K5)	
V	Real Time Operating Systems		
5.1	Real Time Systems: Introduction- -Examples- Architectures, RTOS building blocks Classification-Safety and Reliability- Design issues	Recall the types of OS (K1)	K6
		Outline RTOS architecture (K2)	
		Distinguish blocks of RTOS (K4)	
		Analyze safety and reliability of RTOS (K4)	
		Estimate the design issues of RTOS (K6)	
5.2	CPU Scheduling, scheduling criteria-scheduling algorithms-real-time garbage collection- Case study Linux POSIX system- Traffic Light Controller System.	Recall scheduling algorithms (K1)	K6
		Explain scheduling criteria (K2)	
		Classify scheduling algorithm (K2)	
		Interpret POSIX with RTOS (K2)	
		Compare TLCS with RTOS (K5)	

4.MAPPING (CO, PO, PSO)

P19IT103	P O 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	H	M	L	L	L	L	L	L	M	H	M	L	M
CO2	L	M	H	H	L	L	L	L	L	M	H	L	L
CO3	L	M	H	H	L	L	L	L	M	H	L	M	L
CO4	M	L	L	L	H	L	L	L	L	L	M	L	L
CO5	M	L	L	L	L	L	L	M	L	M	L	L	L
CO6	M	L	L	M	L	L	L	L	L	L	H	L	L

L-Low

M-Moderate

H- High

5.COURSE ASSESSMENT

METHODS DIRECT:

1. Continuous Assessment Test: T1, T2 (Theory Components): Closed Book
2. Cooperative Learning Report, Assignment, Group Presentation, Group Discussion, Seminar, Quiz (written).
3. Pre-Semester & End Semester Theory Examination

INDIRECT:

1. Course end survey (Feedback)

Core Practical I: JAVA PROGRAMMING LAB

SEMESTER: I
CREDITS: 4

COURSE CODE: P19IT1P1
HOURS/WEEK 60

1. COURSE OUTCOMES

After the successful completion of this course, the students will be able to

CO. No.	Course Outcomes	Level	Exercise
CO1	Identify an element, object scope and access.	K3	1
CO2	Experiment with the code reusability and inheritance.	K3	2 – 4
CO3	Examine constructor overloading, packages and interfaces	K4	5 – 6
CO4	Determine the code to handle built in and user defined exceptions and Multithreading	K5	7 – 8
CO5	Interpret collections classes, interfaces and write programs using applets.	K5	9 – 10
CO6	Develop database applications with AWT controls.	K6	11 – 13

Ex. No.	Exercise
1	Preparation of student mark list using classes and objects
2	Preparation of electricity bill using single inheritance
3	Program to display Product details using multilevel inheritance
4	Program to prepare Paybill using hierarchical inheritance
5	Program to calculate areas of different shapes using interfaces
6	Program to perform arithmetic operations using packages
7	Program to implement user defined exception
8	Program to apply the concept of multithreading in Bank transactions.
9	Program to add elements through collection methods
10	Program to move a ball using applet
11	Program to develop simple calculator using awt controls.
12	Program to create a login module using swing.
13	To establish database connection, create and manipulate employee records using JDBC

2. Topics for Self Study

S.No	Topics	Web Links
1	Create a program to find all the permutations of a string	https://www.javatpoint.com/programs-list#string
2	Write a program to create a singly linked list of n nodes and count the number of nodes	https://www.javatpoint.com/programs-list#singly-linked-list
3	Create a program to get an IP address	https://beginnersbook.com/2014/07/java-program-to-get-ip-address/
4	Create a program to implement different sorting algorithms	https://www.w3resource.com/java-exercises/sorting/index.php

3. SPECIFIC LEARNING OUTCOMES (SLO):

Ex · No ·	Lab Exercises	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
1	<p>Program to prepare student mark list using classes and objects</p> <ul style="list-style-type: none"> ● Create a class student having student details and mark details ● Calculate total and result ● Create a main method that includes objects of the class student and call the methods using objects. 	<ul style="list-style-type: none"> ● Organize the creation of classes and objects. ● Make use of objects and call the methods and variables. ● Experiment with a program involves classes and objects. 	K3
2	<p>Program to prepare electricity bill using single inheritance</p> <ul style="list-style-type: none"> ● Create two classes for getting customer details and unit details respectively ● Inherit the properties of a class customer. ● Calculate the unit price according to the units. ● Create a main method and call the methods using objects. 	<ul style="list-style-type: none"> ● Identify the object access with access specifiers. ● Select the classes and methods. ● Experiment with access specifiers. ● Select element and method scope. ● Organize COURSE CODE reusability with inheritance. 	K3
3	<p>Program to display the product details using multilevel inheritance</p> <ul style="list-style-type: none"> ● Create two classes for getting customer details and item details respectively ● Calculate the total price based on the item price and quantity in another class. ● Create a main method and call the methods using objects. 	<ul style="list-style-type: none"> ● Identify the object access with access specifiers. ● Choose the classes and methods. ● Experiment with access specifiers. ● Select element and method scope. ● Organize COURSE CODE reusability with inheritance. 	K3
4	<p>Program to prepare the Paybill using hierarchical inheritance</p> <ul style="list-style-type: none"> ● Create a class consists of employee's details and designation details ● Create class and calculate Paybill based on designation ● Create a main method and call the methods using objects. 	<ul style="list-style-type: none"> ● Identify the Object access with access specifiers. ● Choose the classes and methods. ● Experiment with access specifiers. ● Select element and method scope. ● Organize COURSE CODE reusability with inheritance. 	K3

5	<p>Program to calculate the area of different shapes using interfaces</p> <ul style="list-style-type: none"> • Create an interface which declares methods of calculating area of different shapes • Create a class to implement the methods declared in the interface. • Create a main method and call the methods using objects. 	<ul style="list-style-type: none"> • Analyze and initialize variables. • List the object access with interfaces. • Examine with interfaces. • Inspect the operation of methods. • Take part in abstraction using interfaces. • Examine the programs with total abstraction. 	K4
6	<p>Program to perform arithmetic operations using packages</p> <ul style="list-style-type: none"> • Create a directory and name the packages. • Create packages and class for performing arithmetic operation • Create a main method and call all the packages. 	<ul style="list-style-type: none"> • List the use of methods. • Classify the modules in a program. • Relate the classes into packages. • Inspect the class scope within package 	K4
7	<p>Program to implement user defined exception</p> <ul style="list-style-type: none"> • Create a class exception and declare variables and methods. • Declare user defined exceptions. • Write exception handling mechanisms using try and catch blocks. • Create a main method and call the methods using objects. 	<ul style="list-style-type: none"> • Explain the COURSE CODE with various try () blocks. • Influence the types of exceptions. • Evaluate with various catch blocks. • Deduct new exceptions. • Conclude on possible exceptions. • Determine the COURSE CODE to handle user defined exceptions 	K5
8	<p>Program to apply the concept of multithreading in Bank transactions</p> <ul style="list-style-type: none"> • Creating a class bank includes bank transactions like deposit and withdraw. • Create and initiate the threads. • Start and run the thread for deposit and withdraw options. • Create a main method and call the methods using objects. 	<ul style="list-style-type: none"> • Explain thread. • Evaluate the operation of threads. • Recommend with thread priority. • Assess thread synchronization. • Prioritize the threads. • Interpret their operations with thread synchronization 	K5
9	<p>Program to add elements through collection methods</p> <ul style="list-style-type: none"> • Create a class which consists of collection classes and interfaces. 	<ul style="list-style-type: none"> • Evaluate the collection framework. • Choose the collection classes and interfaces • Interpret with object access and method scope 	K5

	<ul style="list-style-type: none"> ● Add the elements to the collection classes. ● Create a main method and call the methods using objects. 		
10	Program to move a ball using applet <ul style="list-style-type: none"> ● Create a class which extends the applet architecture ● Create and draw the shape using paint. ● Repaint the shape and view it in the applet viewer. 	<ul style="list-style-type: none"> ● Determine an Applet. ● Explain the use of applets. ● Justify shapes, reposition and repaint them using applets. 	K5
11	Program to perform simple calculator using AWT controls. <ul style="list-style-type: none"> ● Create a class which extends abstract window toolkit. ● Create a tool button which consists of arithmetic operations. ● Create event listener interface and write on click events. ● Create a main method and perform calculator operations. 	<ul style="list-style-type: none"> ● Elaborate the controls. ● Combine the various AWT controls. ● Develop an applet. ● Discuss the use of applets. ● Develop web forms using applets. 	K6
12	Program to create login module using swing. <ul style="list-style-type: none"> ● Create a class consists of swing objects. ● Write event handling mechanism and manage the click events. ● Create a main method and validate login module. 	<ul style="list-style-type: none"> ● Elaborate the controls. ● Develop an applet. ● Discuss the use of applets. ● Develop forms using applet and display in appletviewer. 	K6
13	To establish database connection, create and manipulate employee records using JDBC. <ul style="list-style-type: none"> ● Create a class employee having employee details. ● Create a database in ms access and connect the database using JDBC. ● Perform insert, delete and update operations. ● Create a main method and call methods using objects. 	<ul style="list-style-type: none"> ● Construct the database. ● Elaborate the database operations. ● Create the table ● Formulate queries to perform various database operations. 	K6

4. MAPPING (CO, PO, PSO)

P19IT1P1	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	H	H	H	M	M	H	M	H	M	M	L	M	H
CO2	H	M	M	H	H	H	H	M	H	M	M	M	M
CO3	H	H	H	H	H	M	H	H	H	M	M	H	M
CO4	H	H	H	M	M	H	M	H	H	L	H	M	M
CO5	M	H	H	H	H	M	M	H	M	M	L	H	H
CO6	H	M	H	H	M	H	H	H	H	L	L	M	H

L – Low

M – Moderate

H – High

5. COURSE ASSESSMENT

METHODS DIRECT:

1. Continuous Assessment Test: T1, T2 (Practical Components): Closed Book
2. Cooperative Learning Report, Assignment, Group Discussion, project Report, Field Visit Report, Seminar.
3. Pre/Post Test, Viva, Report for each Exercise.
4. Lab Model Examination & End Semester Practical Examination

INDIRECT:

1. Course end survey (Feedback)

Core Practical II: RELATIONAL DATABASE SYSTEMS LAB

SEMESTER: 1

COURSE CODE: P19IT1P2

CREDITS: 3

HOURS/WEEK: 5

1. COURSE OUTCOMES

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

CO. No.	Course Outcomes	Level	Exercise
CO1	Build DML and DDL statements in dbms.	K3	1-2
CO2	Construct SQL Queries to perform different operations with tables.	K3	3
CO3	Experiment with built-in functions, complex and nested queries in SQL.	K3	4-5
CO4	Distinguish Creation of views and Indexes	K4	6
CO5	Importance of functions, procedures, exceptions, cursors and triggers in PL/SQL.	K5	7-11
CO6	Develop an application using PL/SQL.	K6	12

Ex. No.	Exercise
1	Create a student table to perform DDL operations
2	Create an employee table to perform DML operations
3	Create a customers and suppliers table queries using WHERE, HAVING, LIKE and BETWEEN clause. Apply Logical and Set Operation in the above table.
4	Create an Orders table and apply different types of Joins, to perform sub queries and nested queries.
5	Use Built-in function in SQL.
6	Use of Indexes, creating views and querying in views.
7	Write a Program to implement Functions in PL/SQL.
8	Write a Program to implement Procedures in PL/SQL.
9	Write a program to implement Cursors in PL/SQL.
10	Write a program to implement Triggers in PL/SQL.
11	Write a program to implement Exceptions in PL/SQL.
12	Develop PL/SQL programs to perform splitting and merging of tables , preparation of EB bill.

2. Topics for Self Study:

S.No.	Topics	Web Links
1	Write PL/SQL program to Check the given number is Armstrong Number or not.	https://www.scribd.com/doc/63350632/PL-SQL-Program-for-Adam-or-Not
2	Create a program to build a simple web application using php and MySQL.	https://www.youtube.com/watch?v=2gxLcIUfs2U

3	Write a program to establish database connection, create and manipulate student records using JDBC	https://www.youtube.com/watch?v=5vzCjvUwMXg
4	Write PL/SQL program to Check the given number is Armstrong Number or not.	https://www.geeksforgeeks.org/check-armstrong-number-plsql/

3.SPECIFIC LEARNING OUTCOMES (SLO)

Ex. No.	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
1.	To create DDL statements and simple queries. <ul style="list-style-type: none"> ● Create a table with columns and data types ● Insert the values into the table. ● Alter the columns/table with add/modify and drop keywords. ● Truncate the table ● Drop the table 	<ul style="list-style-type: none"> ● Make use of all the DDL Statements. ● Choose data with data type ● Apply constraints to the table. ● Identify DELETE and DROP query ● Build a simple table 	K3
2.	To create DML statements and simple queries. <ul style="list-style-type: none"> ● Create a table with columns and data types ● Insert the values into the table. ● Update the table values using update query ● Delete the unwanted rows with the help of delete query. ● Select the desired rows with the help of select statement. 	<ul style="list-style-type: none"> ● Experiment with all the DML Statements. ● Make use of insert query ● Apply DELETE statement with where condition. ● Build select statement. ● Choose the correct syntax of the DELETE statement. 	K3

3.	<p>Queries using</p> <p>i) WHERE clause, HAVING clause, LIKE operator, BETWEEN clause.</p> <p>ii) Queries using logical operators.</p> <p>iii) Set operators.</p> <p>iv) Sorting and grouping</p> <ul style="list-style-type: none"> ● Create a table with columns and data types ● Make use of set operators like union, intersections and minus in the table ● sorting and grouping the columns in ascending and descending order. 	<ul style="list-style-type: none"> ● Make use of all the logical operators. ● Identify the symbol of union. ● Apply conditions to the table. ● Build aggregation queries involving GROUP BY and HAVING clauses. ● Choose the correct format of LIKE operator. 	K3
4.	<p>To create Nested queries using Sql</p> <p>i) Sub queries.</p> <p>ii) Join operators.</p> <ul style="list-style-type: none"> ● Create a table with columns and data types ● Insert the values into the table. ● Make use of left, right outer join and full join in table 	<ul style="list-style-type: none"> ● Experiment with the special attention of joint operations. ● Identify complex queries ● Utilize left outer join ● Develop nested queries ● Construct inner join query. ● Choose the correct symbol of right join 	K3
5.	<p>Built – in functions</p> <ul style="list-style-type: none"> ● Use character functions ● Use mathematical functions ● Use string functions ● Use date functions 	<ul style="list-style-type: none"> ● Make use of built-in functions ● Identify the DATE function ● Build a query for your age. 	K3

		<ul style="list-style-type: none"> ● Experiment with ceil (23.34) 	
6.	<p>Make use of Use of indexes, creating views and querying in views</p> <ul style="list-style-type: none"> ● Create a table ● Create an index for that table. ● Create a view for another table. <ul style="list-style-type: none"> ● Insert into the view table. 	<ul style="list-style-type: none"> ● Analyze the concept View in dbms. ● Discover the uses of index. ● Compare table and views ● Construct a view for a table. Test for index for a table. 	K4
7.	<p>Implementation of Functions in PL/SQL.</p> <ul style="list-style-type: none"> ● Create a function for Fibonacci. ● Pass values to the variable ● Call the function ● Return the value of the function 	<ul style="list-style-type: none"> ● Define functions ● Compare functions and procedures. ● Interpret user defined function. ● Justify the need of functions. 	K5
8.	<p>Implementation of Procedures</p> <ul style="list-style-type: none"> ● Create a procedure for total ● Pass values to the variable. ● Find pass and fail 	<ul style="list-style-type: none"> ● Compare procedure from other programming languages. ● Determine execution between cursors and procedures ● Estimate procedure. 	K5
9.	<p>Implementation Cursors in PL/SQL</p> <ul style="list-style-type: none"> ● Create a table ● inset values into table ● to retrieve one row at a time, make use of cursors. 	<ul style="list-style-type: none"> ● Explain cursors. ● Estimate explicit cursors ● Choose the syntax for cursor ● Importance of implicit and explicit cursors. 	K5

		<ul style="list-style-type: none"> Evaluate the cursor attribute for SQL%ROWCOUNT 	
10.	Implementation of Triggers in PL/SQL <ul style="list-style-type: none"> Create a table Insert values into table fix a condition to the table condition violated raise error automatically. Errors are Triggering based on DML updating. 	<ul style="list-style-type: none"> Criticize the benefits of trigger. Interpret referential integrity. Importance of trigger 	K5
11.	Implementation of Exceptions in PL/SQL <ul style="list-style-type: none"> Create a table Add exception handlers. Use exceptions in a table. 	<ul style="list-style-type: none"> Determine exceptions for the table. Explain the types of exceptions. Choose the system defined exceptions. 	K5
12.	Develop PL/SQL programs for the followings Case studies i) Splitting of tables ii) Joining of Tables iii) Pay bill preparation <ul style="list-style-type: none"> create student table and split into student_info table. Joining 2 tables. Create real time applications in PL/SQL 	<ul style="list-style-type: none"> Create various applications in PL/SQL. Discuss split and join tables. Build a query for splitting table. 	K6

4. MAPPING (CO, PO, PSO)

P19IT1P2	P O1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PS O1	PS O2	PSO 3	PSO 4
CO1	M	M	M	H	H	H	L	L	L	M	H	H	L
CO2	M	M	M	H	H	H	L	L	L	M	H	H	L
CO3	M	M	M	H	H	H	L	L	L	M	H	H	L
CO4	M	M	M	H	H	H	L	L	L	M	H	H	L
CO5	M	M	M	H	H	H	L	L	L	M	H	H	L
CO6	L	L	L	L	L	L	L	H	H	L	L	L	H

L-Low

M-Moderate

H- High

5. COURSE ASSESSMENT

METHODS DIRECT:

1. Continuous Assessment Test: T1, T2(Theory & Practical Components): Closed Book.
2. Cooperative Learning Report, Assignment, Group Presentation, Project Report, Field Visit Report, Seminar, Quiz(written).
3. Pre-Semester & End Semester Practical Examination.

INDIRECT:

1. Course-end survey.(Feedback)

ELECTIVE I: MULTIMEDIA TECHNOLOGIES

SEMESTER: 1

COURSE CODE: P19IT1: 1

CREDITS: 4

HOURS/WEEK :4

1. COURSE OUTCOMES

After the successful completion of this course, the student will be able to

CO.No	Course Outcomes	Level	Unit
CO1	Define the technical aspect of Multimedia Systems.	K1	I
CO2	Demonstrate various Multimedia database applications in real time.	K2	I
CO3	Identify the importance of Compression and decompression techniques and various data and file standards.	K3	II
CO4	List the Multimedia applications design and components of multimedia systems.	K4	III
CO5	Interpret the concepts of Multimedia authoring and user interface.	K5	IV
CO6	Elaborate hypermedia messaging and Integrated multimedia messaging standards	K6	V

2. A. SYLLABUS

UNIT I : Overview of Multimedia Systems Design

12 Hours

Overview of Multimedia Systems Design : - Multimedia Elements - Multimedia Applications - Documenting Imaging - Image Processing and Image Recognition - Full-Motion Digital Video Application - Electronic Messaging - Evolving Technologies for Multimedia Systems:- Multimedia Data Interface Standards - Multimedia Databases:- Multimedia Storage and Retrieval – DBMS for Multimedia Systems – DB Organization for Multimedia Applications - Transaction Management for Multimedia Systems.

UNIT II: Compression and Decompression

12 Hours

Compression and Decompression: - Types of Compression - Lossless Compression - Lossy Compression - Color, Gray Scale and Still-Video Image Compression - Audio Compression - Data and File Format Standards: - Rich-Text Format - TIFF File Format - Resource Interchange File Format - MIDI File Format - JPEG File Format for Still and Motion Images.

UNIT III: Multimedia Application Design

12 Hours

Multimedia Application Design: - Multimedia Applications Classes - Game Systems - Multimedia Repositories - Interactive TV using set-top systems - Types of Multimedia Systems - Virtual Reality Design - Human Factors - Multimedia Inputs and Outputs - Modeling – Design Considerations - Components of Multimedia Systems: - Input-Output-Storage Systems - Application Workflow Design Issues - Distributed Application Design Issues.

UNIT IV: Multimedia Authoring and User Interface**12 Hours**

Multimedia Authoring and User Interface: - Multimedia Authoring Systems - Design Issues for Multimedia Authoring - Approaches to Authoring - Types of MM Authoring - Hypermedia Application Design Considerations: - Integration of Application - Data Exchange – User Interface Design - Navigation Through the Application - Special Metaphors for Multimedia Applications - Information Access.

UNIT V: Hypermedia Messaging**12 Hours**

Hypermedia Messaging: - Mobile Messaging - Hypermedia Message Components - Text - Rich-Text - Voice Messages - Full-Motion Video Management - Hypermedia Linking and Embedding - Creating Hypermedia Messages – Integrated Multimedia Message Standards: - Vendor-Independent Messaging - MAPI Support- Telephony API - Internet Messaging - Integrated Document Management.

2.B. Topics for Self Study:

S.No	Topics	Web Links
1	Holography	https://www.youtube.com/watch?v=ikuSPBZjkhw
2	Multicast Backbone	https://www.youtube.com/watch?v=diYBfbc7PkA
3	SMIL	https://www.youtube.com/watch?v=xqups1sSIHI
4	Hyper speech	https://www.youtube.com/watch?v=xjkPHchV6sM

2.C. Text Book(s):

1. Prabhat K. Andleigh , Kiran Thakrar, “**Multimedia Systems Design**”, PHI ,New Delhi,2002.

2.D. Reference Books:

1. Ze-Nian Li, Mark S. Drew, “**Fundamentals of Multimedia**”, Pearsons Education, New Delhi, 2005.
2. John F. Koegel Bufford, “**Multimedia Systems**”, Pearson Education, Delhi, 2005.
3. David Hillman, “**Multimedia Technology & Applications**”, Galgotia Publications, New Delhi, 2010.

2.E. Web Links:

1. www.tutorialspoint.com
2. www.wisdomjobs.com
3. https://www.youtube.com/watch?v=Syeu_l3sAJE
4. <https://www.youtube.com/watch?v=QTSxL27GzqA>

3.SPECIFIC LEARNING OUTCOMES (SLO):

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Levels of Transaction
I	Overview of Multimedia System Design, Technologies and DB's		
1.1	Overview of Multimedia System Design: -Multimedia Elements, Multimedia Applications, Documenting Imaging, Image Processing and Image Recognition, Full Motion Digital Video Application, Electronic Messaging- Evolving Technologies for Multimedia Systems: -Multimedia Data Interface Standards	List the elements of multimedia in your daily life.(K1)	K2
		Show the requirements of document image hardware.(K1)	
		Select the multimedia applications used in movies.(K1)	
		Illustrate Multimedia data interface standards.(K2)	
		Classify the different types of Video Processing Standards in Multimedia.(K2)	
1.2	Multimedia Databases: -Multimedia Storage and Retrieval, DBMS for Multimedia Systems, DB Organization for Multimedia Applications, Transaction Management for Multimedia Systems.	Define Multimedia.(K1)	
		Interpret Multimedia data interface standards.(K2)	
		Explain the key concepts of multimedia systems(K2).	
		Develop the DB for Multimedia Applications.(K6)	
II	Compression and Decompression, Data and File Format Standards		
2.1	Compression and Decompression: -Type's compression, Lossless Compression- Lossy Compression-Color, Gray Scale and Still, Video Image Compression, Audio Compression.	Experiment with lossy compression in image compression.(K3)	K3
		Discuss the format of Lossless Compression.(K6)	
		Compare the merits and demerits of lossy and lossless compression.(K5)	
2.2	Rich Text Format, TIFF File Format, Resource Interchange File Format- MIDI File Format, JPEG File Format for Still and Motion Images.	Construct the structure of TIFF file format.(K6)	
		Make use of the channel messages in MIDI communication protocol.(K3)	
		Explain JPEG compression standards.(K5)	

III	Multimedia Application Design and Components		
3.1	Multimedia Applications Classes, Game Systems, Multimedia Repositories, Interactive TV using set top system-Types of Multimedia Systems: Virtual Reality Design, Human Factors, Multimedia Inputs and outputs	Define Multimedia.(K1)	K4
		Discuss Multimedia applications in Business.(K6)	
		Make use of set top in interactive TV system.(K3)	
		Explain the types of multimedia systems.(K5)	
3.2	Input and Output Storage Systems, Application Workflow Design Issues, Distributed, Application Design Issues.	List the components of the Multimedia system.(K4)	
		Discuss the workflow issues for multimedia objects.(K6)	
		Determine the application design issues of Multimedia.(K5)	
IV	MM Authoring and User Interface, Hypermedia Applications		
4.1	Multimedia Authoring Systems, Design Issues for Multimedia Authoring, Approaches to Authoring, Types of MM Authoring.	Illustrate the multimedia Authoring Systems.(K2)	K5
		List the types of multimedia authoring systems.(K4)	
		Explain critical design issues for multimedia approaches to authoring.(K2)	
4.2	Integration of Applications, Data Exchange, User Interface Design, Navigation Through the application, Special Metaphors for Multimedia Applications, Information Access.	Extend windows clipboard formats and how it is useful for storage.(K2)	
		Explain special metaphors in the UI used for multimedia Applications.(K5)	
		Discuss the common forms of navigation for information Access.(K6)	
V	Hypermedia Messaging, MM Message Standards		
5.1	Mobile Messaging, Hypermedia Message Components, Text, Rich Text, Voice Messages, Full Motion Video Management-Hypermedia Linking and Embedding: Creating Hypermedia Messages	Explain the features of hypermedia in mobile messaging.(K5)	K6
		Discuss the function of voice message with video message.(K6)	
		Create text messages that are useful for electronic mail messages.(K6)	
5.2	Integrated Multimedia Message Standards: -Vendor Independent Messaging, MAPI Support	Discuss various standards used in Integrated Multimedia messages.(K6)	

	Telephony API, Integrated Messaging, Integrated Document Management.	
		Recall API.(K1)
		Discuss the function of Multipurpose Internet Mail Extensions.(K6)

4.MAPPING (CO, PO, PSO)

P19IT1: 1	P O1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PS O 1	PS O 2	PSO 3	PSO 4
CO1	H	H	H	M	M	M	L	L	L	H	M	M	L
CO2	H	H	H	M	M	M	L	L	L	H	M	M	L
CO3	M	M	M	M	H	H	H	L	L	M	H	H	L
CO4	L	L	L	L	L	L	H	H	H	L	L	L	H
CO5	L	L	L	L	L	L	H	H	H	L	L	L	H
CO6	M	M	M	M	H	H	H	L	L	M	H	H	L

L-Low

M-Moderate

H- High

5. COURSE ASSESSMENT

METHODS DIRECT:

1. Continuous Assessment Test: T1, T2(Theory & Practical Components): Closed Book.
2. Cooperative Learning Report, Assignment, Group Presentation, Group Discussion, Project Report, Field Visit Report, Poster Presentation, Seminar, Quiz(written).
3. Pre-Semester & End Semester Theory Examination.

INDIRECT:

1. Course-end survey.(Feedback)

ELECTIVE COURSE -1A: COMPUTER GRAPHICS

SEMESTER: 1
CREDITS: 4

COURSE CODE: P19IT1: A
HOURS/WEEK :4

1. COURSE OUTCOMES

After the successful completion of this course, the student will be able to

CO. No.	Course Outcomes	Level	Unit
CO1	Choose various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling and clipping.	K1	I
CO2	Explain applications, principles, commonly used techniques of computer graphics and algorithms for line drawing, circle and ellipse generating.	K2	I
CO3	Make use of simple 2D graphics with lines, curves and can implement algorithms to rasterize simple shapes, fill and clip polygons.	K3	II
CO4	Analyze the techniques for representing geometrical objects, transformations and 3D viewing.	K4	III
CO5	Determine the concepts of lighting and shading models, textures, ray tracing, hidden surface elimination.	K5	IV
CO6	Build projected objects to naturalized the scene in 2D view and use of illumination methods and color models	K6	V

2. A. SYLLABUS

UNIT I: Output Primitives

12 Hours

Points and Lines - Line Drawing algorithms - Loading frame Buffer - Line function - Circle Generating algorithms - Ellipse – generating algorithms. - Attributes of Output Primitives: Line Attributes - Curve attributes - Color and Grayscale Levels - Area fill attributes.

UNIT II: 2D Geometric Transformations

12 Hours

Basic Transformations – Matrix representations - Composite Transformations-Other Transformations. 2D Viewing: The Viewing pipeline - Viewing coordinate Reference Frame-Window to viewport Coordinate Transformation-2D Viewing Functions-Clipping Operations-Point, Line, Polygon, Curve, Text and Exterior Clippings.

UNIT III: 3D Concepts

12 Hours

3D Display Methods -3D Graphics Packages. 3D Object Representations: Polygon Surfaces- Curved lines and Surfaces-Quadric Surfaces-Super Quadrics-Blobby Objects-Spline representations. 3D Geometric Modeling and Transformations: Translation-Rotation-Scaling-Other Transformations –Composite Transformations -3D Transformation functions.

UNIT IV: Variable –Surface Detection Methods

12 Hours

Classification of Visible –Surface Algorithms-Back-Face Detection –Depth Buffer Method-A Buffer method –Scan –Line Method-Depth-Sorting Method-BSP- Tree

Method-Area-Subdivision Method-Ray casting Methods-Curved Surfaces-Wireframe Methods- Visibility-Detection functions.

UNIT V: Illumination Methods

12 Hours

Properties of Light-Standard Primaries at the Chromaticity Diagram-Intuitive color Concepts- RGB Color Model - YIQ Color Model - CMY Color Model- HSV Color Model – Conversion between HSV and RGB models - Color selection Applications.

2. Topics for Self Study:

S.No	Topics	Web Links
1.	Artificial Intelligence	https://www.youtube.com/watch?v=oV74Najm6Nc
2.	computer vision	https://www.youtube.com/watch?v=-4E2-0sxVUM
3.	Graphics systems and Interfaces	https://xd.adobe.com/ideas/principles/human-computer-interaction/graphical-user-interface-gui-definition/
4.	Image Manipulation-Rendering	https://www.youtube.com/watch?v=7E3Tx53T0Bk

3. Text Book(s):

1. Donald D. Hearn, M. Pauline Baker, “**Computer Graphics**”, 2nd edition, Pearson Education, 2002.

4. Reference Books:

1. William M. Newman, Robert F. Sproull, “**Principles of Interactive Computer Graphics**”, 2nd edition, TMH Publications, 2001.

5. E. Web Links:

- www.tutorialspoint.com
- www.geeksforgeeks.org
- <https://www.youtube.com/watch?v=t7g2oaNs-c8>
- <https://www.youtube.com/watch?v=01YSK5gIEYQ>

3. SPECIFIC LEARNING OUTCOMES (SLO):

Unit/Section	Course Contents	Learning Outcomes	Highest Bloom’s Taxonomic Levels of Transaction
I	Output Primitives, Attributes of Output Primitives		

1.1	Points and Lines Line Drawing algorithms - Loading frame Buffer - Line function.	Recall the core concepts of computer graphics.(K1)	K2
		Build a line using a line drawing algorithm.(K2)	
		List the line functions.(K3)	
1.2	Circle Generating algorithms - Ellipse – generating Algorithms-Attributes of Output Primitives: Line Attributes - Curve attributes - Color and Grayscale Levels- Area Fill Attributes	Explain the Circle generating Algorithm.(K5)	
		Classify the various attributes of output primitives.(K4)	
		Compare line and curve attributes.(K2)	
II	2D Geometric Transformations, 2D Viewing		
2.1	Basic Transformations – Matrix representations - Composite Transformations-Other Transformations.	Discuss transforms including translation, rotation and scaling.(K6)	K3
		Explain composite Transformations.(K5)	
		Apply basic Transformations in 2D images.(K3)	
2.2	The Viewing pipeline - Viewing coordinate Reference Frame-Window to viewport Coordinate Transformation-2D Viewing Functions-Clipping Operations-Point, Line, Polygon, Curve, Text and Exterior Clippings	Identify a typical graphics pipeline.(K3)	
		Construct with a window to viewpoint coordinate.(K3)	
		Build an algorithm for 2D transformations.(K6)	
III	3D Concepts, 3D Geometric Modeling and Transformations		
3.1	3D Concepts :3D Display Methods -3D Graphics Packages. 3D Object Representations: Polygon Surfaces- Curved lines and Surfaces	Examine modelling and transformations in 3D.(K4)	K4
		How to construct a 3D object.(K1)	
		Make use of the polygon surfaces in 3D representation.(K3)	
		Discuss 3D object representations.(K6)	
3.2	Quadric Surfaces-Super Quadrics-Blobby Objects-Spline representations-3D	Compare translation, rotation and scaling in 3D.(K4)	
		Relate 2D and 3D transformations.(K2)	

	Geometric Modeling and Transformations: Translation-Rotation-Scaling-Other Transformations -Composite Transformations -3D Transformation functions.	Categorize the types of spline representations.(K4)	
IV	Visible –Surface Detection Methods		
4.1	Classification of Visible –Surface algorithms-Back-Face Detection -Depth Buffer Method-A Buffer method –Scan –Line Method-Depth Sorting Method.	Discuss various surface detection methods.(K6)	K5
		Measure the benefits of the depth buffer method.(K5)	
		Explain depth sorting method in detail.(K5)	
4.2	BSP-Tree Method-Area-Subdivision Method-Ray casting Methods Curved Surfaces-Wireframe Methods- Visibility-Detection functions	Interpret the steps of the BSP tree.(K5)	
		Analyzing wire frame methods is better in curved surfaces.(K4)	
		Explain Ray casting method.(K5)	
V	Illumination Methods		
5.1	Properties of Light-Standard Primaries at the Chromaticity Diagram- Intuitive color Concepts-RGB Color Model - YIQ Color Model - CMY Color Model	Build the chromaticity diagram(K6).	K6
		Discuss intuitive colour concepts.(K6)	
		Explain the properties of light.(K5)	
		Compare RGB and CMY colour Model.(K2)	
5.2	HSV Color Model –Conversion between HSV and RGB models, Color selection Applications.	Discuss HSV color model in computer graphics.(K6)	
		Explain the different types of color models.(K5)	
		List the steps of Conversion between HSV and RGB models(K4).	
		Develop color selection applications.(K3)	

4. MAPPING (CO, PO, PSO)

P19IT1: A	P O1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PS O 1	PS O 2	PSO 3	PSO 4
CO1	H	H	H	M	M	M	L	L	L	H	M	M	L
CO2	H	H	H	M	M	M	L	L	L	H	M	M	L
CO3	M	M	M	M	H	H	L	L	L	M	H	H	L
CO4	M	M	M	M	H	H	H	L	L	M	H	H	L
CO5	M	M	M	M	H	H	H	L	L	M	H	H	L
CO6	L	L	L	L	L	L	H	H	H	L	L	L	H

L-Low

M-Moderate

H- High

5.COURSE ASSESSMENT

METHODS DIRECT:

1. Continuous Assessment Test: T1, T2(Theory & Practical Components): Closed Book.
2. Cooperative Learning Report, Assignment, Group Presentation, Group Discussion, Project Report, Field Visit Report, Poster Presentation, Seminar, Quiz(written).
3. Pre-Semester & End Semester Theory Examination.

INDIRECT:

1. Course-end survey.(Feedback)

ELECTIVE I: DIGITAL IMAGE PROCESSING

SEMESTER: 1
CREDITS: 4

COURSE CODE: P19IT1: B
HOURS/WEEK: 4

1. COURSE OUTCOMES

After the successful completion of this course, the student will be able to

CO. No.	Course Outcomes	Level	Unit
CO1	Illustrate the fundamental concepts of a digital image processing system.	K2	I
CO2	Choose images in the frequency domain using various transforms.	K3	II
CO3	Make use of different types of image transforms and their properties.	K3	II
CO4	Analyze the techniques for image enhancement and image restoration.	K4	III
CO5	Justify the need for compression and to learn the spatial and frequency domain techniques of image compression.	K5	IV
CO6	Compose Image Segmentation and Representation.	K6	V

2. A. SYLLABUS

UNIT I : Digital Image Fundamentals

12 Hours

Digital image, applications of digital image processing- elements of digital image processing- digital camera, line scan CCD sensor – display element perception – luminance – brightness, contrast- color models – RGB, CMY, HSI -Fourier transforms.

UNIT II: Image Transform

12 Hours

Properties of Unitary transform – 2D DFT – DCT- Discrete wavelet transform- Helming Transform – SVD transform – Slant, Haar transforms.

UNIT III: Image Enhancement and Restoration

12 Hours

Contrast stretching – intensity level slicing – Histogram equalization – spatial averaging – smoothing – Median filtering – nonlinear filters – maximum, minimum, geometric mean – edge detection – degradation model –unconstrained and constrained filtering – removal of blur –Wiener filtering.

UNIT IV: Image Compression

12 Hours

Huffman's coding- truncated Huffman's coding – binary COURSE CODES, arithmetic coding, run length coding- transform coding – JPEG and MPEG coding.

UNIT V: Image Segmentation

12 Hours

Pixel based approach – Feature threshold – choice of feature – optimum threshold – threshold selecting method- region based approach – region growing – region splitting – region merging.

2.B. Topics for Self Study:

S.No	Topics	Web Links
1	Image sharpening and restoration	https://www.youtube.com/watch?v=LBPdd2eECjw
2	Medical field-Remote sensing	https://www.youtube.com/watch?v=augQQ-cWuTk
3	Transmission and encoding	https://slideplayer.com/slide/4919385/
4	Color Processing	https://www.youtube.com/watch?v=9BG7OUu3Qr4

2.C. Text Book(s):

1. Jayaraman S, Esakkirajan S., Veerakumar T., “**Digital Image Processing**”, Tata McGraw Hill Education Private Limited.
2. Gonzalez R.C and Woods R. E, “**Digital Image Processing**” Addison Wesley 2. Anil K Jain Fundamentals of Digital image processing, Prentice Hall.

2.D. Reference Books:

1. S. Annadurai, R. Shanmugalakshmi, “**Fundamentals of Digital Image Processing**”, Pearson Education.
2. Anil. K. Jain, “**Fundamentals of Image Processing**”, PrenticeHall.
3. Maher A., Sid Ahmad, “**Image Processing-Theory, Algorithms and Architectures**”, McGraw Hill Education Private Limited.

2.E. Web Links:

1. <https://www.javatpoint.com/digital-image-processing-tutorial>
2. <https://www.tutorialspoint.com/dip/index.htm>
3. <https://www.youtube.com/watch?v=CVV0TvNK6pk>
4. <https://www.youtube.com/watch?v=ps45YH0ovvo>

3.SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of
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			Transaction
I	Digital Image Fundamentals		
1.1	Digital image, applications of digital image processing- Elements of digital image processing: - Image Acquisition, Image sampling, quantization.	Illustrate image sampling and quantization.(K2)	K2
		Build an application of Digital image processing.(K3)	
		List the elements of digital image processing.(K1)	
1.2	Sensor, scanners and Storage Devices -Digital camera, line scan CCD sensor- Display element perception – luminance – brightness, contrast-Color models – RGB, CMY, HSI -Fourier transforms	Explain the storage device.(K2)	
		Compare RGB and CMY color models.(K2)	
		Distinguish Luminance and brightness.(K4)	
		List various color models in Computer Graphics.(K2)	
II	Image Transform		
2.1	Properties of Unitary transform - 2D DFT- DCT- Discrete wavelet transform- Hotelling Transform, SVD transform – Slant, Haar transforms.	Identify the need of image Transforms.(K3)	K3
		Explain the properties of different types of image transform.(K2)	
		Organize the steps in Discrete Fourier Transform.(K3)	
		Demonstrate DCT in computer graphics.(K2)	
III	Image Enhancement and Restoration		
3.1	Contrast stretching – intensity level slicing – Histogram equalization – spatial averaging – smoothing	Examine Histogram equalization(K4).	K3
		Illustrate the steps of smoothing.(K2)	
		Discuss the techniques in spatial and frequency domains.(K5)	
3.2	Median filtering – nonlinear filters – maximum, minimum, geometric mean – edge detection – degradation model- unconstrained and constrained filtering – removal of blur –Wiener filtering	Illustrate degradation model.(K2)	
		Contrast median filtering and nonlinear filters.(K2)	
		Explain the types of Image denoising techniques.(K5)	
		Analyze the causes of image degradation.(K4)	
IV	Image Compression		
4.1	Huffman’s coding- truncated Huffman’s coding-binary Codes, arithmetic coding, run length coding- transform coding- JPEG and MPEG coding.	Justify the need of image compression.(K5)	K5
		Explain Run length encoding algorithm.(K5)	

CORE COURSE – IV: DATA COMMUNICATION NETWORKS

SEMESTER: II
CREDITS : 4

COURSE CODE: P19IT204
HOURS/WEEK:4

1. COURSE OUTCOMES

After the successful completion of this course, the student will be able to

CO. No.	Course Outcomes	Level	Unit
CO1	Explain Data Communications System and its components and explain the types of transmission media with real time applications.	K2	I
CO2	Identify an error occurs in data link layer by error detection and correction mechanisms	K3	II
CO3	Distinguish various multiplexing techniques in data transmission.	K4	II
CO4	Examine the switching mechanisms and the necessity of ATM.	K4	III
CO5	Determine the routing protocols and analyze how to assign the IP addresses for the given network and establish congestion occurs in network layer.	K5	IV
CO6	Discuss with the protocols of computer networks, and how they can be used to assist in network design and implementation.	K6	V

2. A. SYLLABUS

UNIT– I: Introduction to Network and Communication Media **12 Hours**

Overview: A Communication model - Data Communications – Networks – The Internet – Protocol Architecture: The need for a Protocol Architecture – The TCP/IP protocol Architecture. – The OSI Model –Standardization within a Protocol Architecture - Data Transmission: Concepts & terminology–Analog & Digital Data Transmission – Transmission Impairments Guided & Wireless Transmission: Guided Transmission Media – Wireless Transmission – Wireless Propagation.

UNIT–II: Digital Data Communication Techniques **12 Hours**

Digital Data Communication Techniques: Asynchronous and Synchronous Transmission – Types of Errors–Error Detection – Error Correction - Data Link Control Protocols: Flow Control – Error Control – High Level Data Link Control (HDLC) - Multiplexing: Frequency Division Multiplexing – Synchronous Time Division Multiplexing – Statistical Time Division Multiplexing – Asymmetric Digital Subscriber Line – xDSL.

UNIT–III: Switching and Asynchronous Transfer Mode **12 Hours**

Circuit Switching and Packet Switching: Switched Communications Networks–Circuit Switching Networks – Circuit Switching Concepts – Packet Switching Principles–X.25–Frame Relay Asynchronous Transfer Mode: Protocol Architecture – ATM Logical Connections – ATM Cells – Transmission of ATM Cells – ATM Service Categories.

UNIT–IV: Routing and Local Area Network**12 Hours**

Routing in Switched Networks: Routing in Packet Switching Networks – Least Cost Algorithms. Congestion Control in Data Networks: Effects of Congestion – Congestion Control - Traffic Management. Local Area Networks – LAN Overview: Background – Topologies and Transmission Media – LAN Protocol Architecture – Bridges – Layer2 and Layer3 Switches.

UNIT–V: Communication Architecture and Protocols**12 Hours**

Communication Architecture and Protocols: - Internetwork Protocols: Basic Protocol Functions – Principles of Internetworking – Internet Protocol Operation – Internet Protocol – IPV6. - Transport Protocols: Connection Oriented Transport Protocol Mechanisms – TCP – UDP. Internet Applications : Electronic Mail – SMTP and MIME – Network Management (SNMP) – Internet Directory Service – Web Access - HTTP.

2.B. Topics for Self Study:

S.No.	Topics	Web Links
1	Biometric Authentication	https://www.omnisecu.com/security/biometric-authentication.php
2	Types of attacks	https://www.omnisecu.com/security/types-of-network-attacks.php
3	Types of malwares	https://www.omnisecu.com/security/types-of-malwares.php
4	Firewalls	https://www.omnisecu.com/security/infrastructure-and-email-security/firewalls.php
5	E- mail Security	https://www.omnisecu.com/security/infrastructure-and-email-security/e-mail-security.php

2.C. Text Book(s):

1. William Stallings, “**Data and Computer Communications**”, 8th Edition, Pearson Education, 2007.

2.D. Reference Books

1. Behrouz A. Forouzan, “**Data Communications and Networking**”, 4th Edition, Tata McGraw Hill Publishing Company, 2006.
2. Andrew S. Tannenbaum, David J. Wetherall, “**Computer Networks**”, 5th Edition, Pearsons Education, 2011.

2.E. Web Links:

1. https://www.tutorialspoint.com/data_communication_computer_network/index.html
2. <https://www.pinterest.com/maskuthar/data-communication-computer-network-tutorial/>
3. <https://www.youtube.com/watch?v=sG6WGvzmVaw>
4. <https://www.guru99.com/data-communication-computer-network-tutorial.html>
5. <https://www.youtube.com/watch?v=mYWslbszYQ&list=PLtJDAcNXilyR78LDCbEUwwmMYTnuTeS5S&index=17>

3.SPECIFIC LEARNING OUTCOME (SLO)

Unit/ Section	Course Content	Learning outcomes	Highest Blooms Taxonomic Level of Transaction	
I	Introduction to Network and Communication Media			
1.1	Overview: A Communication model - Data Communications – Networks – The Internet	<ul style="list-style-type: none"> ● Outline the purpose of communication (K2) ● Identify components of the communication model. (K3) ● Recognize types of networks.(K1) ● Label the features of the internet. (K1) 	K2	
1.2	Protocol Architecture: The need for a Protocol Architecture – The TCP/IP protocol Architecture. – The OSI Model –Standardization within a Protocol Architecture	<ul style="list-style-type: none"> ● Describe protocol architecture. (K1) ● Identify the types of protocol. (K3) ● Explain layers in OSI model. (K2) ● Explain the functionality of each layer in OSI model (K5) ● Interpret the standards to define protocol structure(K2) 		
1.3	Data Transmission: Concepts & terminology–Analog & Digital Data Transmission – Transmission Impairments	<ul style="list-style-type: none"> ● Compare the types of signals in communication. (K2) ● List the problems in digital data transmission. (K1) ● Summarize transmission difficulties. (K2) ● Discuss impairments in real time transmission. (K6) 		
1.4	Guided & Wireless Transmission: Guided Transmission Media – Wireless Transmission – Wireless Propagation.	<ul style="list-style-type: none"> ● Classify the types of transmission medium (K4) ● Explain transmission media used in real time. (K5) ● Discuss guided media with real time examples. (K6) ● Relate the purpose of wireless transmission. (K2) ● Illustrate difficulties in wireless data transmission. (K2) 		
II	Digital Data Communication Techniques			

2.1	Digital Data Communication Techniques: Asynchronous and Synchronous Transmission – Types of Errors–Error Detection – Error Correction	● Explain the digital communication techniques (K2)	K3
		● List techniques to transmit digital data. (K1)	
		● Categorize types of errors occurred while transmission. (K4)	
		● Classify errors in transmission. (K2)	
		● Compare error detection methods. (K5)	
		● Distinguish errors in transmission. (K4)	
		● Predict the position of error data using error correction methods. (K6)	
2.2	Data Link Control Protocols: Flow Control – Error Control – High Level Data Link Control (HDLC)	● Identify data link control protocols. (K3)	K3
		● Compare flow control mechanisms used in digital data transmission. (K4)	
		● Explain error control techniques used in the data link layer. (K5)	
		● Make use of the HDLC protocol in the data link layer of OSI model. (K3)	
2.3	Multiplexing: Frequency Division Multiplexing – Synchronous Time Division Multiplexing – Statistical Time Division Multiplexing –Asymmetric Digital Subscriber Line – xDSL.	● Examine the purpose of multiplexing. (K4)	K3
		● Classify multiplexing mechanisms used in communication. (K2)	
		● Inspect the drawback of multiplexing techniques. (K4)	
III	Switching and Asynchronous Transfer Mode		
3.1	Circuit Switching and Packet Switching: Switched Communications Networks– Circuit Switching Networks – Circuit Switching Concepts – Packet Switching Principles– X.25–Frame Relay	● Classify switching principles used in communication. (K2)	K4
		● Elaborate switching concepts. (K6)	
		● Analyze drawbacks in different types of switching. (K4)	
		● Discuss circuit and packet switching. (K6)	
3.2	Asynchronous Transfer Mode: Protocol Architecture – ATM Logical Connections – ATM Cells –Transmission	● Explain the purpose of an ATM. (K5)	K4
		● Define layers in the ATM. (K1)	
		● Discuss the functionalities of ATM layers. (K6)	

	of ATM Cells – ATM Service Categories.	<ul style="list-style-type: none"> ● Inspect the services provided by ATM layers (K4) 	
IV	Routing and Local Area Network		
4.1	Routing in Switched Networks: Routing in Packet Switching Networks – Least Cost Algorithms.	<ul style="list-style-type: none"> ● Explain the purpose of routing algorithms. (K5) 	K5
		<ul style="list-style-type: none"> ● Discuss the routing algorithms used in networks. (K6) 	
		<ul style="list-style-type: none"> ● Compare the least cost using routing algorithms in a network (K4) 	
		<ul style="list-style-type: none"> ● Inspect algorithm with example. (K4) 	
4.2	Congestion Control in Data Networks: Effects of Congestion – CongestionControl - Traffic Management. Control - Traffic Management.	<ul style="list-style-type: none"> ● Define problems occurred in data transmission. (K1) 	K5
		<ul style="list-style-type: none"> ● Explain the situation of congestion. (K2) 	
		<ul style="list-style-type: none"> ● Identify a problem when congestion occurred. (K3) 	
		<ul style="list-style-type: none"> ● Explain how to manage the transmission when congestion occurred. (K5) 	
	Local Area Networks: LAN Overview: Background – Topologies and Transmission Media – LAN Protocol Architecture – Bridges – Layer2 and Layer3 Switches.	<ul style="list-style-type: none"> ● Explain the topologies used in LAN. (K2) 	K5
		<ul style="list-style-type: none"> ● Identify protocol architecture used in LAN. (K3) 	
		<ul style="list-style-type: none"> ● Discuss the hardware used in OSI layers. (K6) 	
		<ul style="list-style-type: none"> ● Compare switch and bridge in transmission of digital data. (K4) 	
V	Communication Architecture Protocols and Internet Applications		
5.1	Internetwork Protocols: Basic Protocol Functions – Principles of Internetworking – Internet Protocol Operation – Internet Protocol – IPV6.	<ul style="list-style-type: none"> ● Explain the concepts used in internetworking. (K4) 	K6
		<ul style="list-style-type: none"> ● Illustrate the layers in IP protocol.(K2) 	
		<ul style="list-style-type: none"> ● Discuss the various fields in IP protocol architecture. (K6) 	
		<ul style="list-style-type: none"> ● Compare IPv4 and IPv6. (K5) 	
		<ul style="list-style-type: none"> ● Examine the necessity of IPv6. (K4) 	
5.2	Transport Protocols: Connection Oriented Transport Protocol Mechanisms – TCP – UDP.	<ul style="list-style-type: none"> ● Define connection oriented and connectionless protocol. (K1) 	K6
		<ul style="list-style-type: none"> ● Identify the protocols used in transport layer. (K3) 	
		<ul style="list-style-type: none"> ● Discuss the architecture of TCP and UDP. (K6) 	
		<ul style="list-style-type: none"> ● Discuss the features of TCP and UDP. (K6) 	

5.3	Internet Applications: Electronic Mail – SMTP and MIME – Network Management (SNMP) – Internet Directory Service – Web Access - HTTP.	<ul style="list-style-type: none"> Define how an email works. (K1) 	
		<ul style="list-style-type: none"> Discuss the components involved in the email communication process. (K6) 	
		<ul style="list-style-type: none"> Examine the purpose of SMTP and MIME protocol in the email process. (K4) 	
		<ul style="list-style-type: none"> Discuss how the web pages are accessed through networking protocols. (K6) 	
		<ul style="list-style-type: none"> Explain how the web documents are organized in internet directories. (K5) 	

4.MAPPING (CO, PO, PSO)

P19IT204	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	H	L	L	L	L	L	L	L	L	L	M	L	L
CO2	L	H	L	L	M	L	L	L	L	H	L	L	L
CO3	L	H	L	L	M	L	L	L	L	H	L	L	L
CO4	L	M	L	M	L	M	L	L	L	L	L	M	L
CO5	L	L	M	L	L	H	L	L	M	L	H	L	L
CO6	L	L	L	L	M	L	M	M	H	M	L	H	L

L-Low

M-Moderate

H- High

5.COURSE ASSESSMENT

METHODS DIRECT:

- Continuous Assessment Test: T1, T2 (Theory Components): Closed Book
- Cooperative Learning Report, Assignment, Group Presentation, Group Discussion, Field Visit Report, Seminar, Quiz (written).
- Pre-Semester & End Semester Theory Examination

INDIRECT:

- Course end survey (Feedback)

Core V: WEB PROGRAMMING

SEMESTER: II

COURSE CODE: P19IT205

CREDITS: 4

HOURS/WEEK: 4

1. Course Outcomes:

After the successful completion of this course, the student will be able to

CO. No.	CO Statement	Level	Unit
CO1	Demonstrate web page creation using HTML and its extension	K2	I
CO2	Identify the concepts of CSS and JavaScript	K3	II
CO3	Apply the jQuery and AJAX concepts in database	K3	III
CO4	Distinguish .NET framework and C# basic concepts	K4	III
CO5	Explain Classes and Class Members in C#	K5	IV
CO6	Construct Web services and Deployment of web programming	K6	V

2. A. SYLLABUS

UNIT – 1: HTML and XHTML:

12 Hours

Structuring Documents for the Web - Links and Navigation - Images, Audio, and Video – Tables – Forms – Frames.

UNIT – 2: CSS and JavaScript

12 Hours

Cascading Style Sheets - More Cascading Style Sheets - Learning JavaScript - Working with JavaScript – HTML5.

UNIT – 3: JQuery and C#

12 Hours

Introduction to jQuery - Selecting and Filtering – Events - Arrays and Iteration – AJAX.
Introducing C#: What is the .NET Framework? - What is C#? Writing a C# Program – Variables and Expressions – Flow Control – Functions.

UNIT – 4: Defining Classes & Class Members

12 Hours

Class Definitions in C# - System Object – Constructors and Destructors. **Defining Class Members:** Member Definitions – Interface Implementation.

UNIT – 5: Web Programming:

12 Hours

ASP.NET Web Programming – Web Services – Deploying Web Applications.

2.B. Topics for Self Study:

S. No.	Topics	Web Links
1	HTML5	https://www.tutorialspoint.com/html5/index.htm
2	CSS 3	https://www.tutorialspoint.com/css/css3_tutorial.htm
3	Bootstrap	https://getbootstrap.com/docs/4.4/getting-started/introduction/
4	Xamarin	https://dotnet.microsoft.com/apps/xamarin

2.C. Text Book(s):

1. Jon Duckett, “**Beginning HTML, XHTML, CSS, and JavaScript**”, Wiley Publishing Inc. 2010. (for unit 1)
2. Richard York, “**Beginning JavaScript and CSS Development with JQuery**”, Wiley Publishing Inc., 2009. (for unit 2, 3)
3. Karli Watson, Christian Nagel, Jacob Hammer Pedersen, Jon Reid, and Morgan Skinner, “**Beginning Visual C# 2010**”, Wiley Publishing, Inc., 2010. (for units 3, 4 & 5)

2.D. Reference Books:

1. Matt J. Crouch “**ASP.NET and VB.NET Web Programming**”, Pearson Education. 2010.
2. Matthew Mac Donald, “**ASP.NET:-The Complete Reference**”, TMH, New Delhi, 2002

2.E. Web Links:

1. <https://www.w3schools.com/html/>
2. <https://www.w3schools.com/css/>
3. <https://www.javascript.com/>
4. <https://jquery.com/>
4. <http://msdn.microsoft.com/>

3.SPECIFIC LEARNING OUTCOMES (SLO)

Unit / Section	Course Contents	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
I	HTML and XHTML		
1.1	HTML and XHTML: Structuring Documents for the Web - Links and Navigation - Images, Audio, and Video – Tables – Forms – Frames.	<ul style="list-style-type: none">● Demonstrate the concepts in HTML● Relate the tags available in HTML● Summarize the multimedia operations● Illustrate the concepts of Tables, Forms and Frames	K2
II	CSS and JavaScript		
2.1	CSS and JavaScript: Cascading Style Sheets - More Cascading Style Sheets - Learning JavaScript - Working with JavaScript – HTML5.	<ul style="list-style-type: none">● Apply the internal and external style sheets● Identify More features of Cascading Style Sheets● Make use of Java Script● Model a HTML5 web page	K3
III	JQuery and C#		

3.1	JQuery and C#: Introduction to jQuery - Selecting and Filtering – Events - Arrays and Iteration – AJAX	<ul style="list-style-type: none"> Identify the Concepts in JQuery Make use of selection and filtering concepts in JQuery Model a web Page with AJAX controls 	K3
3.2	Introducing C#: What is the .NET Framework? - What is C#? Writing a C# Program – Variables and Expressions – Flow Control – Functions.	<ul style="list-style-type: none"> Discover the features of .NET Framework Analyze how to write a C# program Examine the expressions, Flow Control and Functions in C# 	K4
IV	Defining Classes		
4.1	Defining Classes: Class Definitions in C# - System Object – Constructors and Destructors.	<ul style="list-style-type: none"> Explain the concepts of classes and objects in C# Importance of Constructors and Destructor in C# programming 	K5
4.2	Defining Class Members: Member Definitions – Interface Implementation.	<ul style="list-style-type: none"> Explain Member definitions and its use Interpret the implementation of Interface using C# 	K5
V	Web Programming		
5.1	Web Programming :ASP.NET Web Programming – Web Services – Deploying Web Applications.	<ul style="list-style-type: none"> Build a Web Application using .NET Discuss ASP.NET web programming Construct a web service extracting XML Elaborate the Deployment of Web Applications 	K6

4.MAPPING (CO, PO, PSO)

P19IT205	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	H	H	H	M	M	M	M	L	L	H	M	M	L
CO2	H	H	M	H	M	M	L	L	L	H	M	M	L
CO3	H	H	H	M	M	M	L	L	L	H	M	M	L
CO4	M	M	H	H	H	M	M	M	L	M	H	H	L
CO5	M	H	M	H	H	H	M	L	L	M	H	H	M
CO6	L	L	M	M	M	H	L	M	L	M	L	H	M

L – Low

M – Moderate

H – High

5. COURSE ASSESSMENT

METHODS DIRECT:

1. Continuous Assessment Test: T1, T2 (Theory & Practical Components):
Closed Book
2. Open Book Test.
3. Cooperative Learning Report, Assignment, Group Presentation, Group Discussion, Project Report, Poster Presentation, Seminar, Quiz (written).
4. Pre-Semester & End Semester Theory Examination

INDIRECT:

1. Course end survey (Feedback)

Core VI: MOBILE TECHNOLOGIES

SEMESTER: III
CREDITS: 5

COURSE CODE: P19IT206
HOURS/WEEK: 6

1. COURSE OUTCOMES

After the successful completion of this course, the student will be able to

CO. No.	Course Outcomes	Level	Unit
CO1	Define Mobile Telecommunication networks and wireless communication systems.	K1	I
CO2	Demonstrate the understanding of mobile computing and wireless networking.	K2	II
CO3	Compare mobile databases for the best fit transaction process in mobile environment.	K3/K4	III
CO4	Categorize various Mobile Operating Systems.	K4	IV
CO5	Determine the android application with suitable User Interface and data manipulation.	K5	IV
CO6	Develop Applications for Android Devices includes content providers and networking.	K6	V

2. A. SYLLABUS

UNIT I: Basics of Communication Technologies

15 Hours

Basics of Communication Technologies: Types of Telecommunication Networks – Components of a Wireless Communication System – Architecture of Mobile Telecommunication Systems – Wireless Networking Standards– WLAN– Bluetooth Technology– Introduction to Mobile Computing and Wireless Networking: Mobile Computing – Mobile Computing Vs. Wireless Networking – Characteristics of Mobile Computing - Structure of Mobile Computing Applications – Cellular Mobile Communication – GSM – GPRS – UMTS. – MAC Protocols: Properties – Issues – Taxonomy –Assignment Schemes – MAC Protocols for Ad Hoc Networks.

UNIT II: Mobile Internet Protocol

15 Hours

Mobile Internet Protocol : – Mobile IP – Packet Delivery – Overview – Desirable Features – Key Mechanism – Route Optimization – DHCP - Mobile Transport Layer : Overview of TCP/IP –Terminologies – Architecture – Operations – Application Layer Protocols of TCP – Adaptation of TCP Window – Improvement in TCP Performance – Mobile Databases : Introduction – Issues of Transaction Processing – Transaction Processing Environment – Data Dissemination – Transaction Processing in Mobile Environment - Data Replication.

UNIT III: Mobile Ad Hoc Networks (MANETs)

15 Hours

Mobile Ad Hoc Networks (MANETs): – Basic concepts – Characteristics – Applications – Design Issues – Routing – Traditional Routing Protocols – Basic concepts of Routing – Popular MANET Routing Protocols – Vehicular Ad Hoc Networks (VANETs) – MANETs Vs. VANETs – Security Issues – Security Attacks on Ad Hoc Networks – Wireless Sensor Networks (WSNs): Introduction – WSN versus MANET – Applications – Architecture of the

Sensor Node – Challenges in the Design of an effective DSN – Characteristics of Sensor Networks – WSN Routing Protocols – Target Coverage - Operating Systems for Mobile Computing : Basic Concepts – Special Constraints and Requirements – Commercial Mobile OSs – Comparative Study of Mobile OSs – OS for Sensor Networks.

UNIT IV: Getting Started with Android

15 Hours

Getting Started with Android -- Activities, Fragments and Intents – Android User Interface – Designing User Interface with views – Displaying Pictures and Menus with Views – Data Persistence.

UNIT V : Content Providers

15 Hours

Content Providers – Messaging – Location Based Services – Networking – Developing Android Services – Publishing Android Applications.

2.B. Topics for Self Study:

S.No.	Topics	Web Links
1	Communication Technologies	https://www.tutorialspoint.com/communication_technologies/communication_technologies_mobile.htm
2	Mobile Operating Systems	https://www.slideshare.net/ash1790/mobile-operating-system-13102277
3	Mobile Devices with AI features	https://www.slideshare.net/ash1790/mobile-operating-system-13102277
4	Introduction to Android Q	https://android-developers.googleblog.com/2019/03/introducing-android-q-beta.html

2.C.Text Book(s):

1. Prasant Kumar Pattnaik, Rajib Mall, “**Fundamentals of Mobile Computing**”, PHI Learning
2. Wei Meng Lee, “**Beginning Android 4 Application Development**”, Wiley India Pvt. Ltd, 2012.

2.E. Reference Book(s):

1. Ashok K Talkuder, Hasen Ahmed, Roopa R Yavagal, “**Mobile Computing**”, 2nd Edition, Tata McGraw Hill Publishing Company Limited, 2010.
2. Jochen Schiller, “**Mobile Communications**”, Pearson Education, 2008.
3. Reto Meir, “**Professional Android 4 Application Development**”, Wiley India Pvt. Ltd., 2012.
4. Pradeep Kotari, “**Android Application Development Black Book**”, Dreamtech Press, 2014.

2.D. Web Links:

1. <https://www3.nd.edu/~cpoellab/teaching/cse40814/Lecture1-Handouts.pdf>
2. <ftp://ftp.micronet-rostov.ru/linux-support/books/programming/Mobile-Apps/Wrox.Beginning.Android.4.Application.Development.Mar.2012.pdf>
3. <https://developer.android.com/samples>

3.SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
I	Basics of Communication Technologies		
1.1	Basics of Communication Technologies: Types of Telecommunication Networks – Components of a Wireless Communication System – Architecture of Mobile Telecommunication Systems – Wireless Networking Standards– WLAN– Bluetooth Technology	Recall the concepts of Wireless Communications and Server applications	K2
		Recall the concepts and explain the features of CAN, LAN and Internetworks and make use of it	
		Illustrate the Components of a wireless communication system	
		List of wireless network standards	
		Outline the Architecture of wireless LAN	
		Categorize the Applications of WLANs	
		Summarize Protocol stack of Bluetooth	
1.2	Introduction to Mobile Computing and Wireless Networking Mobile Computing – Mobile Computing Vs. Wireless Networking – Characteristics of Mobile Computing - Structure of Mobile Computing Applications – Cellular Mobile Communication – GSM – GPRS – UMTS	Define Mobile Computing	
		Compare the Mobile computing and wireless networking	
		List the Characteristics of mobile computing	
		Classify the Generations of cellular communications	
		Illustrate location based Services and their Architecture	
1.3	MAC Protocols Properties – Issues – Taxonomy –Assignment Schemes – MAC Protocols for Ad Hoc Networks	Name the protocols with their properties	
		Analyze the issues in MAC protocols	
		Compare the different schemes like FDMA, TDMA, CDMA, ALOHA and CSMA Schemes	
II	Mobile Internet Protocol		
2.1	Mobile Internet Protocol	Define Mobile IP	K3
		Interpret the Features of Mobile IP	

	Mobile IP – Packet Delivery – Overview – Desirable Features – Key Mechanism – Route Optimization – DHCP	Demonstrate the Key Mechanism used in Mobile IP Analyze and conclude how the Route Optimization works Test the job of Dynamic Host Configuration Protocol	
2.2	Mobile Transport Layer Overview of TCP/IP – Terminologies – Architecture – Operations – Application Layer Protocols of TCP – Adaptation of TCP Window – Improvement in TCP Performance	Explain the working of Protocols in mobile transport layer including TCP/IP Illustrate the working of Application Layer Protocols of TCP Analyze how the Adaptation of TCP Window Discuss the Popular TCP Congestion Control and TCP in mobile networks	
2.3	Mobile Databases Introduction – Issues of Transaction Processing – Transaction Processing Environment – Data Dissemination – Transaction Processing in Mobile Environment – Data Replication.	Explain the issues of Transaction Processing Categorize the Transaction processing environment Demonstrate how to process the transaction in the mobile environment Illustrate the data replication	
III	Mobile Ad Hoc Networks (MANETs)		
3.1	Mobile Ad Hoc Networks (MANETs) Basic concepts – Characteristics – Applications – Design Issues – Routing – Traditional Routing Protocols – Basic concepts of Routing – Popular MANET Routing Protocols – Vehicular Ad Hoc Networks (VANETs) – MANETs Vs. VANETs	Explain the basic concepts of MANETs. Inspect how security is affected on Ad hoc networks List the characteristics of MANETs Analyze the issues of MANETs Explain VANETs and Differentiate MANET and VANET Demonstrate the basic concepts of routing protocols List the security issues of MANET Elaborate how security is affected on Ad hoc networks	K4
	Wireless Sensor Networks (WSNs) Introduction – WSN versus MANET – Applications – Architecture of the Sensor Node – Challenges in the Design of an effective DSN – Characteristics of	Define WSN Compare WSN and MANET Explain the architecture of the sensor node List the challenges in the effective DSN Illustrate the characteristics of sensor networks Classify WSN routing protocols	

	Sensor Networks – WSN Routing Protocols – Target Coverage		
	Operating Systems for Mobile Computing Basic Concepts – Special Constraints and Requirements – Commercial Mobile OSs – Comparative Study of Mobile OSs – OS for Sensor Networks	Illustrate the Basic Concepts of Mobile operating systems Discuss the Special Constraints and Requirements for mobile computing List of commercial mobile operating systems Compare Mobile Oss Explain the Sensor Networks	
IV	Introduction to Android, Activities, User Interface, Views		
4.1	Introduction to Android, Activities, User Interface, Views: Getting Started with Android → Activities, Fragments and Intents – Android User Interface – Designing User Interface with views – Displaying Pictures and Menus with Views – Data Persistence.	Classify Android versions and its feature set Identify the Android architecture Demonstrate how to develop your first Android application Construct the life cycles of an activity Elaborate how to adapt and manage changes in screen orientation Explain how to make use of the basic views in Android to design your user interface Discuss options menus and context menus Explain how to Store simple data using the Shared Preferences object Create and organize a SQLite database	K5
V	Content Providers, Messaging, Networking, Publishing Android Applications		
5.1	Content Providers, Messaging, Networking, Publishing Android Applications: Content	Explain how to make use of a content provider in Android Create and use your own content provider Elaborate how to receive incoming SMS messages Illustrate how to send e-mail messages from your application Explain how to consume JSON web services Demonstrate how to create a service that runs in the background Analyze, how to perform repeated tasks in a service Analyze how an activity and a service communicate	K6

	Providers – Messaging – Location Based Services – Networking – Developing Android Services – Publishing Android Applications.		
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4.MAPPING (CO, PO, PSO)

P19IT20 6	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	H	H	H	M	M	H	H	M	H	H	L	H	H
CO2	H	H	H	M	M	H	H	H	L	H	M	M	M
CO3	M	M	M	H	H	H	H	M	M	L	H	M	L
CO4	M	M	M	H	H	H	M	M	L	M	H	H	H
CO5	L	L	M	M	M	M	H	H	H	H	M	H	M
CO6	H	L	M	M	M	M	H	H	H	H	M	M	M

L – Low

M – Moderate

H – High

5. COURSE ASSESSMENT METHODS

DIRECT:

1. Continuous Assessment Test: T1, T2 (Theory & Practical Components):
Closed Book
2. Open Book Test.
3. Cooperative Learning Report, Assignment, Group Presentation, Group Discussion, Project Report, Poster Presentation, Seminar, Quiz (written).
4. Pre-Semester & End Semester Theory Examination

INDIRECT:

1. Course end survey (Feedback)

Core Practical III: WEB PROGRAMMING LAB

SEMESTER: II
CREDITS: 2

COURSE CODE: P19IT2P3
/HOURS/WEEK 40

1. COURSE OUTCOMES

After the successful completion of this course, the students will be able to

CO. No.	CO Statement	Level	Exercise
CO1	Build Web Pages for Department and Travel Agency using HTML Concepts	K3	1 -2
CO2	Construct Web Pages for menu card and student admission process apply CSS and use forms	K3	3 – 4
CO3	Examine the features of JavaScript and JQuery to validate data and perform events	K4	5 – 6
CO4	Determine the form controls in ASP.NET and apply validations , CSS in registration form	K5	7 – 8
CO5	Interface ASP.NET web application to manipulate data from database and XML to display in Grid Control	K5	9 – 11
CO6	Develop Job portal , application of Bharathidasan University, portal for BHC and a simple web service	K6	12 – 15

Ex. No.	Exercise
	HTML, CSS, JavaScript and JQuery:
1.	Create Web Pages for I. T. Department using features in HTML (use frames, tables, links and navigation).
2.	Create Web Pages for a travel agency using frames, tables and lists. Also use images, audio and video attributes.
3.	Create Web Pages to display the menu card of a hotel using CSS style sheets.
4.	Create Web Pages using forms for College Students Admission Process. (Use list box, Push button, Radio button, Command Button, Rich text box, text box, etc where ever applicable).
5.	Create a Registration Form using Java Script. Apply appropriate data validations.
6.	Write a program using Java Script and JQuery to display the calculator in a web page.
	ASP.NET with C#:
7.	Create an ASP.NET Web form using web control to enter Email Registration form and also apply appropriate validation techniques in Email registration form using validation controls.
8.	Write an ASP.NET application to retrieve form data & display it in the client browser in table format (apply CSS styles for look and feel).
9.	Create a Web application to store the details of the books available for sale in XML format.
10.	Create a Web application using ADO.Net that performs basic data manipulations such as : (i) Insertion (ii) Updation (iii) Deletion (iv) Selection
11.	Create an application using Data grid control to access information's form table in SQL Server.
12.	Develop a Job Portal.

13.	Write an ASP.NET application for registering in an on-line course of Bharathidasan University.
14.	Develop a Portal for Bishop Heber College.
15.	Display a “HELLO” message using Web Services.

2. Topics for Self Study

S.No	Topics	Web Links
1	Menus in asp.net	https://docs.microsoft.com/en-us/dotnet/api/system.web.ui.webcontrols.menu?view=netframework-4.8
2	CSS3	https://www.w3schools.com/css/
3	Bootstrap 4	https://www.w3schools.com/bootstrap4/bootstrap_get_started.asp

3.SPECIFIC LEARNING OUTCOMES (SLO)

Ex No	Lab Exercises	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
1	Create Web Pages for I. T. Department using features in HTML (use frames, tables, links and navigation).	<ul style="list-style-type: none"> ● Build Web Pages for IT Department using the features of HTML ● Apply the features Tables for time table, frames to display multiple pages and link the web pages for navigation 	K3
2	Create Web Pages for a travel agency using frames, tables and lists. Also use images, audio and video attributes.	<ul style="list-style-type: none"> ● Build Web Pages for travel agency using the features of HTML ● Apply the features of frames for booking tickets, tables for schedule and lists for timing ● Make use of the Multimedia attributes 	K3
3	Create Web Pages to display the menu card of a hotel using CSS style sheets.	<ul style="list-style-type: none"> ● Build Web Pages to display Menu card using the features of HTML ● Apply Internal and External Style sheets ● Make use of the attributes in tags 	K3
4	Create Web Pages using forms for College Students Admission Process. (Use list box, Push button, Radio button, Command	<ul style="list-style-type: none"> ● Build Web Pages using forms for College Students Admission Process 	

	Button, Rich text box, text box, etc where ever applicable).	<ul style="list-style-type: none"> ● Apply radio button for gender, text box for name, list box to select course and button to submit or reset 	K3
5	Create a Registration Form using Java Script. Apply appropriate data validations.	<ul style="list-style-type: none"> ● Discover the features of Java Script ● Analyze and apply the appropriate validations in the HTML form controls 	K4
6	Write a program using Java Script and JQuery to display the calculator in a web page.	<ul style="list-style-type: none"> ● Discover the features of Java Script and JQuery ● Examine the controls to design calculator ● Inspect the events working based on the user input 	K4
7	Create an ASP.NET Web form using web control to enter Email Registration form and also apply appropriate validation techniques in Email registration form using validation controls.	<ul style="list-style-type: none"> ● Determine the web controls used to create Email registration form ● Compare the Validation controls available in ASP.NET and apply appropriate validation for Web Controls 	K5
8	Write an ASP.NET application to retrieve form data & display it in the client browser in table format (apply CSS styles for look and feel).	<ul style="list-style-type: none"> ● Determine the web controls in ASP.NET to receive form data ● Choose and Apply CSS Style for better look and feel ● Explain the displayed output in the client Browser 	K5
9	Create a Web application to store the details of the books available for sale in XML format.	<ul style="list-style-type: none"> ● Explain how data is stored in XML ● Interpret the details of books available for sale ● Explain the retrieving process 	K5
10	Create a Web application using ADO.Net that performs basic data manipulations such as : (i) Insertion (ii) Updation (iii) Deletion (iv) Selection	<ul style="list-style-type: none"> ● Explain how ADO.NET works ● Determine the manipulation of data from and to database performing various operations ● Interpret the data displayed in appropriate format 	K5
11	Create an application using Data grid control to access information's form table in SQL Server.	<ul style="list-style-type: none"> ● Explain the SQL Server Database ● Determine the uses of Data Grid control ● Interpret the retrieval of information from table to grid 	K5

12	Develop a Job Portal.	<ul style="list-style-type: none"> Develop a job portal with necessary web pages and navigate between them Plan the pages and controls to use Test the application forms with proper validations 	K6
13	Write an ASP.NET application for registering in an on-line course of Bharathidasan University.	<ul style="list-style-type: none"> Develop an application for registering online course at Bharathidasan University Plan the controls and validations to use Create the events based on the designed controls Test the working of application 	K6
14	Develop a Portal for Bishop Heber College.	<ul style="list-style-type: none"> Develop a portal for BHC with necessary web pages and navigate between them Plan the pages, menu and other controls to use Test the application forms with proper validations and working of portal 	K6
15	Display a “HELLO” message using Web Services.	<ul style="list-style-type: none"> Build a basic web service to be consumed by other languages Test the functions GET and POST Elaborate the basic web service that distribute the sample data 	K6

4.MAPPING (CO, PO, PSO)

P19IT2P3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	H	H	H	M	M	M	L	L	L	H	M	M	L
CO2	H	H	H	M	M	M	M	L	L	H	M	M	L
CO3	H	H	H	M	M	M	L	L	L	H	M	M	L
CO4	M	M	M	H	H	H	H	M	L	M	H	H	M
CO5	M	H	M	H	H	H	M	M	L	M	H	H	M
CO6	H	L	L	L	L	L	L	L	L	M	H	H	L

L – Low

M – Moderate

H – High

5. COURSE ASSESSMENT METHODS

DIRECT:

- Continuous Assessment Test: T1, T2 (Practical Components): Closed Book
- Cooperative Learning Report, Assignment, Group Discussion, project Report, Field Visit Report, Seminar.
- Pre/Post Test, Viva, Report for each Exercise.
- Lab Model Examination & End Semester Practical Examination

INDIRECT:

- Course end survey (Feedback)

Core Practical – IV: MOBILE APPLICATIONS DEVELOPMENT LAB

SEMESTER: II

CREDITS: 4

COURSE CODE: P19IT2P4

HOURS/WEEK 60

1. COURSE OUTCOMES

After the successful completion of this course, the students will be able to

CO. No.	Course Outcomes	Level	Exercise
CO1	Build Android application with suitable user interface and android controls	K3	1 – 3, 14
CO2	Make use of image controls perform coloring screen and animate bitmap images.	K3	4 – 6, 11
CO3	Examine the user interface with dialog box and countdown timer.	K4	7 – 8
CO4	Interpret the android controls to store contact details and make phone call.	K5	9 – 10
CO5	Build Android Application to access media file from memory and store images from native applications	K5	12, 15
CO6	Create Android Application to perform data manipulation such as Insert, update, delete and retrieve from SQLite database	K6	13

Ex. No.	Exercise
1	Create a simple application to display “Hello World” with text and background colors.
2	Create an application to display toast(message).
3	Create an application to demonstrate list view.
4	Create an application to validate a login module.
5	Create an application to change the color of the screen using menu options.
6	Create an application to change the image displayed on the screen using radio button.
7	Create an application to demonstrate alert dialog box.
8	Create an application to demonstrate countdown timer.
9	Create an application to create a new contact using Intent.
10	Create an application to call specific entered number by user in the edit text.
11	Create an application to animate a bitmap.
12	Create an application to play a media file from the sd card.
13	Create an application to make database operations.
14	Create an application using images and spinner objects.
15	Create an application to take picture using native application.

2. Topics for Self Study:

S.No.	Topics	Web Links
1	Create an application Program to Draw on a Canvas	https://www.sanfoundry.com/java-android-program-to-draw-canvas/

2	Create an application Program to perform all Operations using Calculators	https://www.sanfoundry.com/java-android-program-perform-all-operations/
3	Create an application Program to Demonstrate Calendar Content Provider	https://www.sanfoundry.com/java-android-program-demonstrate-calendar-content-provider/
4	Create an application program to Record Media Using Media Recorder	https://www.sanfoundry.com/java-android-program-record-media-media-recorder/

3.SPECIFIC LEARNING OUTCOMES (SLO)

Ex. No.	Course Content	Learning Outcomes	Level
1	<p>Create simple application to display “Hello World” with text and background colors</p> <ul style="list-style-type: none"> ● Exposure of new IDE for android application development ● Create new Android application project and Android Virtual Device(AVD) ● Add a Text View control and modify the attributes for “Hello World” text ● Build, debug and run the application through AVD 	<ul style="list-style-type: none"> ● Model the creation of android application project. ● Select the element to display the text. ● Choose the property to design the text. ● Solve with android virtual device (AVD) to run the application. 	K3
2	<p>Create an application to display toast(message)</p> <ul style="list-style-type: none"> ● Create a new activity and design the UI using android controls ● Modify the activity to display the Toast ● Set the duration of the Message to display ● Build, debug and run the application in AVD 	<ul style="list-style-type: none"> ● Identify the components to be used to display the toast. ● Apply the component using views. ● Construct the method to handle the events. ● Solve with AVD to run the application. 	K3
3	<p>Create an application to demonstrate list view.</p> <ul style="list-style-type: none"> ● Create a new activity and design the UI using android controls ● Modify the attributes in layout XML file with Edit Text control ● Edit the activity JAVA file to pass data from one activity to the other 	<ul style="list-style-type: none"> ● Identify the components for demonstrate list view. ● Apply the component using views. ● Construct android activity to display the list view. ● Develop event handling mechanism for selecting items. 	K3

	<ul style="list-style-type: none"> ● Build, debug and run the application in AVD 	<ul style="list-style-type: none"> ● Solve with AVD to run the application. 	
4	<p>Create an application to validate a login module.</p> <ul style="list-style-type: none"> ● Create a new activity and design the UI using android controls ● Modify the attributes in layout XML file ● Write event handling mechanism to pass data between activities ● Build, debug and run the application in AVD 	<ul style="list-style-type: none"> ● Select text view, text field and button to validate a login module. ● Apply the component using views. ● Construct android activity and use intent to pass the data to the next activity. ● Develop event handling mechanism for clicking the button. ● Solve AVD to run the application 	K3
5	<p>Create an application to change the color of the screen using menu options.</p> <ul style="list-style-type: none"> ● Create a new activity and design the UI using android controls ● Create a menu of different color with color COURSE CODEs ● Edit the activity JAVA to perform the color change on the other screen ● Check the output by selecting menu to change color 	<ul style="list-style-type: none"> ● Select the text view to change the color. ● Choose menu to display various colors. ● Develop event handling mechanism to display different colors. ● Solve with AVD to run the application. 	K3
6	<p>Create an application to change the image displayed on the screen using radio button.</p> <ul style="list-style-type: none"> ● Create a new activity and design the UI using android controls ● Create a radio button and image gallery. ● Write event handling mechanism to change the images using radio button option. ● Check the output by selecting the radio button 	<ul style="list-style-type: none"> ● Identify the components of forms. ● Select the images and add it to the gallery. ● Develop the mechanism to change the images using radio button option. ● Experiment with AVD to run the application. 	K3
7	<p>Create an application to demonstrate alert dialog box.</p> <ul style="list-style-type: none"> ● Create a new activity and design the UI using android controls ● Create a button and builder objects. ● Design an alert dialog box using builder message. 	<ul style="list-style-type: none"> ● Classify the components of forms. ● Analyze the builder objects. ● Inspect an alert dialog box using builder message. ● Discover the mechanism to handle the events. ● Examine with AVD to run the application. 	K4

	<ul style="list-style-type: none"> ● Build, debug and run the application in AVD 		
8	<p>Create an application to demonstrate countdown timer.</p> <ul style="list-style-type: none"> ● Create a new activity and design the UI using android controls ● Create a button and timer objects ● Edit the activity JAVA to handle the events and perform countdown activities ● Check the output by pressing the button 	<ul style="list-style-type: none"> ● Classify the components of forms. ● Analyze the timer objects. ● Discover the mechanism to perform countdown activities. ● Examine with AVD to run the application. 	K4
9	<p>Create an application to create a new contact using Intent.</p> <ul style="list-style-type: none"> ● Create a new activity and design the UI using android controls ● Create an android manifest xml file and get the permission to add new contact to the android virtual device. ● Write JAVA activity file to include the new contact into the list. ● Build, debug and run the application in AVD. 	<ul style="list-style-type: none"> ● Choose the components of forms. ● Determine the android manifest xml file and get the permission to add new contact. ● Formulate the mechanism to add the new contact. ● Justify with AVD to run the application. 	K5
10	<p>Create an application to call specific entered number by user in the edit text.</p> <ul style="list-style-type: none"> ● Create new activities and design the UI using android controls ● Modify the attributes of Edit Text to dial a number ● Access the content provider to call application ● Copy the apk file and check the output in mobile device 	<ul style="list-style-type: none"> ● Choose the components of forms. ● Determine the components using views. ● Formulate the mechanism to handle the events. ● Justify with AVD to run the application. 	K5
11	<p>Create an application to animate a bitmap.</p> <ul style="list-style-type: none"> ● Create a new android activity. ● Add images to the drawable resource. ● Reposition and move the images using event handling mechanism. ● Run the application in AVD. 	<ul style="list-style-type: none"> ● Identify the components of media gallery. ● Select the images to the drawable component. ● Develop the mechanism to handle the events. ● Experiment with AVD to run the application. 	K3
12	<p>Create an application to play a media file from the sd card.</p>	<ul style="list-style-type: none"> ● Choose the components of forms. ● Determine the media file to the drawable component 	

	<ul style="list-style-type: none"> ● Create a new activities and design the UI using android controls ● Access the media library to add media file ● Study the content providers to search for base applications ● Get access for External storage to load media ● Copy the apk file and check the output in mobile device 	<ul style="list-style-type: none"> ● Assess the components using views ● Formulate the mechanism to handle the events ● Justify with AVD to run the application 	K5
13	<p>Create an application to make database operations.</p> <ul style="list-style-type: none"> ● Create a new activities and design the UI using android controls ● Modify the XML to perform data manipulations ● Edit the activities with modified packages to perform insert, update, delete and retrieve from database ● Check the output with Successful transactions 	<ul style="list-style-type: none"> ● Choose the components of forms. ● Build the mechanism to handle the events ● Solve with AVD to run the application 	K6
14	<p>Create an application using images and spinner objects.</p> <ul style="list-style-type: none"> ● Create a new activities and design the UI using android controls ● Specify the frames for activities ● Choose the layout suitable for gallery view ● Place the required images in the appropriate folder ● Edit the activity to link the frames and refresh the UI ● Gain access the content providers ● Copy the apk file and check the output in mobile device and tablets 	<ul style="list-style-type: none"> ● Identify the components of forms ● Select the images to the drawable component ● Collect the components using views ● Construct the event handling mechanism for operating the spinner ● Experiment with AVD to run the application 	K3
15	<p>Create an application to take pictures using native application.</p> <ul style="list-style-type: none"> ● Create a new activities and design the UI using android controls ● Modify the activity to gain access to the native camera application 	<ul style="list-style-type: none"> ● Choose the components of forms ● Determine the camera activity to the android manifest file ● Formulate the event handling mechanism to handle camera objects 	

	<ul style="list-style-type: none"> • Provide UI for the native application to your application view • Modify the controls of native application like resolution, aspect ratio, etc.. • Gain access to the storage to save the picture with auto filename suggestion • Copy the apk file and check the output in mobile device and tablets 	<ul style="list-style-type: none"> • Justify with AVD to run the application 	K5
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4.MAPPING (CO, PO, PSO)

P19IT2P4	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	H	H	H	M	H	H	H	H	M	H	H	M	H
CO2	H	M	M	H	H	H	M	H	H	H	H	H	H
CO3	M	M	M	H	M	H	H	M	H	H	M	H	H
CO4	H	H	M	H	M	M	H	H	H	H	M	H	H
CO5	H	H	H	M	M	H	M	M	M	M	M	M	M
CO6	H	H	H	M	H	H	H	M	M	M	H	M	H

L – Low

M – Moderate

H – High

5.COURSE ASSESSMENT

METHODS DIRECT:

1. Continuous Assessment Test: T1, T2 (Practical Components): Closed Book
2. Cooperative Learning Report, Assignment, Group Discussion, project Report, Field Visit Report, Seminar.
3. Pre/Post Test, Viva, Report for each Exercise.
4. Lab Model Examination & End Semester Practical Examination

INDIRECT:

1. Course end survey (Feedback)

ELECTIVE– II: UNIFIED MODELING LANGUAGE

SEMESTER: II

COURSE CODE: P19IT2:2

CREDITS: 4

HOURS/WEEK : 4

1. COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

CO. No.	Course Outcomes	Level	Unit
CO1	Recall the concepts of requirement model using UML	K1	I
CO2	Outline the basic structural modeling.	K2	I
CO3	Identify advanced structural modeling in terms of high level and low-level model	K3	II
CO4	Identify basics for modeling the behavior if the system.	K4	III
CO5	Determine the insight knowledge into analyzing and designing software using advanced behavioral modeling.	K5	IV
CO6	Create components for deploying the logical concepts of software.	K6	V

2. A. SYLLABUS

UNIT I: Introduction to Unified Modeling Language

12 Hours

Introduction to Unified Modeling Language Principles of Modeling – Object Oriented Modeling – Introduction to UML. Basic Structural Modeling: Classes – Relationships – Common mechanisms – Diagrams – Class diagrams.

UNIT II: Advanced Structural Modeling

12Hours

Advanced Structural Modeling: Advanced Classes – Advanced Relationships – Interfaces, Types and Roles – Packages - Instances – Object diagrams.

UNIT III: Basic Behavioral Modeling

12 Hours

Basic Behavioral Modeling: Interactions – Use Cases – Use Case Diagrams – Interaction Diagrams – Activity Diagrams.

UNIT IV: Advanced Behavioral Modeling

12 Hours

Advanced Behavioral Modeling: Events and Signals – State Machines – Processes and Threads – Time and Space – State chart Diagrams.

UNIT V: Architectural Modeling

12 Hours

Architectural Modeling: Components – Deployment – Collaborations – Patterns and Frameworks – Component Diagrams – Deployment Diagrams – Systems and Models.

2.B. Topics for Self-Study

S.No	Topics	Web Links
1	Reuse of classes.	https://link.springer.com/chapter/10.1007/978-3-642-48673-9_13
2	Reuse of components.	https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.157.2982&rep=rep1&type=pdf
3	Reuse of frameworks black box framework, white box frame.	http://www.copypasteisforword.com/notes/object-oriented-frameworks
4	Reuse of patterns Architectural pattern and Design pattern.	https://www.developer.com/design/article.php/3309461/using-design-patterns-in-uml.htm

2.C. Text Book(s):

1. Grady Booch, James Rumbaugh and Ivar Jacobson, “**The Unified Modeling Language User Guide**”, Addison Wesley – Fourth Indian Reprint 2000.

2.D. Reference Books:

1. RumBaugh, Blaha “**Object - Oriented Modeling and Design with UML**”, 2007
2. Karolyn Nyisztor, Monika Nyisztor “**UML and Object-Oriented Design Foundations: Understanding Object-Oriented Programming and the Unified Modeling Language (Professional Skills)**, 2018

2.E. Web Links:

1. www.tutorialspoint.com
2. https://en.wikipedia.org/wiki/Unified_Modeling_Language
3. <https://www.youtube.com/watch?v=UI6lqHOVHic>
4. <https://www.youtube.com/watch?v=FkRwbVUVFvE>

3.SPECIFIC LEARNING OUTCOMES(SLO)

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
I	Introduction to Unified Modeling Language, Basic Structural Modeling		

1.1	Introduction to Unified Modeling Language: Principles of Modeling – Object Oriented Modeling – Introduction to UML.	Recall OO modeling.(K1)	K1
		Illustrate UML concepts.(K2)	
		Explain Architecture of Software Development Life Cycle.(K2)	
		Compare UML and SDLC.(K5)	
1.2	Basic Structural Modeling: Classes – Relationships – Common mechanisms – Diagrams – Class diagrams.	Tells the techniques of structural modeling.(K1)	
		List the kinds of Diagrams.(K1)	
		Relate static and dynamic level of diagrams.(K1)	
		Summarize different levels of relationships.(K2)	
		Demonstrate the various mechanisms used for modeling.(K2)	
II	Advanced Structural Modeling		
2.1	Advanced Structural Modeling: Advanced Classes – Advanced Relationships – Interfaces, Types and Roles – Packages - Instances – Object diagrams.	Explain the concepts of advanced modeling.(K2)	K2
		Label the concepts of Interfaces and its implementation.(K1)	
		Construct the model using extended properties.(K6)	
		Formulate forward and reverse engineering.(K6)	
		Apply grouping of elements.(K3)	
		Distinguish Concrete and Prototypical instances.(K4)	
III	Basic Behavioral Modeling		
3.1	Basic Behavioral Modeling: Interactions – Use Cases – Use Case Diagrams – Interaction Diagrams – Activity Diagrams.	Label requirements for interactions.(K1)	K6
		Recall the flow with use cases.(K1)	
		Explain sequence and collaboration diagram.(K2)	
		Apply a use case diagram for modeling requirements.(K3)	
		Build modeling workflow and operations.(K6)	
IV	Advanced Behavioral Modeling		
4.1	Advanced Behavioral Modeling:	Classify events and	

	Events and Signals – State Machines – Processes and Threads – Time and Space – State chart Diagrams.	signals.(K2)	K3
		Recall various types of processes.(K1)	
		Label the terms used in the state chart diagram.(K1)	
		Identify the keywords used in time and space.(K3)	
		Apply a state machine to model the lifetime of objects.(K3)	
V	Architectural Modeling		
5.1	Architectural Modeling Components – Deployment – Collaborations – Patterns and Frameworks – Component Diagrams – Deployment Diagrams – Systems and Models.	Recall tables, files and documents executables and Libraries.(K1)	K6
		Identify distribution of components.(K3)	
		Classify systems, subsystems.(K2)	
		Develop the model for realization of use cases.(K6)	
		Build Adaptable systems.(K6)	
		Distinguish design patterns and architectural patterns.(K4)	
		Construct client server model.(K6)	

4.MAPPING (CO, PO, PSO)

P19IT2:2	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	H	M	L	M	L	L	L	L	L	H	H	L	L
CO2	H	M	L	L	L	L	L	L	L	M	H	L	L
CO3	M	H	H	M	L	L	L	L	L	M	M	L	L
CO4	H	M	L	M	L	L	L	L	L	M	H	L	L
CO5	H	M	H	M	L	L	L	L	L	M	H	L	L
CO6	M	M	M	H	H	L	L	L	L	M	H	M	L

L-Low

M-Moderate

H- High

5. COURSE ASSESSMENT

METHODS DIRECT:

1. Continuous Assessment Test: T1, T2 (Theory & Practical Components):
Closed Book
2. Open Book Test.
3. Assignment, Seminar, Quiz (written).
4. Pre-Semester & End Semester Theory Examination

INDIRECT:

1. Course end survey (Feedback)

ELECTIVE COURSE – II B: OBJECT ORIENTED ANALYSIS AND DESIGN

SEMESTER: II
CREDITS: 4

COURSE CODE: P19IT2: A
HOURS/WEEK: 4

1. COURSE OUTCOMES

After the successful completion of this course, the student will be able to

CO. No.	Course Outcomes	Level	Unit
CO1	Describe the importance, aims and principles of modelling.	K2	I
CO2	Identify the OOPs concepts and Object-Oriented Modelling languages and its advantages.	K3	II
CO3	Examine the case studies and model it in different views with respect user requirement such as use case, logical, component and deployment and etc.,	K4	III
CO4	Explain unified library Applications, case study and modeling diagrams using UML.	K5	III
CO5	Explain UML architecture, conceptual model of Unified Modelling Language.	K5	IV
CO6	Analyze various phases of Software development life cycle and preparation of document of the project for the unified Library application	K6	V

2.A. SYLLABUS

UNIT I: Introduction to OOAD

12 Hours

Introduction to OOAD - Unified Process - UML diagrams - Use Case-Class Diagrams - Interaction Diagrams - State Diagrams - Activity Diagrams - Package, Component and Deployment Diagrams.

UNIT II: GRASP

12 Hours

GRASP-Designing objects with responsibilities-Creator-Information expert-Low Coupling-High Cohesion-Controller-Design Patterns-Creational-Factory method-Structural-Bridge-Adapter-Behavioural –Strategy-Observer.

UNIT III: Case study

12 Hours

Case study-The next Gen POS system, Inception-Use case modelling-Relating Use cases-include, extend and generalization-Elaboration-Domain Models- Finding conceptual classes and description classes-Associations-Attributes-Domain model refinement-Finding conceptual class hierarchies-Aggregation and Composition.

UNIT IV : System sequence diagrams

12 Hours

System sequence diagrams-Relationship between sequence diagrams and use cases logical architecture and UML package diagram-Logical architecture refinement-UML class diagrams-UML interaction diagram-Applying GoF design patterns.

UNIT V : Mapping design to code Testing

12 Hours

Mapping design to CODE-Testing: Issues in OO Testing-Class Testing-OO Integration Testing-GUI Testing-OO System Testing

2.B. Topics for Self Study:

S. No	Topics	Web Links
1	UML Diagrams: Library management system	https://www.indiastudychannel.com/resources/150271-UML-Diagrams-For-The-Case-Studies-Library-Management-System-And-Online-Mobile-Recharge.aspx
2	Hospital Management System	https://www.uml-diagrams.org/examples/hospital-management-example.html
3	Online Shopping	https://www.uml-diagrams.org/examples/online-shopping-example.html
4	Bank ATM	https://www.uml-diagrams.org/examples/bank-atm-example.html
5	Online mobile Recharge System	https://www.indiastudychannel.com/attachments/19794-Online-Mobile-Recharge-UML-Usecase-Diagram

2.C. Text Book(s):

1. Craig Larman, "Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development", Third Edition, Pearson Education, 2005.

2.D. Reference Books:

1. Simon Bennett, Steve Mc Robb and Ray Farmer, "Object Oriented Systems Analysis and Design using UML", Fourth Edition, Mc-Graw Hill Education, 2010.
2. Erich Gamma, and Richard Helm, Ralph Johnson, John Vlissides, "Design Patterns: Elements of Reusable Object Oriented Software", Addison Wesley, 1995.

2.E. Web Links:

1. <https://www.startertutorials.com/uml/object-oriented-analysis-design.html>
2. <https://www.COURSECODEproject.com/Articles/186107/Object-Orientation-Beginners-Tutorial>
3. <https://medium.com/omarelgabrys-blog/object-oriented-analysis-and-design-introduction-part-1>
4. <https://www.youtube.com/watch?v=1gtpsFV4DWo>

3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit/Section	Course Content	Learning Outcomes	Highest Blooms Taxonomic Level of Transaction
I	Uml Diagrams		
1.1	Introduction to OOAD - Unified Process - UML diagrams - Use	Recall Object oriented concepts (K1)	K2

	Case-Class Diagrams - Interaction Diagrams - State Diagrams - Activity Diagrams - Package, Component and Deployment Diagrams.	Explain the necessity of UML diagrams. (K2) Explain different types of UML diagrams. (K2) Identify the components in UML diagrams.(K3) Discuss various UML diagrams. (K4)	
II	Design And Patterns		
2.1	GRASP-Designing objects with responsibilities-Creator- Information expert-Low Coupling-High Cohesion-Controller-De sign Patterns-Creational-Fact ory method-Structural-Bridg e-Adapter-Behavioural -Strategy-Observer.	Define blueprint of an Objects (K1) Identify the objects and responsibilities from the problem domain. (K3) Explain coupling by how the objects are connected with one another.(K2) Explain how the controller used to describe the overall system.(K2) Outline the purpose of cohesion(K2) Discuss the responsibilities of cohesion to manage objects.(K4) Examine various strategies and factory methods to design an object. (K4) Discuss behavioral decomposition by implementing algorithms. (K4) Explain how an adapter and observer used to avoid direct coupling between two or more elements. (K2)	K3
III	Case Study		
3.1	The next Gen POS system, Inception-Use case modelling-Relating Use cases-include, extend and generalization-Elaborati on-Domain Models- Finding conceptual classes and description classes-Associations-Att ributes-Domain model refinement-Finding	Recall use case models in UML diagrams. (K1) Explain the components in use case diagram(K2) Identify the conceptual classes with their attributes and associations(K3) List an annotation for domain models (K1) Summarize some typical situation in association.(K2)	K4

	conceptual class hierarchies-Aggregation and Composition.	Discuss domain constraints in conceptual hierarchy. (K4)	
		Discuss to design an attributes in conceptual class (K4)	
		Discuss how to handle the system as a block box.(K4)	
		Analyze the importance of objects and models in the domain. (K4)	
IV	Applying Design Patterns		
4.1	System sequence diagrams-Relationship between sequence diagrams and use cases logical architecture and UML package diagram-Logical architecture refinement-UML class diagrams-UML interaction diagram-Applying GoF design patterns.	Define the necessity of design patterns. (K1)	K5
		Recall UML diagrams. (K1)	
		Examine the advantages of sequence and interaction diagrams. (K4)	
		Design patterns to translate OOD rule. (K2)	
		Create an object without dependence of classes. (K5)	
		Define GUI on different platforms. (K1)	
		Explain how to design class diagram. (K2)	
		Create new object from a prototype through an interface to avoid dependency on classes. (K5)	
		Explain how to design class diagrams. (K2)	
		Create relationships between classes. (K5)	
		Discuss interaction diagrams to design the system behavior. (K4)	
V	Coding and Testing		
5.1	Mapping design to Code-Testing: Issues in OO Testing-Class Testing-OO Integration Testing-GUI Testing-OO System Testing	Recall Object oriented languages. (K1)	K6
		Design Code to map UML diagrams. (K2)	
		Explain how to implement UML diagrams in Object oriented languages. (K2)	
		Explain how to design methods from interaction diagrams.(K2)	
		Discuss the necessity of testing in OO languages.(K5)	

		Identify the testing issues raised by OO software.(K3)	
		Identify the levels of OO testing.(K3)	
		Construct an application using OO language. (K6)	
		Test the Code through GUI. (K1)	
		Relate UML diagrams to OO languages. (K2)	
		Demonstrate an application using OO language. (K2)	

4.MAPPING (CO, PO, PSO)

P19IT2: A	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	H	L	L	L	L	L	L	L	L	H	L	L	L
CO2	L	H	M	L	L	L	L	L	L	M	H	L	L
CO3	L	M	M	H	L	L	L	L	L	L	H	L	M
CO4	L	M	L	M	L	L	L	L	M	M	L	L	L
CO5	L	M	L	L	L	L	L	L	L	L	H	M	L
CO6	M	M	L	M	L	M	L	L	L	L	H	L	M

L-Low

M-Moderate

H- High

5.COURSE ASSESSMENT

METHODS DIRECT:

- 1 Continuous Assessment Test: T1, T2 (Theory Components): Closed Book
- 2 Cooperative Learning Report, Assignment, Group Presentation, Group Discussion, Seminar, Quiz (written).
- 3 Pre-Semester & End Semester Theory Examination

INDIRECT:

1. Course end survey (Feedback)

ELECTIVE – II C: PRINCIPLES OF USER EXPERIENCE DESIGN

SEMESTER: II

COURSE CODE: P19IT2: B

CREDITS: 4

HOURS/WEEK:4

1.COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

CO. No.	Course Outcomes	Level	Unit
CO1	Recall the concepts of User Experience Design.	K1	I
CO2	Outline the tools and techniques used in Research.	K2	II
CO3	Construct the site map and prototypes.	K3	III
CO4	Organize the content, patterns and Layout of the page.	K3	III
CO5	Determine trees, charts and design forms for user input.	K5	IV
CO6	Develop mobile and desktop applications.	K6	V

2.A. SYLLABUS

UNIT I: The Tao of UXD

12 Hours

The Tao of UXD: What Is User Experience Design – About UX Designers – Where UX Designers Live? The Project Ecosystem: Identify the Type of Site - Choose Your Hats. Proposals for Consultants and Freelancers: Proposals - Creating the Proposal - Statements of Work. Project Objectives and Approach: Solidify Project Objectives - Understand the Project Approach.

UNIT II: User Research

12 Hours

User Research: Choosing Research Techniques. Site Maps and Task Flows: What Is a Site Map? - What Is a Task Flow? - Tools of the Trade - Basic Elements of Site Maps and Task Flows - Common Mistakes - Advanced Site Maps - Breaking the Site Map Mold - Task Flows - Taking Task Flows to the Next Level. Wireframes and Annotations: What Is a Wireframe? - What Are Annotations? - Who Uses Wireframes? - Start Simply: Design a Basic Wireframe. Prototyping: What Is Prototyping? - How Much Prototype Do I Need? - Paper Prototyping - Digital Prototyping - Prototype Examples.

UNIT III: Organizing the Content:

12 Hours

Organizing the Content: Information Architecture and Application Structure: The Big Picture - The Patterns. Getting Around: Navigation, Signposts, and Wayfinding: Staying Found - The Cost of Navigation - Navigational Models - Design Conventions for Websites - The Patterns. Organizing the Page: Layout of Page Elements: The Basics of Page Layout - The Patterns.

UNIT IV: Doing Things

12 Hours

Doing Things: Actions and Commands: Pushing the Boundaries - The Patterns. Showing Complex Data: Trees, Charts, and Other Information Graphics: The Basics of Information Graphics - The Patterns. Getting Input from Users: Forms and Controls: The Basics of Form Design - Control Choice - The Patterns.

UNIT V: Using social media

12 Hours

Using social media: The Basics of social media - The Patterns. Going Mobile: The Challenges of Mobile Design -The Patterns Making It Look Good: Visual Style and Aesthetics: The Basics of Visual Design - What This Means for Desktop Applications - The Patterns.

2.B. Topics for Self-Study

S.No	Topics	Web Links
1	Prototyping & User Testing	https://www.toptal.com/designers/prototyping/user-testing-prototypes
2	Iterating the Prototype and Further User Testing	https://xd.adobe.com/ideas/process/user-testing/process-user-testing-iterative-usability-testing-best-practices/
3	Designing Alternatives	https://www.coursera.org/lecture/user-experience-design/design-alternatives-OObxy

2.C. Text Book(s):

1. Russ Unger and Carolyn Chandler, “**A Project Guide to UX Design - For user experience designers in the field or in the making**”, New Riders is an imprint of Peach pit, a division of Pearson Education, 2009 Edition. (For Units – 1 and 2)
2. Jenifer Tidwell, “**Designing Interfaces**”, Second Edition, Published by O’Reilly Media. (For Units – 3, 4 and 5)

2.D. Reference Books:

1. Alan Cooper, Robert Remann and David Cronin “**The Essentials of Interaction Design**” 4th Edition.
2. David J Bland, Alexander **Osterwalder** “Testing Business Ideas: A Field Guide for Rapid Experimentation”, **Kindle Edition**.

2.E. Web Links:

1. <https://stfalcon.com/en/blog/post/user-interface-web-design-principles>
2. <http://interaction-design.org/literature/topics/ui-design>
3. <https://www.nngroup.com/articles/ten-usability-heuristics/>
4. <https://www.youtube.com/watch?v=MzrfwTMFI74>

3.SPECIFIC LEARNING OUTCOMES(SLO)

Unit/ Section	Course Content	Learning Outcomes	Highest Blooms Taxonomic
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			Level of Transaction
I	The Tao of UXD		
1.1	The Tao of UXD: What Is User Experience Design – About UX Designers – Where UX Designers Live? The Project Ecosystem: Identify the Type of Site - Choose Your Hats.	Recall user experience design and designer.(K1)	K1
		Tell where the designer lives.(K1)	
		Identify what type of project site is choose.(K3)	
1.2	Proposals for Consultants and Freelancers: Proposals - Creating the Proposal - Statements of Work. Project Objectives and Approach: Solidify Project Objectives - Understand the Project Approach	What is the project proposal?(K1)	
		Label the statements of proposal work.(K1)	
		Define the objectives of the project proposed.(K1)	
		Identify which approach suits for project.(K3)	
II	User Research		
2.1	User Research: Choosing Research Techniques. Site Maps and Task Flows: What Is a Site Map? - What Is a Task Flow? - Tools of the Trade - Basic Elements of Site Maps and Task Flows - Common Mistakes - Advanced Site Maps - Breaking the Site Map Mold - Task Flows - Taking Task Flows to the Next Level. Wireframes and Annotations: What Is a Wireframe? - What Are Annotations? - Who Uses Wireframes? - Start Simply: Design a Basic Wireframe.	Define the site map and task flow.(K1)	K2
		List the elements of site maps and task flow.(K1)	
		Explain advanced site maps.(K2)	
		Classify task flow.(K2)	
		Identify the common mistakes happening in sitemaps.(K3)	
		Design basic wireframes.(K6)	
		Create the wireframe design.(K6)	
2.2	Prototyping: What Is Prototyping? - How Much Prototype Do I Need? - Paper Prototyping - Digital Prototyping - Prototype Examples.	Tells what is a prototype.(K2)	
		List various type of prototype.(K2).	
		Construct prototype with example.(K2)	
III	Organizing the Content		
3.1	Organizing the Content: Information Architecture and Application Structure: The Big Picture - The Patterns. Getting Around: Navigation, Signposts,	Recall the architecture of application structure.(K1)	K3
		List the patterns of application software.(K1)	

	and Way finding: Staying Found - The Cost of Navigation - Navigational Models - Design Conventions for Websites - The Patterns.	Illustrate the navigation, signpost, and wayfinding.(K2)	
		Estimate the cost of navigation and models.(K6)	
		Utilize the design conventions and patterns.(K3)	
3.2	Organizing the Page: Layout of Page Elements: The Basics of Page Layout - The Patterns.	Organize the elements in the page.(K3)	
		Construct page layout.(K6)	
IV	Doing Things		
4.1	Doing Things: Pushing the Boundaries - The Patterns. Showing Complex Data: Trees, Charts, and Other Information Graphics: The Basics of Information Graphics - The Patterns.	Build trees, charts and information for complex data.(K6)	K5
		Organize the data in numerical patterns.(K3)	
4.2	Getting Input from Users: Forms and Controls: The Basics of Form Design - Control Choice - The Patterns.	Recall the controls used for getting input from users.(K1)	
		Identify the elements of forms.	
		List the choice controls for selecting the choices.(K2)	
V	Using social media		
5.1	Using social media: The Patterns. Going Mobile: The Challenges of Mobile Design -The Patterns.	Discuss the basics of social media.(K6)	K6
		Interpret how to go mobile design.(K6)	
		Analyze the challenges of mobile design.(K4)	
5.2	Making It Look Good: Visual Style and Aesthetics: The Basics of Visual Design - What This Means for Desktop Applications - The Patterns.	Explain the basics of visual design.(K2)	
		Define the uses of desktop applications.(K1)	
		Tell the patterns used for creating desktop application.(K1)	

4.MAPPING (CO, PO, PSO)

P19IT2: B	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PS O 1	PS O 2	PS O 3	PS O 4
CO1	H	M	L	M	L	L	L	L	L	H	H	L	L
CO2	H	M	L	L	L	L	L	L	L	M	H	L	L
CO3	M	H	H	M	L	L	L	L	L	M	M	L	L
CO4	H	M	L	M	L	L	L	L	L	M	H	L	L
CO5	H	M	H	M	L	L	L	L	L	M	H	L	L
CO6	M	M	M	H	H	L	L	L	L	M	H	M	L

L-Low

M-Moderate

H- High

5.COURSE ASSESSMENT

METHODS DIRECT:

1. Continuous Assessment Test: T1, T2 (Theory & Practical Components): Closed Book
2. Open Book Test.
3. Assignment, Seminar, Quiz (written).
4. Pre-Semester & End Semester Theory Examination

INDIRECT:

- 1.Course end survey (Feedback)

Elective – III A: CRYPTOGRAPHY AND NETWORK SECURITY

SEMESTER: II
CREDITS: 4

COURSE CODE: P19IT2:3
HOURS/WEEK :4

1. COURSE OUTCOMES

After the successful completion of this course, the student will be able to

CO. No.	S.No.	Course Outcomes	Level	Unit
CO1	1	Relate the working principle of the Cryptographic using number theory	K1	I
CO2	2	Classify the Symmetric and Asymmetric algorithms	K2	II
CO3	3	Apply the User Authentication and Kerberos techniques.	K3	III
CO4	4	Analyze the security concepts through secure socket layer	K4	IV
CO5	5	Agree to improve the Electronic mail security	K5	V
CO6	6	Develop the IP security mechanism	K6	V

2. A. SYLLABUS

UNIT – I: Computer and Network Security Concepts and Number theory 12 Hours

Computer and Network Security Concepts: Computer Security Concepts- The OSI Security Architecture-Security Attacks-Security Services - Security Mechanisms - Fundamental Security Design principles – A model for Network Security - Introduction to Number Theory: Divisibility and The Division Algorithm - The Euclidean Algorithm - Modular Arithmetic – Prime Number –Fermat’s and Euler’s theorems –Testing for primality – The Chinese Remainder theorem

UNIT – II: Symmetric and Asymmetric cipher 12 Hours

Symmetric cipher : Classical Encryption Techniques: Cipher Model - Substitution Techniques - Transposition Techniques - Rotor Machines – Steganography – DES – AES - Block Cipher Operation: Multiple Encryption and Triple DES - Electronic COURSE CODE Book - Cipher Block Chaining Mode - Cipher Feedback Mode - Output Feedback Mode - Counter Mode –RC4.- Asymmetric cipher :Public Key Cryptography and RSA: Principles of Public-Key Cryptosystems – RSA Algorithm - Diffie-Hellman Key Exchange - Elgamal Cryptographic System - Elliptic Curve Arithmetic - Elliptic Curve Cryptography.

UNIT –III: Data Integrity Algorithms, Digital signature and authentication 12 Hours

Cryptography Data Integrity Algorithms: Applications of Cryptographic Hash Functions - Two Simple Hash Functions - Requirements and Security - Hash Functions Based on Cipher Block Chaining - Secure Hash Algorithm (SHA) – SHA3 – Message Authentication COURSE CODE (MAC) – HMAC – Digital Signature: RSA –PSS Digital Signature Algorithm – Key Management and Distribution: Distribution of Public keys – X.509 Certificates – Public – key Infrastructure- User Authentication: Kerberos.

UNIT –IV: Transport Level Security and wireless Network Security **12 Hours**
 Transport Level Security: Web Security Considerations - Secure Sockets Layer - Secure Sockets Layer – HTTPS - Secure Shell (SSH) - Wireless Network Security: Wireless Security - Wireless Security - IEEE 802.11 Wireless LAN Overview - IEEE 802.11i Wireless LAN Security

UNIT – V: Electronic Mail Security and IP Security **12 Hours**
 Electronic Mail Security: Internet Mail Architecture – Email formats- Email threats – S/MIME- Pretty Good Privacy -IP Security: IP security overview – IP Security Policy – Encapsulating Security payload – Internet key exchange

2.B. Topics for Self Study:

S.No.	Topics	Web Links
1	Cyber Security	http://uou.ac.in/foundation-course/
2	Cyber Law	https://www.tutorialspoint.com/information_security_cyber_law/quick_guide.htm/
3	Block chain technology	https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-es26/
4	Steganography and Biometrics	https://www.igi-global.com/chapter/steganography-using-biometrics/184201/

2.C. Text Book(s):

1. William Stallings, “**Cryptography and Network Security: Principles and Practices**”, 7th Edition, Pearson Education, 2005.

2.D. Reference Books:

1. Atul Kahate, “**Cryptography and Network Security**”, 5th Edition, TMH Publications, New Delhi, 2016.
2. Bruce Schneier, “**Applied Cryptography Protocols, Algorithms**”, Second Edition, John Wiley & Sons Inc., 2002.
3. Richard E. Smith, “**Internet Cryptography**” ,Addison –Wesley Professional Aug 1997.
4. Behrouz A. Forouzan, “**Cryptography and Network Security**”, Tata McGraw-Hill Publishing Company Limited,2007

2.E. Web Links

1. <http://https://nptel.ac.in/courses/106/106/106106129/>
2. <https://lecturenotes.in/project-report/17568-cyber-crime-and-its-prevention>
3. [www.javatpoint.com > computer-network-security.](http://www.javatpoint.com/computer-network-security)
4. https://www.tutorialspoint.com/network_security/index.htm/

3.SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
1	Computer and Network Security Concepts and Number theory		
1.1	Computer and Network Security Concepts: Computer Security Concepts- The OSI Security Architecture-Security Attacks-Security Services - Security Mechanisms - Fundamental Security Design principles – A model for Network Security	List out the basic concepts of computer security(K1) Classify the elements of Security attacks , services and mechanism(K2) Illustrate the fundamental principles of security design(K2) Identify the issues in security design(K3) Develop the model of network security(K3)	K1
1.2	Introduction to Number Theory: Divisibility and The Division Algorithm - The Euclidean Algorithm - Modular Arithmetic – Prime Number –Fermat's and Euler's theorems –Testing for primality – The Chinese Remainder theorem	Recall the concept of division operation(K1) Discuss the modular arithmetic Concepts.(K6) Identify the prime numbers(K3) Compare Fermat's and Euler's theorem(K4) Test for primality to prove the prime numbers(K4) Justify the Chinese remainder theorem(K5)	
II	Symmetric and Asymmetric cipher		
2.1	Symmetric cipher: Classical Encryption Techniques: Cipher Model - Substitution Techniques - Transposition Techniques - Rotor Machines – Steganography – DES – AES	Build the techniques to replace the characters of the plain text(K3) Apply the techniques to modify the position of plaintext characters(K3) Plan to hide the message with in the image(K3) Explain the steps of DES algorithm(K2) Compare the steps of AES with DES algorithm(K2)	K2
2.2	Block Cipher Operation: Multiple Encryption and Triple DES - Electronic COURSE CODE Book -	Discuss the public key cryptosystem(K6)	

	Cipher Block Chaining Mode - Cipher Feedback Mode - Output Feedback Mode - Counter Mode –RC4.-	Illustrate the steps of RSA algorithm(K2)	
2.3	Asymmetric cipher: Public Key Cryptography and RSA: Principles of Public-Key Cryptosystems – RSA Algorithm - Diffie-Hellman Key Exchange - Elgamal Cryptographic System - Elliptic Curve Arithmetic - Elliptic Curve Cryptography.	Choose the techniques to exchange the secret key(K3)	
		Distinguish RSA and Elgamal cryptographic system(K4)	
		Recall the elliptic curve arithmetic (K1)	
		Discuss the public key cryptosystem(K6)	
		Illustrate the steps of RSA algorithm(K2)	
III	Data Integrity Algorithms, Digital signature and user Authentication		
3.1	Cryptography Data Integrity Algorithms: Applications of Cryptographic Hash Functions - Two Simple Hash Functions - Requirements and Security - Hash Functions Based on Cipher Block Chaining - Secure Hash Algorithm (SHA) – SHA3 – Message	Apply hash function in cryptography(K3)	K3
		Make use of cipher block chaining in SHA(K3)	
		Compare two simple hash functions based on their security(K4)	
		Interpret the MAC algorithm(K2)	
		Distinguish SHA an SHA-3(K4)	
3.2	Digital Signature: RSA –PSS Digital Signature Algorithm	Apply RSA in Digital signature (K3)	
		Compare RSA and PSS algorithm(K2)	
3.3	Key Management and Distribution: Distribution of Public keys – X.509 Certificates – Public – key Infrastructure	Plan to distribute public keys(K3)	
		Create and distribute digital certificate(K6)	
		classify the public key infrastructure(K2)	
3.4	User Authentication: Kerberos.	Select Kerberos system for key distribution(K3)	
IV	Transport Level Security and Wireless Network Security		
4.1	Transport Level Security: Web Security Considerations - Secure Sockets Layer - Secure Sockets Layer – HTTPS - Secure Shell (SSH)	Construct the secure socket layer(K3)	K4
		Justify the security of HTTP(K5)	

		Define secure shell mechanism(K1)	
4.2	Wireless Network Security: Wireless Security - Wireless Security - IEEE 802.11 Wireless LAN Overview - IEEE 802.11i Wireless LAN Security	Build the overview of wireless security(K3)	
		Design IEEE 802.11i wireless LAN security(K6)	
V	Electronic Mail Security and IP Security		
5.1	Electronic Mail Security: Internet Mail Architecture – Email formats- Email threats – S/MIME- Pretty Good Privacy	Develop Internet mail architecture(K6)	K6
		Create the PGP for email security(K6)	
		Improve the format of Email(K6)	
		Identify the threats of email(K3)	
		Illustrate the Multi Purpose Mail Extension(K2)	
5.2	IP Security: IP security overview – IP Security Policy – Encapsulating Security payload – Internet key exchange	Discuss the overview of IP security(K6)	
		List out the Policy of IP security(K4)	
		Design to encapsulate security payload(K6)	
		Formulate the internet key exchange techniques(K6)	

4. MAPPING SCHEME FOR THE PO, PSOS AND COS

P19IT2:3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	H	H	H	M	H	M	L	H	H	H	M	M	M
CO2	H	H	H	M	M	M	L	H	H	H	L	H	H
CO3	H	H	H	H	H	M	L	H	L	M	L	H	H
CO4	H	H	H	M	H	M	L	M	M	H	L	H	H
CO5	H	H	H	H	H	H	M	H	H	H	M	H	H
CO6	H	M	H	H	H	M	M	H	H	H	M	H	H

L-Low

M-Moderate

H- High

5.COURSE ASSESSMENT

METHODS DIRECT:

1. Continuous Assessment Test T1, T2 (Theory & Practical Components): Closed Book
2. Open Book Test.
3. Cooperative learning report, Assignment, Group Presentation, Group Discussion, Project Report, Field Visit Report, Poster Presentation, Seminar, Quiz (written).
4. Pre-Semester & End Semester Theory Examination.

INDIRECT

1. Course end survey (Feedback)

Elective – III B: CYBER CRIMES AND COMPUTER FORENSICS

SEMESTER: II

CREDITS: 4

COURSE CODE: P19IT2:C

HOURS/WEEK :4

1. COURSE OUTCOMES

After the successful completion of this course, the student will be able to

CO. No.	Course Outcomes	Level	Unit
CO1	Define the basics of cyber crime	K1	I
CO2	Classify the various cases of cyber crime	K2	I
CO3	Identify the types of security attacks and defensive measures	K3	II
CO4	Analyse the motivation of attackers in cyber security	K4	III
CO5	Select the intrusion detection and prevention system	K6	IV
CO6	Assess the different forensics tools.	K6	V

2. A. SYLLABUS

UNIT – I: Introduction to Cyber Crime Case

12 Hours

Introduction – Cyber Crime Defined – Computer Crime Technology – Computer Crime on the Internet – Financial Computer Crime – White Collar Computer Crime – Crime Offender or Victim. – Cyber Crime Cases – Fake Websites – Money Laundering – Bank Fraud – Advance Fee Fraud – Malicious Agents – Stock Robot Manipulation – Identity Theft – Digital Piracy – Intellectual Property Crime – Internet Gambling.

UNIT – II: Cyber Threats and Defence

12 Hours

Cyber Threats and Defence – Domain Name System Protection – Router Security – Spam/Email Defensive Measures – Phishing Defensive Measures – Web Based Attacks – Database Defensive Measures – Botnet Attacks and Applicable Defensive Techniques.

UNIT – III: Cyber Security Overview

12 Hours

Cyber Security Overview – Introduction – Security from a Global Perspective – Trends in the Types of Attacks and Malware – The Types of Malware – Vulnerability Naming Schemes and Security Configuration Settings – Obfuscation and Mutations in Malware – The Attackers Motivation and Tactics – Zero Day Vulnerabilities – Attacks on the Power Grid and Utility Networks – Network and Information Infrastructure Defensive Overview.

UNIT – IV: Intrusion Detection / Prevention System

12 Hours

Intrusion Detection / Prevention System – Overview – The Approaches used for IDS / IPS – Network Based IDS / IPS – Host Based IDS / IPS – Honeypots – The Detection of Polymorphic

/ Metamorphic Worms – Distributed Intrusion Detection Systems and Standards –SNORT – The Tipping Point IPS – The McAfee Approach to IPS – The Security Community’s Collective Approach to IDS / IPS.

UNIT – V: Forensic Process, Documenting Investigation and Justice System 12 Hours The Forensic Process – Types of Investigations – The Role of the Investigator – Elements of a Good Process – Defining a Process – After the Investigation – Documenting the Investigation – Read Me – Internal Report – Declaration – Affidavit – Expert Report. – The Justice System – The Criminal Court System – The Civil Justice System – Expert Status.

2.B. Topics for Self Study:

S. No	Topics	Web Links
1.	Cyber acts	http://www.iibf.org.in/documents/cyber-laws-chapter-in-legal-aspects-book.pdf/
2.	Types of Cyber Law	http://osou.ac.in/eresources/introduction-to-indian-cyber-law.pdf/
3.	Trade Mark Law	https://www.wipo.int/edocs/pubdocs/en/wipo_pub_653.pdf/
4.	Cyber terrorism	https://www.usip.org/sites/default/files/sr119.pdf/

2.C. Text Book(s):

1. Petter Gottschalk, **“Policing Cyber Crime”**, Petter Gottschalk & Ventus Publishing ApS, 2010.
2. Chwan-Hwa (John) Wu, J. Dravid Irwin, **“Introduction to Computer Networks and Cyber Security”**, CRC Press Taylor & Francis Group, New York, 2013.
3. Aaron Philip, David Cowen, Chris Davis, **“Hacking Exposed Computer Forensics – Secrets & Solutions”** 2nd Edition, TMH Publications, 2010.

2.D. Reference Books:

1. Bernadette H Schell, Clemens Martin, **“Cyber Crime”**, ABC – CLIO Inc. California, 2004.
2. Nelson Phillips and Enfinger Stuart, **“Computer Forensics and Investigations”**, Cengage Learning, New Delhi, 2009.
3. Kevin Mandia, Chris Prosise, Matt Pepe, **“Incident Response and Computer Forensics”**, TMH, 2006.
4. Andress J., **“Cyber Warfare: Techniques, Tactics and Tools for Security Practitioners”**, TMH, 2013.

2.E. Web links:

1. <https://www.cse.iitb.ac.in/~siva/talks/ips2012.pdf/>
2. <https://cybercrime.gov.in/pdf/Cyber%20Security%20Awareness%20Booklet%20for%20Citizens.pdf/>
3. www.dbs.com/act/assets.pdf/

3.SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
I	Introduction Cyber Crime		
1.1	Introduction Cyber Crime – Cyber Crime Defined – Computer Crime Technology – Computer Crime on the Internet – Financial Computer Crime – White Collar Computer Crime – Crime Offender or Victim.	Define the basic terminology of cyber crime.(K1)	K2
		Identify the crime on the internet(K3))	
		Classify the types of computer crime(K4)	
1.2	Cyber Crime Cases – Fake Websites – Money Laundering – Bank Fraud – Advance Fee Fraud – Malicious Agents – Stock Robot Manipulation – Identity Theft – Digital Piracy – Intellectual Property Crime – Internet Gambling.	Categorize the source to perform the cyber crime.(K4)	
		Interpret the solution of the cyber crime(K2)	
II	Cyber Threats and Defence		
2.1	Cyber Threats and Defence – Domain Name System Protection – Router Security – Spam/Email Defensive Measures – Phishing Defensive Measures – Web Based Attacks – Database Defensive Measures – Botnet Attacks and Applicable Defensive Techniques.	Illustrate the cyber threats associate with internet(K2)	K3
		Justify the different methods of defensive measures.(K5)	
		Asses the solution to the threats(K5)	
III	Cyber Security Overview		
3.1	Cyber Security Overview – Introduction – Security from a Global Perspective – Trends in the Types of Attacks and Malware – The Types of Malware – Vulnerability Naming Schemes and Security Configuration Settings – Obfuscation and Mutations in Malware – The Attackers Motivation and Tactics – Zero Day Vulnerabilities – Attacks on the Power Grid and Utility Networks – Network and Information Infrastructure Defensive Overview.	Build the security against cyber crime(K3)	K4
		Classify the types of attacks and malware(K4)	
		Identify the motivation of attackers(K3)	
IV	Intrusion Detection / Prevention System		

4.1	Intrusion Detection / Prevention System – Overview – The Approaches used for IDS / IPS – Network Based IDS / IPS – Host Based IDS / IPS – Honeypots – The Detection of Polymorphic / Metamorphic Worms – Distributed Intrusion Detection Systems and Standards –SNORT – The Tipping Point IPS – The McAfee Approach to IPS – The Security Community’s Collective Approach to IDS / IPS.	Categorize the intrusion detection and prevention system(K4)	K6
		Design the distributed Intrusion detection system(K6)	
		Build the security using antivirus software(K6)	
V	The Forensic Process		
5.1	The Forensic Process – Types of Investigations – The Role of the Investigator – Elements of a Good Process – Defining a Process – After the Investigation	Plan the forensic process(K6)	K6
		Determine the role of investigator(K5)	
		Define the process of forensic after investigation(K1)	
5.2	Documenting the Investigation – Read Me – Internal Report – Declaration – Affidavit – Expert Report.	Create the documentation and report during the investigation.(K6)	
		Analyze the report by expert(K4)	
5.3	The Justice System – The Criminal Court System – The Civil Justice System – Expert Status.	Organize the criminal court and civil justice system(K3)	

4. MAPPING SCHEME FOR THE PO, PSOS AND COS

P19IT2:C	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	H	M	M	M	L	H	M	H	H	M	M	M	H
CO2	H	M	H	H	H	H	M	M	H	M	L	M	H
CO3	H	M	H	H	M	H	H	L	H	L	H	M	H
CO4	M	H	H	H	H	M	M	H	H	L	M	H	H
CO5	M	H	H	H	H	M	M	H	H	L	M	H	H
CO6	H	M	M	M	L	H	M	H	H	M	M	M	H

L-Low

M-Moderate

H- High

5. COURSE ASSESSMENT

METHODS DIRECT:

1. Continuous Assessment Test T1, T2 (Theory & Practical Components): Closed Book
2. Open Book Test.
3. Cooperative learning report, Assignment, Group Presentation, Group Discussion, Project Report, Field Visit Report, Poster Presentation, Seminar, Quiz (written).
4. Pre-Semester & End Semester Theory Examination.

INDIRECT

1. Course end survey (Feedback)

Elective – III C: CYBER LAWS AND ITS APPLICATIONS

SEMESTER: II

COURSE CODE: P19IT2:D

CREDITS: 4

HOURS/WEEK :4

1.COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

CO. No.	Course Outcomes	Level I	Unit
CO1	Define the fundamentals of cyber law and its applications	K1	I
CO2	Compare the cybercrime and cyber terrorism	K2	I
CO3	Identify and apply the law of trade mark and domain name	K3	II
CO4	Examine the usage of digit certificate	K4	III
CO5	Asses the steps for investigation and preventive measures	K5	IV
CO6	combine the appropriate cybercrime with the cyber law	K6	V

2.A. SYLLABUS

UNIT – I: Introduction , Typology of cybercrime and Cyber terrorism 12 Hours

Introduction: Fundamentals of Information technology and cyber-Law and its application – Meaning of cyber law – nature and scope of cyber law –**Typology of cybercrime:**

Cybercrime- Cyber criminals – computer crime – reason for cybercrime –types of cybercrime- crime against economy- prevention of cyber crime – cyber ethics - **Cyber**

terrorism: Definition –tool- reason for cyber terrorism – Danger of cyber terrorism –efforts of combining cyber terrorism

UNIT – II: Domain Name and trade Mark Law 12 Hours

Domain Name and trade Mark Law: Domain name – types of Domain Name-Disputes, trademark law of Domain name – trademark Vs. Domain name –Cybersquatting-Uniform Domain Name Dispute Resolution Policy (UDRP)- An overview of Information Technology Act,2000 –Cyber-crime under Information Technology Act, 2000.

UNIT – III: Digital (Electronic) Signature 12 Hours

Digital (Electronic) Signature: Definition – Essential steps of the Digital signature process- Digital signature certificate - Certification Authority – Types of certificates- Authentication of electronic records – Electronic Governance

UNIT – IV: Cyber-crime Investigation and Preventive measures of Cybercrime 12Hours

Cyber-crime Investigatigation: Precautions at the search site –Steps for the seize –Computer forensics- Preventive measures of Cybercrime: Classification of Cybercrimes - Remedial measures to combat cybercrime - Combating Cybercrimes through Legislation – Prevention of Cyber Crime – Preventive Measures

UNIT – V: Applications of Cyber Law**12 Hours****Applications of Cyber Law:** Online Banking – Network Service Provider – Ecommerce – E-Governance**2.B. Topics for Self Study:**

S.No.	Topics	Web Links
1	Cyber Crime Cases	http://www.itu.int/ITU-D/cyb/cybersecurity/docs/Cybercrime %20legislation%20EV6.pdf/
2	Cyber Threats	file:///C:/Users/SaiKrish/Downloads/ACS_Cybersecurity_Guide.pdf/
3	Cyber defences	https://niti.gov.in/sites/default/files/2019-07/CyberSecurityConclaveAtVigyanBhavanDelhi_1.pdf/
4	Forensic process	https://www.researchgate.net/publication/255614731_Mapping_Process_of_Digital_Forensic_Investigation_Framework/

2.C. Text Book(s):

1. Shilpa Surayabhan Dongre ,” **Cyber Law and Its Applications** “, Current Publication ISBN:978-81-925610-0-4, 2015

2.D. Reference Books:

1. Dr. S. R. Myneni, “**Information Technology Law (Cyber Laws)**” ,Asia Law House
2. Divya Rohatgi & Shruti Karkare, “**Cyber Law & Crimes**” , Whytes & Co’s Guide

2.E. Web Links:

1. https://heimdalsecurity.com/pdf/cyber_security_for_beginners_ebook.pdf/
2. <http://larose.staff.ub.ac.id/files/2011/12/Cyber-Criminology-Exploring-Internet-Crimes-and-Criminal-Behavior.pdf/>
3. <http://docshare04.docshare.tips/files/21900/219006870.pdf/>
4. <http://www.uou.ac.in/sites/default/files/slm/FCS.pdf/>
5. https://cyber-cops.com/book_detail/

3.SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom’s Taxonomic Level of Transaction
I	Introduction, Typology of cybercrime and Cyber terrorism:		
1.1	Introduction: Fundamentals of Information technology and cyber-Law and its application – Meaning of cyber law – nature and scope of cyber law –	Recall the fundamentals of information technology(K1)	K2
		Define the cyber law and its types(K1)	

		Illustrate the nature and scope of cyber law(K2)	
1.2	Typology of cybercrime: Cybercrime- Cyber criminals – computer crime – reason for cybercrime –types of cybercrime- crime against economy- prevention of cybercrime – cyber ethics -	Distinguish the cybercrime and computer crime(K4)	
		Classify the types of cyber crime (K4)	
		Asses the prevention techniques of cyber crime((K5)	
1.3	Cyber terrorism: Definition –tool- reason for cyber terrorism – Danger of cyber terrorism –efforts of combining cyber terrorism	Identify the reason and danger of cyber terrorism(K3)	
II	Domain Name and trade Mark Law		
2.1	Domain Name and trade Mark Law: Domain name – types of Domain name-Disputes, trademark law of Domain name – trademark Vs. Domain name –Cyber squatting-Uniform Domain Name Dispute Resolution Policy (UDRP)- An overview of Information Technology Act,2000 –Cybercrime under Information Technology Act, 2000.	Classify the issues related to the types of domain name(K4)	K3
		Apply the UDRP in the assignment of domain name(K3)	
		Compare the act related to information technology(K5)	
III	Digital (Electronic) Signature		
3.1	Digital (Electronic) Signature: Definition – Essential steps of the Digital signature process- Digital signature certificate - Certification Authority – Types of certificates- Authentication of electronic records – Electronic Governance	Illustrate the steps of digital signature process (K2)	K4
		Examine the digital certificate issued by the certification authority(K4)	
		Assess the authentication of electronic records(K5)	
IV	Cybercrime Invesitigation and Preventive measures of Cybercrime		
4.1	Cybercrime Invesitigation: Precautions at the search site –Steps for the seize –Computer forensics-	Test for the precautions followed by searching the web site(K4)	K5
4.2	Preventive measures of Cybercrime: Classification of	Classify the cyber crimes(K4)	
		Justify the preventive measures of cyber crimes(K5)	

	Cybercrimes - Remedial measures to combat cybercrime - Combating Cybercrimes through Legislation – Prevention of Cyber Crime – Preventive Measures		
V	Applications of Cyber Law		
5.1	Applications of Cyber Law: Online Banking – Network Service Provider – Ecommerce – E-Governance	Improve the applications of cyber law.(K6)	K6

4.MAPPING (CO, PO, PSO)

P19IT2:D	P O1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	M	M	H	H	M	H	M	M	H	M	M	H	H
CO2	H	H	H	H	H	H	H	H	H	M	M	H	H
CO3	L	M	L	M	M	M	H	H	M	L	L	H	H
CO4	H	M	M	H	H	M	L	H	H	L	M	H	H
CO5	H	H	H	H	H	H	M	H	H	L	M	H	H
CO6	H	H	H	H	H	H	M	H	H	L	M	H	H

L-Low

M-Moderate

H- High

5.COURSE ASSESSMENT

METHODS DIRECT:

1. Continuous Assessment Test T1, T2 (Theory & Practical Components): Closed Book
2. Open Book Test.
3. Cooperative learning report, Assignment, Group Presentation, Group Discussion, Project Report, Field Visit Report, Poster Presentation, Seminar, Quiz (written).
4. Pre-Semester & End Semester Theory Examination.

INDIRECT

1. Course end survey (Feedback)

PROGRAMMING WITH PYTHON

SEMESTER: III
CREDITS: 5

COURSE CODE: P19IT307
HOURS/WEEK:5

1. COURSE OUTCOMES

After the successful completion of this course, the student will be able to

CO. No.	Course Outcomes	Level	Unit
CO1	Illustrate the basics of computer programming languages	K2	I
CO2	Apply the concepts of user defined functions	K3	II
CO3	Make use of the built in functions	K3	II
CO4	Classify the built in function of string, List, Tuple and Dictionary.	K4	III
CO5	Determine the Importance of file programs and Exceptions handling	K5	IV
CO6	Develop programs using classes and Objects	K6	V

2. A. SYLLABUS

UNIT – I: Introduction to Python

15 Hours

Introduction to Python: Introduction – Python Overview – Getting started with python – Comments – Python Identifiers – Reserved Keywords – Variables – Standard Data Types – Operators – Standard and Expressions – String Operations – Boolean Expressions – Control Statements – Iteration – Input from Keyboard.

UNIT – II: Functions

15 Hours

Functions: Introduction – Built-in Functions – Composition of Functions – User Defined Functions – Parameters and Arguments – Function Calls – The return statement – Python Recursive functions – The anonymous functions – Writing python scripts

UNIT – III: Strings, Lists, Tuples and Dictionaries

15 Hours

Strings and Lists: Strings – Compound Data type – len Function – String Slices – Strings are Immutable – String Traversal – Escape Characters – String Formatting Operator – String Formatting Functions - Lists – Values and accessing elements – Lists are Mutable – Traverse – Deleting elements from list – Built-in list operators – Built-in List methods - Tuples and Dictionaries: Tuples – Creating Tuples – Accessing values in Tuples – Basic Tuple Operations – Built-in Tuple Functions - Dictionaries.

UNIT – IV: Files and Exceptions

15 Hours

Files and Exceptions: Text Files – Opening a File – Closing a File – File Object Attributes – Reading from a file – Writing to a file – Renaming a file – Deleting a file – File related methods. - Directories – Exceptions – Built-in Exceptions – Handling Exceptions - Exception with arguments – User defined Exceptions

UNIT – V: Classes and Objects

15 Hours

Classes and Objects: Overview of OOP – Class Definition – Creating Objects – Objects as Arguments – Objects as Return values – Built-in class attributes – Inheritance – Method Overriding – Data Encapsulation – Data Hiding.

2.B. Topics for Self Study

S.No	Topics	Web Links
1	Python with Database	https://www.tutorialspoint.com/python/pdf/python_database_access.pdf/
2	Scientific Python	https://raw.githubusercontent.com/jrjohansson/scientific-python-lectures/master/Scientific-Computing-with-Python.pdf
3	Client Server Programming	http://www.dabeaz.com/python/PythonNetBinder.pdf/
4	Game Development	https://inventwithpython.com/makinggames.pdf/

2.C. Text Book(s):

1. Balagurusamy E, “**Introduction to Computing and Problem Solving Using Python**”, 1st Edition, McGraw Hill Education(India) Private Limited, 2017.

2.D. Reference Books:

1. Reema Thareja, “**Python Programming using Problem Solving Approach**”, Oxford University Press, 2017.
2. Ashok Namdev Kamthane and Amit Ashok Kamthane, “**Programming and Problem Solving with Python**”, McGrawHill Education, November 2017.
3. Mark Lutz, “**Learning Python**”, O’Reilly, Shroff Publishers & Distributors Private Ltd., June 2017.

2.E. Web Links:

1. https://www.tutorialspoint.com/python3/python_tutorial.pdf/
2. <https://nptel.ac.in/courses/106/106/106106145/>
3. <https://towardsdatascience.com/>
4. <https://www.computer-pdf.com/programming/802-tutorial-python-tutorial.html/>

3.SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom’s Taxonomic Level of Transaction
I	Introduction to Python		
1.1	Introduction to Python: Introduction - Python Overview- Getting started with python- Comments- Python Identifiers- Reserved Keywords- Variables- Standard Data Types- Operators- Standard and Expressions- String Operations- Boolean Expressions	Tell the basics of Python(K1)	K2
		List the Key Features of Python(K1)	
		Recall the fundamentals of Programming Language(K1)	
		Demonstrate the installation of Python(K2)	

1.2	Control Statements - Iteration - Input from Keyboard.	Recall the selection and iteration statements(K1)	
		Identify programs using control statements(K3)	
		Classify input and output statements(K2)	
II	Functions		
2.1	Functions: Introduction – Built-in Functions – Composition of Functions – User Defined Functions – Parameters and Arguments – Function Calls – The return statement – Python Recursive functions – The anonymous functions – Writing python scripts	Experiment with built in function(K3)	K3
		Test the results of Built in Function(K4)	
		Build functions with parameters(K3)	
		Construct anonymous function(K3)	
		Develop programs using Python scripts(K6)	
		Create functions with call and return statements(K6)	
		Recall recursive function(K1)	
III	Strings, Lists, Tuples and Dictionaries		
3.1	Strings and Lists: String – Compound Data type – len Function – String Slices – Strings are Immutable – String Traversal – Escape Characters – String Formatting Operator – String Formatting Functions - Lists – Values and accessing elements – Lists are Mutable – Traverse – Deleting elements from list – Built-in list operators – Built-in List methods -	Categorize the string functions.(K4)	K4
		Interpret the results of string functions(K5)	
3.2	Tuples and Dictionaries: Tuples – Creating Tuples – Accessing values in Tuples – Basic Tuple Operations – Built-in Tuple Functions - Dictionaries.	Classify the functions of tuples and dictionaries.(K2)	
		Compare the functionality of list tuples and dictionaries(K4)	
		Make use of list functions(K3)	
IV	Files and Exceptions		
4.1	Files and Exceptions: Text Files – Opening a File – Closing a File – File Object Attributes – Reading from a file – Writing to a file – Renaming a file – Deleting a file – File related methods. – Directories	Recall the file concepts(K1)	K5
		Create programs using file concepts(K6)	

4.2	Exceptions: Exceptions – Built-in Exceptions – Handling Exceptions - Exception with arguments – User defined Exceptions	Define the concepts of Exception handling(K1)	
		Develop program using exception handling(K3)	
		Build user defined exception(K3)	
V	Classes and Objects		
5.1	Classes and Objects: Overview of OOP – Class Definition – Creating Objects – Objects as Arguments – Objects as Return values – Built-in class attributes – Inheritance – Method Overriding – Data Encapsulation – Data Hiding.	Recall the oops concepts(K1)	K6
		Apply objects as arguments and return types(K3)	
		Classify the types of inheritance(K4)	
		Test the execution of methods in parent and child class(K6)	
		Evaluate both data and function using access specifier(K6)	

4.MAPPING (CO, PO, PSO)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
P19IT307													
CO1	H	H	H	H	H	H	H	M	H	H	H	M	H
CO2	H	H	H	H	M	H	M	L	M	H	H	M	M
CO3	M	H	H	H	H	H	M	L	M	M	H	M	M
CO4	H	H	H	H	H	H	M	M	H	H	H	H	M
CO5	M	M	M	H	M	M	M	H	M	M	H	H	M
CO6	H	M	H	H	M	H	M	H	H	H	H	M	H

L-Low

M-Moderate

H- High

5.COURSE ASSESSMENT

METHODS DIRECT:

1. Continuous Assessment Test T1, T2 (Theory & Practical Components): Closed Book
2. Cooperative learning report, Assignment, Group Presentation, Group Discussion, Project Report, Field Visit Report, Poster Presentation, Seminar, Quiz (written).
3. Pre-Semester & End Semester Theory Examination.

INDIRECT

1. Course end survey (Feedback)

Core VIII: INTERNET OF THINGS

SEMESTER: III
CREDITS: 5

COURSE CODE: P19IT308
HOURS/WEEK 75

1. COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

CO. No.	CO Statement	Level	Unit
CO1	Demonstrate the designs and levels of IoT	K2	I
CO2	Identify Domain Specific IoTs	K3	II
CO3	Utilize both IoT and M2M	K3	II
CO4	Discover IoT design methodology, Devices and Endpoints	K4	III
CO5	Interpret IoT design using case studies	K5	IV
CO6	Elaborate Data analytics for IoT and Tools for IoT	K6	V

2. A. SYLLABUS

UNIT – 1: Introduction to Internet of Things **15 Hours**

Introduction to Internet of Things: Introduction – Physical Design of IoT – Logical Design of IoT – IoT Enabling Technologies – IoT Levels & Deployment Templates.

UNIT – 2: Domain Specific IoTs **15 Hours**

Domain Specific IoTs: –Introduction – Home automation – Cities – Environment – Energy – Retail – Logistics – Agriculture – Industry – Health & Lifestyle – **IoT and M2M:** Introduction – M2M – Difference between IoT and M2M – SDN and NFV for IoT – Software Defined Networking – Network Function Virtualization.

UNIT – 3: IoT Platforms Design Methodology **15 Hours**

IoT Platforms Design Methodology: Introduction – IoT Design Methodology – **IoT Physical Devices and Endpoints:** – What is an IoT device – Exemplary Device: Raspberry Pi – About the Board – Linux on Raspberry Pi – Raspberry Pi Interfaces – Programming Raspberry Pi with Python – Other IoT devices.

UNIT – 4: Case Studies Illustrating IoT Design **15 Hours**

Case Studies Illustrating IoT Design: Introduction – Home Automation – Smart Lighting – Home Intrusion Detection – Cities – Smart Parking – Environment –Weather Monitoring System – Weather Reporting Bot – Air Pollution Monitoring – Forest Fire Detection – Agriculture – Smart Irrigation – Productivity Applications.

UNIT – 5: Data Analytics for IoT **15 Hours**

Data Analytics for IoT: Introduction – Apache Hadoop – Using Hadoop MapReduce for Batch Data Analysis – Apache Oozie – Apache Spark – Apache Storm – Using Apache Storm for Real-time data analysis. **Tools for IoT:** Introduction – Chef – Chef case studies – Puppet – Puppet case study.

2.B. Topics for Self Study:

S.No.	Topics	Web Links
1	NodeMcu	https://www.nodemcu.com/index_en.html
2	Arduino	https://www.arduino.cc/en/Guide
3	IOT Projects	https://nevonprojects.com/iot-projects/

2.C. Text Book(s):

1. Arshdeep Bahga, Vijay Madiseti, “**Internet of Things – A Hands-on Approach**”, Universities Press (India) Private Limited, 2016.

2.D. Reference Books:

1. Peter Waher, “**Learning Internet of Things**”, PACKT Publishing, 2015.
2. Cuno Pfister, “**Getting Started with the Internet of Things**”, O’Rielly Publication.
3. Francis DaCosta, “**Rethinking the Internet of Things-A Scalable Approach to Connecting Everything**”, Apress open publication, 2013 Edition.

2.E. Web Links:

1. https://www.tutorialspoint.com/internet_of_things/index.htm
2. <https://www.edureka.co/blog/iot-tutorial/>
3. <https://www.youtube.com/watch?v=LlhmzVL5bm8&list=PL9ooVrP1hQOGccfBbP5tJWZ1hv5sIUWJI>

3.SPECIFIC LEARNING OUTCOMES (SLO)

Unit / Section	Course Contents	Learning Outcomes	Highest Bloom’s Taxonomic Level of Transaction
I	Introduction to Internet of Things		
1.1	Introduction to Internet of Things: Introduction – Physical Design of IoT – Logical Design of IoT – IoT Enabling Technologies – IoT Levels & Deployment Templates.	<ul style="list-style-type: none">• Tell Introduction of IoT• Demonstrate the designs of IoT• Explain IoT enabling technologies	K2
II	Domain Specific IoTs		

		<ul style="list-style-type: none"> • Compare different levels and Deployment Templates of IoT 	
2.1	Domain Specific IoTs: Introduction – Home automation – Cities – Environment – Energy – Retail – Logistics – Agriculture – Industry – Health & Lifestyle	<ul style="list-style-type: none"> • Applications of IoT • Identify IoT in different domains • Make use of IoT in all domains 	K3
2.2	IoT and M2M: Introduction – M2M – Difference between IoT and M2M – SDN and NFV for IoT – Software Defined Networking – Network Function Virtualization.	<ul style="list-style-type: none"> • Apply M2M in IoT • Identify the difference between IoT and M2M • Make use of SDN and NFV for IoT • Organize SDN and NFV 	K3
III	IoT Platforms Design Methodology		
3.1	IoT Platforms Design Methodology: Introduction – IoT Design Methodology	<ul style="list-style-type: none"> • Analyze design methodology of IoT • Discover the steps involved in IoT Design Methodology 	K4
3.2	IoT Physical Devices and Endpoints: What is an IoT device – Exemplary Device: Raspberry Pi – About the Board – Linux on Raspberry Pi – Raspberry Pi Interfaces – Programming Raspberry Pi with Python – Other IoT devices.	<ul style="list-style-type: none"> • Analyze the devices and endpoints of IoT • List the other IoT Devices • Distinguish different IoT devices • Examine how to program Raspberry Pi with Python 	K4
IV	Case Studies Illustrating IoT Design		
4.1	Case Studies Illustrating IoT Design: Introduction – Home Automation – Smart Lighting – Home Intrusion Detection – Cities – Smart Parking – Environment –Weather Monitoring System – Weather Reporting Bot – Air Pollution Monitoring – Forest Fire Detection – Agriculture – Smart Irrigation – Productivity Applications.	<ul style="list-style-type: none"> • Importance of IoT in Use cases • Decide the framework for Home Automation • Determine the weather using IoT • Prioritize IoT Home Intrusion detection • Select smart irrigation from IoT • Support IoT Productivity applications 	K5
V	Data Analytics for IoT		
5.1	Data Analytics for IoT: Introduction – Apache Hadoop – Using Hadoop MapReduce for Batch Data Analysis – Apache Oozie – Apache Spark – Apache	<ul style="list-style-type: none"> • Build Data analytics application for IoT using Apache Hadoop • Elaborate Apache Oozie, Spark and Storm 	K6

	Storm – Using Apache Storm for Real-time data analysis.	<ul style="list-style-type: none"> Construct Real-time data analysis using Apache Storm 	
5.2	Tools for IoT: Introduction – Chef – Chef case studies – Puppet – Puppet case study.	<ul style="list-style-type: none"> Discuss Tools for IoT Formulate Chef case study Adapt puppet Case study 	K6

4.MAPPING (CO, PO, PSO)

P19IT308	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	H	H	H	M	M	M	L	L	L	H	M	M	L
CO2	H	H	H	M	M	M	L	L	L	H	M	M	L
CO3	H	H	M	M	M	M	L	L	L	H	M	M	L
CO4	M	M	M	H	H	H	M	M	L	M	H	M	M
CO5	M	H	M	H	M	M	L	L	L	M	H	H	M
CO6	L	L	L	M	M	M	L	M	M	M	H	M	M

L – Low

M – Moderate

H – High

5. COURSE ASSESSMENT

METHODS DIRECT:

1. Continuous Assessment Test: T1, T2 (Theory & Practical Components): Closed Book
2. Open Book Test.
3. Cooperative Learning Report, Assignment, Group Presentation, Group Discussion, Project Report, Field Visit Report, Poster Presentation, Seminar, Quiz (written).
4. Pre-Semester & End Semester Theory Examination

INDIRECT:

1. Course end survey (Feedback)

Core VII: CLOUD COMPUTING

SEMESTER: I

CREDITS: 5

COURSE CODE: P19IT309

HOURS/WEEK : 15

1. COURSE OUTCOMES

After the successful completion of this course, the students will be able to

CO. No.	Course Outcomes	Level	Unit
CO1	Classify the fundamentals and essentials components of Cloud Computing	K2	I
CO2	Identify the technical foundations of Cloud Systems Architectures.	K3	I
CO3	Construct the importance of Virtualization in distributed computing and how this has enabled the development of cloud computing.	K3	II
CO4	Classify the concept of Cloud infrastructure model.	K4	III
CO5	Determine the concept of Cloud Security.	K5	IV
CO6	Discuss Federated Cloud Computing with Service Providers Perspective of SLA Management	K6	V

2. A. SYLLABUS

UNIT I: Introduction to Cloud Computing

15 Hours

Introduction to Cloud Computing : Cloud Computing in a Nutshell – Roots of Cloud Computing – Layers and types of Clouds – Desired features of a Cloud – Cloud Infrastructure Management – Challenges and Risks – Migrating into a Cloud: - Introduction – Broad Approaches – The Seven step model – Enriching the ‘Integration as a Services’ Paradigm for the Cloud Era: - Introduction – The Evolution of SaaS – The Challenges of SaaS Paradigm – Approaching the SaaS Integration Enigma – New Integration Scenarios – The Integration Methodologies – SaaS Integration Services – The Enterprise Cloud Computing Paradigm: - Introduction – Background – Issues – Transition Challenges – The Cloud Supply Chain.

UNIT II: Infrastructure as a Service

15 Hours

Infrastructure as a Service :- Virtual Machine Provisioning and Migration Services: Introduction – Background – Manageability – Migration Services – Management of Virtual Machines for Cloud Infrastructures: - Anatomy of Cloud Infrastructures – Distributed Management of Virtual Infrastructures – Scheduling techniques for Advance Reservation of Capacity – Enhancing Cloud Computing Environments Using a Cluster as a Service: - Introduction – Related Work – RVWS Design – The Logical Design – Secure Distributed Data Storage in Cloud Computing: - Introduction – Cloud Storage from LANs to WANs – Technologies for Data Security – Challenges.

UNIT III: Platform and Software as Service (PAAS/IAAS)

15 Hours

PLATFORM AND SOFTWARE AS SERVICE (PAAS/IAAS) Aneka-Integration of Private and Public Clouds: Introduction– Technologies and Tools – Aneka Cloud Platform - Aneka Resource Provisioning Service – Hybrid Cloud Implementation – CometCloud: An

Autonomic Cloud Engine: - Introduction – CometCloud – Architecture – Autonomic Behavior of CometCloud – Overview of CometCloud-based Applications – Implementation and Evaluation

UNIT IV: Platform and Software as Service (PAAS/IAAS) 15 Hours
PLATFORM AND SOFTWARE AS SERVICE (PAAS/IAAS) T-Systems Cloud-based Solutions for Business Applications: - Introduction – Enterprise Demand of Cloud Computing – Dynamic ICT Service – Importance of Quality and Security in Clouds – Dynamic Data Centre-Producing Business-ready; Dynamic ICT Services – The MapReduce Programming Model and Implementations: - Introduction – MapReduce Programming Model – MapReduce implementations for the Cloud.

UNIT V: Monitoring and Management 15 Hours
MONITORING AND MANAGEMENT: An Architecture for Federated Cloud Computing – Introduction – A typical Use case – The Basic Principles of Cloud Computing – A Federated Cloud Computing Model – Security Considerations – Service Providers Perspective of SLA Management in Cloud Computing: - Traditional Approaches to SLO Management – Types of SLA – Life Cycle of SLA – SLA Management in Cloud –Automated Policy-based Management – Performance Prediction for HPC on Clouds: - Introduction – Background – Grid and Cloud – Performance related issues of HPC in the Cloud.

2.B. Topics for Self Study:

S.No	Topics	Web Links
1	Best Practices in Architecting Cloud Applications in the AWS Cloud	https://www.slideshare.net/AmazonWebServices/architectingforthecloudbestpractices
2	Massively Multiplayer Online Game Hosting on Cloud Resources	https://www.powershow.com/view4/6198e3-MmYxY/Multiplayer_Games_and_Networking_powerpoint_ppt_presentation
3	Building Content Delivery Networks Using Clouds	https://awesome-tech.readthedocs.io/caching/
4	Resource Cloud Mashups	https://slideshare.net/elvasvj/cloud-mashup

2.C. Text Book:

1. Rajkumar Buyya, James Broberg, Andrzej Goscinsky, “**Cloud Computing Principles and Paradigms**”, Wiley India Pvt. Ltd., 2011.

2.D. Reference Book:

1. Barrie Sosinsky, “**Cloud Computing Bible**”, 1st Edition, Wiley India Pvt. Ltd., New Delhi, 2011.
2. Michael Miller, “**Cloud Computing**”, 1st Edition, Pearson Education Inc., New Delhi, 2008.

2.E. Web Links:

1. https://onlinecourses.nptel.ac.in/noc20_cs20/preview
2. <https://nptel.ac.in/courses/106/104/106104182/>
3. <https://www.slideshare.net/mustafasalam167/cloud-technology-mashup/>

3.SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Levels of Transaction
I	Foundations of cloud computing		
1.1	Introduction to Cloud Computing Cloud Computing in a Nutshell – Roots of Cloud- Computing – Layers and types of Clouds – Desired features of a Cloud – Cloud Infrastructure Management –Challenges and Risks	Define the cloud computing(K1)	K2
		Summarize the Roots of Clouds(K2)	
		Explain Layers and types of Clouds(K6)	
		Illustratethe clouds Infrastructure Management (K2)	
		Discuss Challenges and Risks(K6)	
		Summarize desired features of a clouds(K2)	
1.2	Migrating into a Cloud: Introduction – Broad Approaches – The Seven step model.	Recall the migration into a clouds(K3)	
		Explain BroadApproaches(K6)	
		ConstructThe Seven step Model.(K3)	
1.3	Enriching the 'Integration as a Services' Paradigm for the Cloud Era: Introduction – The Evolution of SaaS – The Challenges of SaaS Paradigm – Approaching the SaaS Integration Enigma–New Integration Scenarios–The Integration Methodologies – SaaS Integration Services	Recall the 'Integration as a Services'(K3)	
		Classify Evolution ofSaaS(K3)	
		Apply SaaS Integration Enigma(K3)	
		Construct Integration Methodologies(K3)	
1.4	The Enterprise Cloud Computing Paradigm: Introduction – Background – Issues – Transition Challenges – The	Summarize Transition Challenges (K2)	
		Illustrate the Cloud Supply Chain(K2)	
II	INFRASTRUCTURE as a SERVICE		
2.1	Infrastructure As A Service: Introduction – Background – Manageability – Migration Services	Explain Virtual Machine Provisioningandmanageability(K3)	K3
		Organize the Virtual Migration service(K3)	
2.2	Management of Virtual Machines for Cloud	Classify Anatomy of Cloud Infrastructures(K4)	

	Infrastructures: Anatomy of Cloud Infrastructures – Distributed Management of Virtual Infrastructures – Scheduling techniques for Advance Reservation of Capacity	Summarize distributed Management of Virtual Infrastructures(K2) Show Scheduling techniques for Advance Reservation of Capacity(K1)	
2.3	Enhancing Cloud Computing Using a Cluster as a Service: Introduction-Related work-RVWS Design-The Logical Design.	Construct Enhancing Cloud Computing(K3) Experiment with RVWS Design(K2) Build Cluster as a Service of the Logical Design(K3)	
2.4	Secure Distributed Data Storage in Cloud Computing Introduction -Cloud Storage from LANs to WANs-Technologies for Data Security-Challenges	Organize secure distributed data storage(K3). Apply LANs to WANs Plan Technologies for Data Security(K3)	
III	PLATFORM AND SOFTWARE AS SERVICE (PAAS/IAAS)		
3.1	Platform And Software as Service (PAAS/IAAS) Aneka-Integration of Private and Public Clouds	Define the Aneka-Integration of Private and Public Clouds(K1)	K4
3.2	Introduction– Technologies and Tools – Aneka Cloud Platform - Aneka Resource Provisioning Service – Hybrid Cloud Implementation	Develop technologies and Tools of Comet Cloud(K6) Classify Aneka CloudPlatform(K4), Experiment with Aneka Resource Provisioning Service(K4). Develop Hybrid Cloud Implementation(K6)	
3.2	Comet Cloud: An Autonomic Cloud Engine: Introduction –Comet Cloud – Architecture – Autonomic Behavior of CometCloud – Overview of CometCloud-based Applications – Implementation and Evaluation	Recall CometCloud: An Autonomic Cloud Engine(K1) Classify Architecture – Autonomic Behavior of CometCloud(K4) Make use of comet Cloud based Applications(K3) Test for Implementation and Evaluation(K3)	
IV	PLATFORM AND SOFTWARE AS SERVICE(PAAS/IAAS)		
4.1	Platform And Software as Service (PAAS/IAAS): Introduction – Enterprise Demand of Cloud Computing – Dynamic ICT Service	Apply Enterprise Demand of Cloud Computing(K3). Classify Enterprise Demand of Cloud Computing(K5)	K5

	–Importance of Quality and Security in Clouds – Dynamic Data Centre-Producing Business-ready; Dynamic ICTServices.	Construct Dynamic ICT Service(K6)	
		Determine Importance of Quality and Security in Clouds(K5)	
		Evaluate dynamic data center producing business(K5).	
4.2	The MapReduce Programming Model and Implementations: Introduction – MapReduce Programming Model – MapReduce implementations for the Cloud.	Analyze MapReduce Programming model and implementations (K5)	
		Develop MapReduce implementations for the Cloud.(K3)	
V	MONITERING AND MANAGEMENT An Architecture for Federated Cloud Computing		
5.1	Monitering and Management : Introduction – A typical Usecase – The Basic Principles of Cloud Computing – A Federated Cloud Computing Model – Security Considerations	Describe an Architecture for Federated Cloud Computing(K6)	K6
		Classify the Basic Principles of Cloud Computing(K4)	
		Categorize FederatedCloudComputingModel(K4)	
		Evaluate security considerations(K5)	
5.2	Service Providers Perspective of SLA Management in Cloud Computing: Traditional Approaches to SLO Management – Types of SLA – Life Cycle of SLA – SLA Management in Cloud –Automated Policy-based Management	Originate Service Providers Perspective of SLAManagement in Cloud Computing(K6).	
		Discus Traditional Approaches to SLO Management(K6)	
		Analyze Types of SLA(K4)	
		Design life cycle of SLA(K6)	
		Estimate SLAManagement in Cloud(K6)	
		Elaborate AutomatedPolicybased Management(K6)	
5.3	Performance Prediction for HPC on Clouds: Introduction – Background – Grid and Cloud – Performance related issues of HPC in the Cloud.	Explain the Grid and Cloud(K6)	
		Construct the Related issues of HPC in the Cloud(K6).	

4.MAPPING SCHEME FOR THE PO, PSOS AND COS

P19IT309	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	H	H	H	M	M	M	H	H	H	H	M	M	H
CO2	H	H	H	M	M	M	H	M	H	H	M	M	H
CO3	H	H	H	H	H	H	H	H	H	M	H	H	H
CO4	M	M	M	M	H	H	H	H	M	M	H	H	H
CO5	M	M	M	H	H	H	H	H	H	M	H	H	L
CO6	H	H	H	M	H	H	M	M	H	H	H	H	H

L-Low

M-Moderate

H- High

5. COURSE ASSESSMENT

METHOD SDIRECT:

1. Continuous Assessment Test: T1, T2 (Theory & Practical Components): Closed Book
2. Open Book Test.
3. Cooperative Learning Report, Assignment, Group Presentation, Group Discussion, project Report, Field Visit Report, Poster Presentation, Seminar, Quiz (written).
4. Pre-Semester & End Semester Theory Examination

INDIRECT:

1. Course end survey (Feedback)

Core – VII: PYTHON PROGRAMMING LAB

SEMESTER: III
CREDITS: 4

COURSE CODE: P19IT3P5
HOURS/WEEK:4

1.COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

CO. No.	Course Outcomes	Level	Exercises
CO1	Apply the basic concepts of programming using Python	K3	1-6
CO2	Construct the program using built in functions of List and string	K3	7-13
CO3	Test for mapping using Dictionary	K4	14-16
CO4	Asses the execution speed of the program using recursion	K5	17-19
CO5	Evaluate the basic operations of file creation	K5	20-22
CO6	Build the program using Object oriented concepts	K6	23-25

2.A.SYLLABUS

Ex.No	Exercises
1	Program to calculate the average of numbers in a given list.
2	Program to accept three digits and print all possible combinations from the digits.
3	Program to count number of digits in a number.
4	Program to compute prime factors of an integer.
5	Program to find LCM and GCD of two numbers.
6	Program to check if a number is a perfect number.
7	Program to remove the duplicate items from a list.
8	Program to find union and intersection of two lists.
9	Program to swap the first and last value of a list.
10	Program to count the number of vowels in a string.
11	Program to calculate the number of digits and letters in a string.
12	Program to form a new string by exchanging the first and the last characters.
13	Program to check common letters in two input strings.
14	Program to add a key-value pair to the dictionary.
15	Program to map two lists into dictionary.
16	Program to sum all the items in a dictionary.
17	Program to find the Fibonacci series using recursion.
18	Program to flatten a nested list using recursion.
19	Program to find the length of a list using recursion.
20	Program to count the number of words in a text file.
21	Program to copy the contents of one file into another.
22	Program to read the contents of a file in reverse order.

23	Program to append, delete and display elements of a list using classes.
24	Program to create a class which performs basic calculator operations.
25	Program to create a class and get all possible subsets from a set of distinct integers.

2.B. Topics for Self Study

S.No.	Topics	Web Links
1	Develop a program to calculate standard deviation	https://www.geeksforgeeks.org/python-statistics-stdev/
2	Create a program to find the factorial using recursion	https://www.programiz.com/python-programming/examples/factorial-recursion/
3	Create a program to find the minimum and maximum element of a set of 'N' Numbers	https://www.geeksforgeeks.org/python-maximum-minimum-set/
4	Create a program to find the transpose of the given matrix	https://www.tutorialspoint.com/python-program-to-find-the-transpose-of-a-matrix/

3.SPECIFIC LEARNING OUTCOMES (SLO)

Ex. No.	Lab Exercises	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
1	Calculate the average of numbers in a given list	<ul style="list-style-type: none"> • Choose decision making statements in Python • Make use of arithmetic operators. • Construct python program to calculate the sum and average • Organize the flow of control. • Plan the results. 	K3
2	Accept a three digits And print all possible combination from the digits	<ul style="list-style-type: none"> • Select the looping statement. • Build a Python program to print all possible combination of digits. • Develop a program to calculate the factorial of the given number. • Organize the flow of control. • Experiment with the results. 	K3
3	Count the number of digits in a number	<ul style="list-style-type: none"> • Construct a while looping • Develop a Python program to count the number of digits in a number. • Build a program to print the number in reverse order • Experiment with the results. 	K3

4	Compute the prime factors of an integer	<ul style="list-style-type: none"> ● Apply looping statement. ● Construct a Python program to compute the prime factors of an integer ● plan program to check whether the given number is prime or not ● Experiment with the results. 	K3
5-6	To find LCM and GCD	<ul style="list-style-type: none"> ● Choose if statement ● Develop a Python program to find LCM and GCD ● Construct a program to check if a number is a perfect number ● Build the flow of control. ● Experiment with the results. 	K3
7-9	Remove the duplicate items from a list	<ul style="list-style-type: none"> ● Make use of list in Python ● Develop a Python program to remove the duplicate elements ● Construct a program to swap the first and last value and find the union and intersection of two list ● Experiment with the results. 	K3
10-13	Count the number of vowels in a string	<ul style="list-style-type: none"> ● Apply string functions. ● Develop a Python program to count the number of vowels in a strings ● Build a program to calculate the number of digits and letters in a string and also swap the first and last characters of a string. ● Construct the program to check common letters in two input string ● Experiment with the results. 	K3
14-16	Add a key-value pair to the dictionary	<ul style="list-style-type: none"> ● List the Dictionary function. ● Examine a Python program to add a key-value pair to the Dictionary ● Inspect a program to map two lists into dictionary and also find the sum of all the items in dictionary ● Test for the results. 	K4
17-19	Generating Fibonacci numbers using recursive function	<ul style="list-style-type: none"> ● Determine the use of recursive function. ● Asses a Python program to print Fibonacci series of given integer value using recursion. ● Recommend a program to find the length of the string and also flatten a nested list using recursion ● Evaluate the results.. 	K5
20-22	Count the number of words in a text file.	<ul style="list-style-type: none"> ● Determine the file operations. ● Interpret a Python program to count the number of words in a Text file 	K5

		<ul style="list-style-type: none"> • Justify a program to copy the contents of one file into another file and also display the content of file in reverse order • Evaluate the results. 	
23-25	Create a class which performs basic calculator operations	<ul style="list-style-type: none"> • Construct classes and objects. • Develop a Python program to create a class which performs basic calculator operations. • Create a Python program to append, delete and display elements of a list using classes and also get all possible subsets from a set of distinct integer • Test the results. 	K6

4. MAPPING (CO, PO, PSO)

P19IT3P5	L-Low			M-Moderate			H- High				PSO			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PSO 1	PSO 2	PSO 3	PSO 4	
CO1	H	M	H	H	M	H	M	L	H	M	H	M	H	
CO2	H	H	H	H	H	M	M	L	H	M	H	M	H	
CO3	M	M	H	H	M	M	H	M	H	M	H	H	H	
CO4	M	M	H	H	H	M	M	M	H	M	H	H	H	
CO5	M	M	M	H	M	M	M	L	M	M	H	M	H	
CO6	H	M	H	H	M	H	H	L	H	M	H	M	H	

5. COURSE ASSESSMENT

METHODS DIRECT:

1. Continuous Assessment Test T1, T2 (Practical Components): Closed Book.
2. Pre/Post Test, Viva, Report for each Exercise.
3. Lab Model Examination & End Semester Practical Examination.

INDIRECT

1. Course end survey (Feedback)

Core Practical VI: INTERNET OF THINGS LAB

SEMESTER: III

COURSE CODE: P19IT3P6

CREDITS: 3

HOURS/WEEK 45

1. COURSE OUTCOMES:

After the successful completion of this course, the students will be able to

CO. No.	Course Outcomes	Level	Exercise
CO1	Build Raspberry Pi and program to access ports	K3	1
CO2	Identify RGB LED, 7 segment display and temperature measurement using sensors	K3	2 – 3
CO3	Examine different motors and IR sensors	K4	4 – 5
CO4	Determine Wi-Fi and GSM controller and design online Voltmeter	K5	6 – 7
CO5	Interface LoRA and using RTC design IoT Clock	K5	8 – 9
CO6	Design online Radio and Cloud Application	K6	10 – 11

Ex. No.	Exercise
1.	Basic Programming and Programming with Digital and Analog Ports.
2.	Interfacing 7 Segment RGB LED.
3.	Temperature Measurement with LCD Interface.
4.	Interfacing DC Motor, Stepper Motor and Servo Motors.
5.	IR Remote and IR Receiver Interfacing.
6.	Interfacing Wi-Fi and GSM with Controllers
7.	Designing Online Voltmeter.
8.	Interfacing LoRA.
9.	Designing IoT Clock.
10.	Designing Online Radio.
11.	Cloud Application employing Device Management and Security.

2. Topics for Self Study

S.No	Topics	Web Links
1	Water Quality Monitoring System	https://create.arduino.cc/projecthub/chanhj/water-quality-monitoring-system-ddcb43?ref=tag&ref_id=iot&offset=2
2	IoT Pet Feeder	https://create.arduino.cc/projecthub/circuito-io-team/iot-pet-feeder-10a4f3?ref=tag&ref_id=iot&offset=3
3	IOT Smart Energy Grid	https://nevonprojects.com/iot-smart-energy-grid/
4	IOT Car Parking System	https://nevonprojects.com/iot-car-parking-system/

3.SPECIFIC LEARNING OUTCOMES (SLO)

Ex. No.	Lab Exercises	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
1	Basic Programming and Programming with Digital and Analog Ports.	<ul style="list-style-type: none"> ● Construct a module with Raspberry Pi, Potentiometer and LED ● Apply python programming to interface with GPIO in Pi ● Identify the output from analog and digital ports 	K3
2	Interfacing 7 Segment RGB LED.	<ul style="list-style-type: none"> ● Construct a module with Raspberry Pi, 7 Segment Display and RGB LED ● Apply python programming to interface with GPIO in Pi ● Identify the output from 7 Segment display and RGB LED 	K3
3	Temperature Measurement with LCD Interface.	<ul style="list-style-type: none"> ● Construct a module with Raspberry Pi, Temperature Sensor and 6x4 LCD display ● Apply python programming to interface with GPIO in Pi ● Identify the output from temperature sensor and display in LCD display 	K3
4	Interfacing DC Motor, Stepper Motor and Servo Motors.	<ul style="list-style-type: none"> ● Analyze DC motor, Stepper motor and Servo motor ● Examine the motors interfacing with Raspberry pi ● Test for the results from DC motor, Stepper motor and Servo motor 	K4
5	IR Remote and IR Receiver Interfacing.	<ul style="list-style-type: none"> ● Analyze IR receiver and remote ● Examine the IR sensor and interface with Raspberry Pi ● Test for the results to manually change the IR remote operation 	K4
6	Interfacing Wi-Fi and GSM with Controllers	<ul style="list-style-type: none"> ● Evaluate Wi-Fi and GSM module ● Conclude the connections with Raspberry Pi Using Python ● Determine the result from Wi-Fi module as control ● Determine the result from GSM module as text messages 	K5
7	Designing Online Voltmeter.	<ul style="list-style-type: none"> ● Evaluate the voltage from Potentiometer ● Conclude the connections with Raspberry Pi Using Python 	

		<ul style="list-style-type: none"> Determine the result from internet server as a web application 	K5
8	Interfacing LoRA.	<ul style="list-style-type: none"> Explain LoRA module Conclude the connections with Raspberry Pi Using Python Evaluate the result from LoRA 	K5
9	Designing IoT Clock.	<ul style="list-style-type: none"> Explain RTC Module Conclude the connections with Raspberry Pi Using Python Evaluate the current time from Pi using Internet Determine the result as IoT Clock 	K5
10	Designing Online Radio.	<ul style="list-style-type: none"> Build a Radio module interfacing with Raspberry Pi Construct the connections to access internet Test the result changing the frequency of radio stations 	K6
11	Cloud Application employing Device Management and Security.	<ul style="list-style-type: none"> Construct a cloud Interface through internet with Raspberry Pi Build Device management Application Test the security using Key Elaborate the result as cloud application control 	K6

4.MAPPING (CO, PO, PSO)

P19IT3 P6	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	H	H	H	M	M	M	L	L	L	H	M	M	L
CO2	H	H	H	M	M	M	L	L	L	H	M	M	L
CO3	H	H	H	M	M	M	L	L	L	H	M	M	L
CO4	M	M	M	H	H	H	M	M	L	M	H	H	L
CO5	M	M	H	H	H	H	M	H	L	M	H	H	M
CO6	M	M	M	H	H	H	L	M	M	M	H	H	M

L – Low

M – Moderate

H – High

5.COURSE ASSESSMENT METHODS

DIRECT:

- Continuous Assessment Test: T1, T2 (Practical Components): Closed Book
- Cooperative Learning Report, Assignment, Group Discussion, project Report, Field Visit Report, Seminar.
- Pre/Post Test, Viva, Report for each Exercise.
- Lab Model Examination & End Semester Practical Examination

INDIRECT:

- Course end survey (Feedback)

ELECTIVE-IV A: SOFTWARE ENGINEERING

SEMESTER: III

COURSE CODE: P19IT3:4

CREDITS: 4

HOURS/WEEK:4

1. COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

CO. No.	Course Outcomes	Level	Unit
CO1	Tells the members and Needs of Software Engineering.	K1	I
CO2	Recall the process modeling and Life cycle of Software Engineering.	K1	I
CO3	Identify how to plan and manage the project.	K3	II
CO4	Examine the requirement specification notations.	K4	III
CO5	Interpret the architectural styles, standards and procedures.	K5	IV
CO6	Adapt different testing strategies and quality factors of process models.	K6	V

2. A. SYLLABUS

UNIT I: Need for Software Engineering

12 Hours

Need for Software Engineering – About software and S/w engineering – A systems approach, - Engineering approach – Members of the development team – Change in S/w engineering. - Modeling the process and Life cycle: The meaning of process – S/w process models – Tools and techniques for process modeling – Practical process modeling.

UNIT II: Tracking progress

12 Hours

Tracking progress – Project personnel – Effort estimation – Risk management – The project plan – Process models and project management.

UNIT III: The requirement process

12 Hours

The requirement process – Types of Requirements – Characteristics of requirements – Expressing requirements – Additional requirements notations – Prototyping requirements – Requirements Documentation – Participants in the requirements process – Requirements validation – Measuring requirements – Choosing a requirements specification Techniques.

UNIT IV: Design Introduction

12 Hours

Design Introduction – Decomposition and Modularity – Architectural styles and strategies – Characteristics of good design – Techniques for improving design – Design evaluation and validation – Documenting the design – Programming standards and procedures – Programming guidelines – Documentation.

UNIT V: Testing strategic issues

12 Hours

Testing strategic issues – Test strategies for conventional Software – Test strategies for object-oriented Software – Validation testing – System testing – Software Testing Fundamentals – Black-box and White-box testing – White box testing – Black box testing – McCall’s Quality factors – ISO 9126 - QF – Software Reengineering: – Software Maintenance – A Software Reengineering process model.

2.B. Topics for self-study

S.No	Topics	Web Links
1	Advancements in Software Engineering	https://www.ecpi.edu/blog/most-important-technological-advances-software-developers
2	Cleanroom software development	https://www.youtube.com/watch?v=XNENtRpYy2o
3	Apply Software engineering concepts in Web application	https://www.youtube.com/watch?v=rwGTkaUuzXQ
4	Agile software development life cycle	https://relevant.software/blog/agile-software-development-lifecycle-phases-explained

2.C. Text Book(s):

1. Shari Lawrence P. Fleeger, “**Software Engineering Theory and Practice**”, 2nd Edition, Pearson Education, Delhi, 2001. [(for Units 1–4) Chapters 1, 2, 3, 4, 5, 7]
2. Roger S. Pressman, “**Software Engineering a Practitioner’s Approach**”, 6th Edition, Tata McGraw Hill Publication, [(for Unit 5) Chapters: 13, 14, 15, 31]

2.D. Reference Books:

1. Ian Sommerville, “**Software Engineering**”, 6th Edition, Pearson Education, Delhi, 2005.
2. Douglas Bell, “**Software Engineering for Students-A Programming Approach**”, 4th Edition, Pearson Education, Delhi 2007

2.E. Web links:

1. <http://www.qucis.queensu.ca/Software-Engineering/reading.html>
2. <http://infolab.stanford.edu/~burback/watersluice/watersluice.html>
3. <https://www.youtube.com/watch?v=sB2iQSvrcG0>
4. <https://www.youtube.com/watch?v=4b1D1QFEeI0>

3.SPECIFIC LEARNING OUTCOMES (SLO):

Unit /Section n	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
I	Need for Software Engineering		
1.1	Need for Software Engineering – About software and S/W engineering – A systems approach, - Engineering approach. Members of the development team – Change in S/W engineering.	Recall the phases of software development life cycle.(K1)	K1
		Tell the tools and techniques used for software engineering.(K1)	
		Identify the members of the development team.(K3)	
	Modeling the process and Life cycle: The meaning of process – S/w process models – Tools and techniques for professional modeling – Practical process modeling	List the various software development process models.(K1)	
		Define the pros and cons of each model.(K1)	
		Explain the standards and techniques of the process model.(K2)	
		Illustrate the practical process modeling.(K2)	
II	Planning and managing the project		
2.1	Planning and managing the project: Tracking progress – Project personnel – Effort estimation.	Plan and schedule the project.(K6)	K1
		Identify the persons involved in the project.(K3)	
		Estimate effort involved while managing the project.(K6)	
2.2	Risk management – The project plan – Process models and project management.	Identify the risk in each phase.(K3)	
		Organize the activities in the project.(K3)	
		Build the process model according to requirement specification.(K6)	
III	Capturing the requirements		
3.1	Capturing the requirements: The requirement process – Types of Requirements – Characteristics of requirements – Expressing	Define the process requirements.(K1)	

	requirements – Additional requirements notations – Prototyping requirements	Tells how to express and characterize the requirements.(K1)	K3
		Inspect the captured notation.(K4)	
		Create the prototype for the captured requirement.(K6)	
3.2	Requirements Documentation – Participants in the requirements process – Requirements validation – Measuring requirements – Choosing requirements specification Techniques.	Explain the people who participate in the requirement.(K2)	
		Illustrate the requirement in the form of documentation.(K2)	
		Classify the requirement specification.(K2)	
		Explain the requirements using specification techniques.(K2)	
IV	Designing the system		
4.1	Designing the system: Design Introduction – Decomposition and Modularity – Architectural styles and strategies – Characteristics of good design – Techniques for improving design – Design evaluation and validation	Assess the design styles and strategies.(K5)	K5
		Interpret the requirement into design.(K5)	
		Explain the cohesion and coupling of design.(K2)	
		Choose the technique for improving design.(K3)	
		Recommend the system design.(K5)	
4.2	Documenting the design – Programming standards and procedures – Programming guidelines – Documentation.	Explain the system design with standards and procedures.(K2)	
		Evaluate the guidelines for programming with design constructed.(K5)	
		Interpret documentation using natural language.(K5)	
V	Testing Strategies		
5.1	Testing Strategies: Testing strategic issues – Test strategies for conventional Software – Test	Build the various types of testing done on software.(K5)	
		Choose the testing strategies for projects.(K3)	
		Plan appropriate testing for developed software.(K3)	

	strategies for object-oriented Software – Validation testing – System testing – Software Testing Fundamentals – Black-box and White-box testing – White box testing – Black box testing	Create functional and nonfunctional testing.(K6)	K6
5.2	McCall’s Quality factors – ISO 9126 - QF – Software Reengineering: – Software Maintenance – A Software Reengineering process model.	Identify the quality factors and standards of software engineering.(K3)	
		Explain the standards applied to software reengineering process model.(K2)	

4.MAPPING (PO, PSOS AND COS)

P19IT3: 4	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PS O 1	PS O 2	PS O 3	PS O 4
CO1	H	M	H	M	M	L	H	L	L	M	H	L	M
CO2	L	H	M	M	M	M	H	M	M	M	H	L	M
CO3	L	M	H	M	H	L	H	L	L	M	H	L	M
CO4	L	L	M	H	M	L	M	M	L	M	H	L	M
CO5	M	L	H	H	M	L	H	L	M	M	H	L	M
CO6	L	H	M	H	H	M	M	L	L	M	H	L	M

L – Low

M – Moderate

H – High

5.COURSE ASSESSMENT

METHODS DIRECT:

1. Continuous Assessment Test: T1, T2 (Theory & Practical Components): Closed Book
2. Open Book Test.
3. Assignment, Field Visit Report, Seminar, Quiz (written).
4. Pre-Semester & End Semester Theory Examination

INDIRECT:

- 1.Course end survey (Feedback)

ELECTIVE – IV B: SOFTWARE TESTING

SEMESTER: III
CREDITS: 4

COURSE CODE: P19IT3: A
HORUS/WEEK: 4

1.COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

CO. No.	Course Outcomes	Level	Unit
CO1	Recall the Software Development Life cycle.	K1	I
CO2	Illustrate the need for testing in software development process.	K2	II
CO3	Identify the needs of system testing.	K3	III
CO4	Analyse test phases and formulate tools for testing.	K4	IV
CO5	Build test plan, manage and report the software developed.	K6	V
CO6	Create test automation tools for programming model.	K6	V

2.A. SYLLABUS

UNIT I: Software Development Life Cycle Models

12 Hours

Software Development Life Cycle Models: – Phases of Software Project – Quality, Quality Assurance and Quality control – Testing, Verification & Validation – Process Model – Life Cycle Models - White Box Testing: Overview of White Box Testing – Static Testing – Structural Testing – Challenges - Black Box Testing: Overview of Black Box Testing – Need for Black Box Testing – When to do Black Box Testing? – How to do Black Box Testing?

UNIT II: Integration Testing

12Hours

Integration Testing: Overview of Integration Testing – Integration Testing as a Type of Testing – Integration Testing as a Phase of Testing – Scenario testing – Defect Bash - System and Acceptance Testing: Overview – Need for System Testing – Functional Vs Non-Functional Testing – Functional System Testing – Non-Functional Testing – Acceptance Testing – Summary of Testing Phases.

UNIT III: Performance Testing

12 Hours

Performance Testing: Factors governing Performance Testing – Methodology for Performance Testing – Tools for Performance Testing – Process for Performance Testing - Regression Testing: – What is Regression Testing – Types of Regression Testing – When to do Regression Testing – How to do Regression Testing – Best Practices in Regression Testing.

UNIT IV: Internationalization**12 Hours**

Internationalization (I18n) Testing: - Primer – Test Phases – Enabling Testing – Locale Testing – Validation – Language Testing – Localization Testing – Tools – Challenges and Issues – Ad hoc Testing: - Overview – Buddy Testing – Pair Testing – Exploratory Testing – Iterative Testing – Agile and Extreme Testing – Defect Seeding – Usability and Accessibility Testing: - Overview of Usability Testing – Approach – When to do Usability Testing? – How to Achieve Usability? – Quality Factors – Aesthetics Testing – Accessibility Testing – Tools – Lab Setup – Test Roles

UNIT V: Test Planning, Management, Execution and Reporting**12 Hours**

Test Planning, Management, Execution and Reporting: - Test Planning -Test Management – Test Process – Test Reporting – Best Practices - Software Test Automation: What is Test Automation – Terms used in Automation – Skills Needed for Automation – What to Automate, Scope of Automation – Design & Architecture for Automation – Generic Requirement for Test Tool Framework – Process model for Automation – Selecting a Test tool – Automation for Extreme Programming Model – Challenges in Automation.

2.B. Topics for Self-Study

S.No	Topics	Web Links
1	Develop a strategy for testing software that uses a sequence of testing steps	https://www.edureka.co/blog/software-testing-strategies/
2	Strategy along with testcase design	https://reqtest.com/testing-blog/test-case-design-techniques/
3	Testing Principles	https://www.guru99.com/software-testing-seven-principles.html
4	Concepts of testing	https://techazzist.wordpress.com/2012/05/04/basic-concepts-of-software-testing/
5	Strategies and tactics for Extreme programming.	http://agilemodeling.com/essays/agileModelingXP.htm

2.C. Text Book(s):

1. Srinivasan Desikan, Gopalaswamy Ramesh, “**Software Testing–Principle & Practices**”, Pearson Education, New Delhi, 2006.

2.D. Reference Books

1. Ron Patton, “Software Testing”, 2nd Edition, Pearson Education, New Delhi, 2006.
2. William E. Perry, “Effective Methods for Software Testing”, 3rd Ed., Wiley India, 2006.
3. Renu Rajani, Pradeep Oak, “Software Testing – Effective Methods, Tools and Techniques”, TMH Publishing Company Limited, New Delhi, 2004.

2.E. Web Links:

1. http://en.wikipedia.org/wiki/Software_testing#White-box_and_black-box_testing

2. <http://www.testingstuff.com/>
3. <https://www.youtube.com/watch?v=goaZTAzsLMk>
4. <https://www.youtube.com/watch?v=cv6GvRCIuTs>

3.SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
I	Software Development Life Cycle Models, White Box, Black Box Testing		
1.1	Software Development Life Cycle Models, White Box, Black Box Testing : Software Development Life Cycle Models: Phases of Software Project – Quality, Quality Assurance and Quality control – Testing, Verification & Validation – Process Model – Life Cycle Models	Recall the phases of the SDLC.(K1)	K1
		Outline the various process models for software development.(K2)	
		Identify the quality by following standards.(K3)	
		Examine the software by testing with requirements.(K4)	
1.2	White Box Testing Overview of White Box Testing – Static Testing – Structural Testing – Challenges -	Tells what white box is testing.(K1)	K1
		Recall why white box testing.(K1)	
		Apply the testing strategies for doing static testing.(K3)	
1.3	Black Box Testing: Overview of Black Box Testing – Need for Black Box Testing – When to do Black Box Testing? – How to do Black Box Testing?	Defines black box testing.(K1)	K1
		Identify why, when, where and how to do black box testing.(K3)	
II	Integration, System and Acceptance Testing		
2.1	Integration Testing: Overview of Integration Testing – Integration Testing as a Type of Testing – Integration Testing as a Phase of Testing – Scenario testing – Defect Bash	Label the use of integration testing.(K1)	K2
		Relate the testing with the previous and next phase.(K1)	
		Identify the bugs and send them to the development team.(K3)	
2.2	System and Acceptance Testing: Overview – Need for System Testing – Functional Vs Non-Functional Testing – Functional System Testing –	Defines the importance of system testing.(K1)	K2
		Explain the functional and non-functional testing.(K2)	

	Non-Functional Testing – Acceptance Testing – Summary of Testing Phases.	Identify the satisfactory level of testing.(K3)	
		Tell the test plan in each phase.(K1)	
III	Performance and Regression Testing		
3.1	Performance and Regression Testing: Performance Testing: Factors governing Performance Testing – Methodology for Performance Testing – Tools for Performance Testing – Process for Performance Testing	Recall the factors used for testing the performance.(K1)	K3
		Outline the road map for testing.(K2)	
		Identify the manual or automation tools for testing the performance.(K3)	
		Illustrate the plan of process to test.(K2)	
3.2	Regression Testing: What is Regression Testing – Types of Regression Testing – When to do Regression Testing – How to do Regression Testing – Best Practices in Regression Testing.	Define the importance of regression testing.(K1)	
		Illustrate the various types of regression testing.(K2)	
		Tells when and how to perform regression testing.(K1)	
		Determine the innovation of regression testing.(K5)	
IV	Internationalization (I18n) Testing, Ad hoc Testing and Usability and Accessibility Testing		
4.1	Internationalization (I18n) Testing: Primer – Test Phases – Enabling Testing – Locale Testing – Validation – Language Testing – Localization Testing – Tools – Challenges and Issues –	Define languages, character set and locale.(K1)	K4
		Recall validation and language testing.(K1)	
		Explain the localization of testing.(K2)	
		Identify the tools for testing.(K3)	
		Inspect the challenges and issues in testing.(K4)	
4.2	Ad hoc Testing: - Overview – Buddy Testing – Pair Testing – Exploratory Testing – Iterative Testing – Agile and Extreme Testing – Defect Seeding	Define different types of Ad hoc testing.(K1)	
		Tells techniques in exploratory testing.(K1)	
		Recall agile and extreme testing.(K1)	
4.3	Usability and Accessibility Testing: - Overview of Usability Testing – Approach – When to	Define usability testing.(K1)	
		When, how to achieve usability.(K1)	
		Outline the quality factors.(K2)	
		Identify tools and lab setup of testing.(K3)	

	do Usability Testing? – How to Achieve Usability? – Quality Factors – Aesthetics Testing – Accessibility Testing – Tools – Lab Setup – Test Roles	Apply aesthetic and accessibility testing.(K3)	
V	Test Planning, Management, Execution and Reporting, Software Test Automation		
5.1	Test Planning, Management, Execution and Reporting: Test Planning -Test Management – Test Process – Test Reporting – Best Practices	What is test planning and management?(K1)	K6
		Tells the activities involved in test process.(K1)	
		Explains the test reporting.(K2)	
		Tells the best practices of testing.(K1)	
5.2	Software Test Automation: What is Test Automation – Terms used in Automation –Skills Needed for Automation – What to Automate, Scope of Automation – Design & Architecture for Automation – Generic Requirement for Test Tool Framework – Process model for Automation – Selecting a Test tool – Automation for Extreme Programming Model – Challenges in Automation.	Recall the test automation.(K1)	
		List the tools and techniques used for automation testing.(K1)	
		Select the scope of automation.(K5)	
		Identify the requirement test tool.(K3)	
		Analyze the challenges in automation.(K4)	
		Select a test tool of automation testing.(K5)	

4.MAPPING (CO, PO, PSO)

P19IT3: A	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PS O 1	PS O 2	PS O 3	PS O 4
CO1	H	M	M	M	L	L	L	L	L	H	M	L	L
CO2	M	M	H	H	L	L	M	L	L	H	M	L	L
CO3	M	M	H	H	M	L	M	L	L	H	M	L	L
CO4	L	H	H	H	M	L	M	L	L	H	M	L	L
CO5	L	M	M	M	H	M	H	M	M	H	M	L	M
CO6	L	L	L	M	M	H	H	H	M	H	M	L	M

L-Low

M-Moderate

H- High

5. COURSE ASSESSMENT

METHODS DIRECT:

1. Continuous Assessment Test: T1, T2 (Theory & Practical Components):
Closed Book
2. Open Book Test.
3. Assignment, Project Report, Field Visit Report, Seminar, Quiz (written).
4. Pre-Semester & End Semester Theory Examination

INDIRECT:

1. Course end survey (Feedback)

ELECTIVE – IV C: SOFTWARE PROJECT MANAGEMENT

SEMESTER: III

COURSE CODE: P19IT3: B

CREDITS: 4

HOURS/WEEK : 4

1. COURSE OUTCOMES:

After the successful completion of this course the students will be able to

CO. No.	Course Outcomes	Level	Unit
CO1	Recall steps involved in project planning.	K1	I
CO2	Outline the cost and risk in project.	K2	II
CO3	Plan the project schedule, manage risk and identify hazards in project.	K3	III
CO4	Analyze how to prioritize and manage and controls the contract.	K4	IV
CO5	Determine the team involved in project.	K5	V
CO6	Build the safety and health of the people involved in project.	K6	V

2. A. SYLLABUS

UNIT I: Introduction to Software Project Management

12 Hours

Introduction to Software Project Management Project Definition – Contract Management – Activities Covered by Software Project Management – Overview of Project Planning .

UNIT II: Project Evaluation

12 Hours

Project Evaluation: Strategic Assessment – Technical Assessment – Cost Benefit Analysis–Cash Flow Forecasting – Cost Benefit Evaluation Techniques – Risk Evaluation.

UNIT III: Activity Planning Objectives

12 Hours

Activity Planning Objectives – Project Schedule – Sequencing and Scheduling Activities –Network Planning Models – Forward Pass – Backward Pass – Activity Float – Shortening Project Duration – Activity on Arrow Networks – Risk Management – Nature of Risk – Types of Risk – Managing Risk – Hazard Identification – Hazard Analysis – Risk Planning and Control.

UNIT IV: Monitoring and Control:

12 Hours

Monitoring and Control: Creating Framework – Collecting the Data – Visualizing Progress – Cost Monitoring – Earned Value – Prioritizing Monitoring – Getting Project Back to Target –

Change Control – Managing Contracts – Introduction – Types of Contract – Stages In Contract Placement – Typical Terms Of A Contract – Contract Management – Acceptance.

UNIT V: Managing People and Organizing Teams

12 Hours

Managing People and Organizing Teams: Introduction – Understanding Behavior – Organizational Behavior: A Background – Selecting the Right Person for The Job – Instruction in The Best Methods – Motivation – The Old man – Hackman Job Characteristics Model – Working in Groups – Becoming A Team – Decision Making – Leadership – Organizational Structures – Stress – Health and Safety – Case Studies.

2.B. Topics for Self-Study:

S.No	Topics	Web Links
1	Defining Software Quality	https://xbosoft.com/definition-software-quality/
2	Software Measures	https://www.tutorialspoint.com/software_quality_management/software_quality_measurement_metrics.htm
3	Product Vs. Process Quality Management.	https://www.ease.io/manufacturing-quality-control-the-difference-between-product-and-process-audits/
4	External Standards.	https://www.gristprojectmanagement.us/software-2/external-standards.html

2.C. Text Book(s):

1. Bob Hughes, Mike Cotterell, “Software Project Management”, 4th edition. TMH, 2009

2.D. Reference Books:

1. Walker Royce, “Software Project Management”, Pearson Education, 1998.
2. Pankaj Jalote, “Software Project Management in Practice”, Pearson Education, 2002.

2.E. Web Links:

1. <http://www.processimpact.com/articles/telepathy.html>
2. <http://www.agile-software-development.com/>
3. <https://www.youtube.com/watch?v=eOTcPOvT-H4>
4. <https://www.youtube.com/watch?v=fbwmAzPY8tE>

3.SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning Outcomes	Highest
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			Bloom's Taxonomic Level of Transaction
I	Introduction to Software Project Management Project		
1.1	Introduction to Software Project Management Project: Definition – Contract Management – Activities Covered by Software Project Management – Overview of Project Planning – Stepwise Project Planning.	Define, what is a software project?(K1)	K1
		Illustrate the activities covered in the project.(K2)	
		Identify what should be included in project.(K3)	
		Organize the activities of the project plan.(K3)	
II	Project Evaluation		
2.1	Project Evaluation: Strategic Assessment – Technical Assessment – Cost Benefit Analysis–Cash Flow Forecasting – Cost Benefit Evaluation Techniques – Risk Evaluation.	Tells how to assess the strategic and technical activities of project evaluation.(K1)	K2
		Analyze the benefits of the project.(K4)	
		Inspect the risk involved in the project.(K4)	
		Build the techniques for cost evaluation and cash flow.(K6)	
III	Activity Planning		
3.1	Activity Planning: Objectives – Project Schedule – Sequencing and Scheduling Activities –Network Planning Models – Forward Pass – Backward Pass – Activity Float – Shortening Project Duration – Activity on Arrow Networks – Risk Management – Nature Of Risk – Types Of Risk – Managing Risk – Hazard Identification – Hazard Analysis – Risk Planning And Control.	What are the objectives of the project proposed?(K1)	K3
		Illustrate the activities of the project with a plan.(K2)	
		Organize the activities and schedule appropriately.(K3)	
		Propose an activity on the network which comes first and next.(K6)	
		Analyze the types of risk that occur.(K4)	
		Identify the risk and control the risk with tolerance.(K3)	
IV	Monitoring and Control		
4.1	Monitoring and Control: Creating Framework – Collecting the Data – Visualizing Progress – Cost	Explain the structure of the system.(K2)	

	Monitoring – Earned Value – Prioritizing Monitoring – Getting Project Back to Target – Change Control – Managing Contracts – Introduction – Types Of Contract – Stages In Contract Placement – Typical Terms Of A Contract – Contract Management – Acceptance.	Identify the data required for development.(K3) Classify the priority according to importance.(K2) Construct the contracts for developing subsystems.(K6) Demonstrate the stages in contract.(K2)	K5
V	Managing People and Organizing Teams		
5.1	Managing People and Organizing Teams: Introduction – Understanding Behavior – Organizational Behavior: A Background – Selecting the Right Person For The Job – Instruction In The Best Methods – Motivation – The Old man – Hackman Job Characteristics Model – Working In Groups – Becoming A Team – Decision Making – Leadership – Organizational Structures – Stress – Health And Safety – Case Studies.	Recall the behavior of the people in development.(K1) Select the correct person with the experience.(K1) Appraise the person for his work involvement.(K5) Propose right decision-making work in group.(K6) Create organizational hierarchy.(K6) Build health and safety measures of team members.(K6)	K6

4.MAPPING (CO, PO, PSO)

P19IT3: B	P O1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PS O 1	PS O 2	PS O 3	PS O 4
CO1	H	M	L	L	L	L	M	L	L	H	L	L	L
CO2	M	H	L	L	L	L	L	L	L	H	L	L	L
CO3	L	H	M	M	L	L	M	L	L	H	L	L	L
CO4	L	M	H	H	M	L	M	L	L	H	L	M	L
CO5	L	L	M	H	M	L	M	L	L	M	M	H	L
CO6	L	M	M	H	M	M	M	L	L	M	M	H	L

L-Low

M-Moderate

H- High

5.COURSE ASSESSMENT

METHODS DIRECT:

1. Continuous Assessment Test: T1, T2 (Theory & Practical Components):
Closed Book
2. Open Book Test.
3. Assignment, Project Report, Field Visit Report, Seminar, Quiz (written).
4. Pre-Semester & End Semester Theory Examination

INDIRECT:

1. Course end survey (Feedback)

Core X: BIG DATA ANALYTICS

SEMESTER: 4

CREDITS: 5

COURSE CODE: P19IT410

HORUS/WEEK: 4

1. COURSE OUTCOMES

After the successful completion of this course, the student will be able to

CO. No.	Course Outcomes	Level	Unit
CO1	Interpret the importance of data mining.	K2	I
CO2	Organize and prepare the data needed for data mining using preprocessing techniques.	K3	II
CO3	Examine the basic principles, concepts and applications of data warehousing and data mining.	K4	III
CO4	Analyze the Conceptual, Logical, and Physical designData Warehouses, OLAP applications and OLAP deployment.	K4	III
CO5	Criticize Infosphere BigInsights and Big Data Recommendations.	K5	IV
CO6	Build on Big data application Using Pig and Hive.	K6	V

2. A. SYLLABUS

UNIT I: Introduction

12 Hours

Motivation Behind Data Mining – Importance of Data Mining– Overview of Data Mining -Kinds of Data – Data Mining Functionalities – Kinds of Patterns Mined– Classification of Data Mining Systems – Data Mining Task Primitives – Integration of Data Mining System with a Database or Data Warehouse System – Major Issues in Data Mining.

UNIT II: Data Preprocessing

12 Hours

Need for Preprocessing the Data– Descriptive Data Summarization – Data leaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation.

UNIT III: Data Warehouse and OLAP Technology

12 Hours

An Overview: Overview of Data Warehouse – A Multidimensional Data Model – Data Warehouse Architecture – Data Warehouse Implementation – From Data Warehousing to Data Mining.

UNIT IV: Big Data from the Business Perspective

12 Hours

Overview of Big Data – Characteristics of Big Data -Data in Warehouse and Data in Hadoop – Importance of Big Data – Considering Big Data Solution - Big Data Use Cases -Patterns for Big Data Deployment.

UNIT V: Big Data From the Technology Perspective

12 Hours

The History of Hadoop- Components of Hadoop – Application Development in Hadoop- Getting Your Data into Hadoop- Other Hadoop Components.

2.B. Topics for Self Study:

S.No	Topics	Web Links
1	No SQL database	https://www.mongodb.com/nosql-explained
2	Apache Spark	https://spark.apache.org/docs/latest/quick-start.html
3	Blockchain	https://blockgeeks.com/guides/what-is-blockchain-technology/
4	Hadoop Ecosystem	https://www.simplilearn.com/big-data-and-hadoop-ecosystem-tutorial

2.C. Text Book(s):

1. Jiawei Han and Micheline Kamber, “Data Mining Concepts and Techniques”, Morgan Kaufmann Publishers, An imprint of Elsevier, 2006, Second Edition (for units 1, 2 and3)
2. Paul C. Zikopoulos, Chris Eaton, Dirk deRoos, Thomas Deutsch,George Lapis “Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data”, McGraw-Hill, 2012. (for Units 4 &5).

2.D. Reference Books:

1. Radha Shankaramani and M.Vijayalakshmi“Big Data Analytics”, Wiley,2nd Edition, 2016.
2. Charu C. Aggarwal “Data Mining”, Springer.

2.E. Web Links:

1. www.tutorialspoint.com
2. www.guru99.com
3. <https://www.youtube.com/watch?v=bz0N-WP2FQE>
4. <https://www.youtube.com/watch?v=zez2Tv-bcXY>

3.SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom’s Taxonomic Levels of Transaction
I	Introduction		

1.1	Motivation Behind Data Mining – Importance of Data Mining- Overview of Data Mining	Recall database.(K1)	K2
		Classify the different types of databases.(K2)	
		Determine the evolution of database system technology.(K5)	
		Relate Data Mining and Gold Mining.(K2)	
		List out the importance of data mining.(K4)	
1.2	Data Mining Functionalities – Kinds of Patterns Mined -Classification of Data Mining Systems – Data Mining Task Primitives	Discuss the features of data mining functionalities.(K6)	
		Classify various Data mining systems.(K2)	
		Explain the data mining task primitives.(K5)	
1.3	Integration of Data Mining System with a Database or Data Warehouse System – Major Issues in Data Mining	Relate data mining system with Data Warehouse system.(K2)	
		Summarize the major issues in data mining.(K2)	
		Compare the advantages of Data mining and data warehouse system.(K4)	
II	Data Preprocessing		
2.1	Need for Preprocessing the Data- Descriptive Data Summarization – Data Cleaning- Data Integration and Transformation–Data Reduction-Data Discretization and Concept Hierarchy Generation.	What is data cleaning?(K1)	K3
		Build a concept hierarchy for an enterprise.(K6)	
		Apply the data cleaning methods in raw data.(K3)	
		List out the steps of data preprocessing.(K4)	
III	Data Warehouse and OLAP Technology: An Overview		
3.1	Overview of Data Warehouse -A Multidimensional Model-Data Warehouse Architecture, Data Warehouse Implementation, From Data Warehousing to Data Mining	Give the importance of multidimensional data models.(K5)	K4
		Build a data warehouse for your organization.(K3)	
		Classify the tiers of data warehouse architecture.(K2)	
		Distinguish OLAP and OLTP.(K4)	
IV	Big Data: From the Business Perspective		
4.1	What is Big data? Characteristics of Big data. Data in the warehouse And in Hadoop	Compare data in warehouse and Hadoop.(K5)	K5
		Discuss the IT for IT Log use case of Big data.(K6)	
		Explain the characteristics of Big data.(K5)	

4.2	Big Data Important; When to Consider Big Data Solution Information Management Challenges.	How is big data handled effectively in social media?(K1)	
		Relate structured and semi structured data in email.(K2)	
		Prioritize information management challenges in big data.(K5)	
V	Big Data from the Technology Perspective		
5.1	Hadoop: The Big data Lingo Chapter: Brief History of Hadoop	Discuss the history of Hadoop.(K6)	K6
		How Hadoop is well suited for Big data Insights.(K1)	
		Compare Name node and server node in Hadoop File system.(K4)	
5.2	Components of Hadoop: The Hadoop Distributed File System, the basics of Map Reduce, Hadoop Common Components	Explain various components used in Hadoop system.(K5)	
		Discuss the working principles of Hadoop Distributed File System.(K6)	
		List out the steps of Map and Reduce functions.(K4)	
5.3	Application Development in Hadoop: Pig and Pig Latin: load, Transform, Dump and Store, Hive, Jaql, Jaql Operators and Built-in Functions: Getting Your Data into Hadoop, other Hadoop Components	Discuss built -in functions in Jaql.(K6)	
		List of the steps of Pig Latin operations.(K4)	
		Compare Hive database system with normal database.(K5)	

4.MAPPING (CO, PO, PSO)

P19IT410	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	H	H	H	M	M	M	L	L	L	H	M	M	L
CO2	M	M	M	M	H	H	H	L	L	M	H	H	L
CO3	M	M	M	M	H	H	H	L	L	M	H	H	L
CO4	M	M	M	M	H	H	H	L	L	M	H	H	L
CO5	L	L	L	L	L	L	H	H	H	L	L	L	H
CO6	L	L	L	L	L	L	H	H	H	L	L	L	H

L-Low

M-Moderate

H- High

5.COURSE ASSESSMENT

METHODS DIRECT:

1. Continuous Internal Assessment Test: 1, 2(Theory & Practical Components): Closed Book.
2. Cooperative Learning Report, Assignment, Group Presentation, Group Discussion, Project Report, Field Visit Report, Poster Presentation, Seminar, Quiz(written).

INDIRECT:

1. Course-end survey.(Feedback)

Elective - V: MACHINE LEARNING

SEMESTER: IV

CREDITS: 4

COURSE CODE: P19IT4:5

HOURS/WEEK: 4

1. COURSE OUTCOMES

After the successful completion of this course, the student will be able to

CO. No.	Course Outcomes	Level	Unit
CO1	Define the characteristics of datasets and relate the trivial data and big data for various applications.	K1	I
CO2	Compare the Neural networks and Genetics algorithms	K2	II
CO3	Identify the concept behind neural networks for learning non-linear functions.	K3	III
CO4	Categorize instant based learning algorithms and its applications	K4	IV
CO5	Build the advanced learning rules	K5	V
CO6	Improve the usage of advanced learning techniques	K6	V

2. A. SYLLABUS

UNIT I: Introduction

12 Hours

Introduction: Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search.

UNIT II: Neural Networks and Genetic Algorithms

12 Hours

Neural Networks and Genetic Algorithms: Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evaluation and Learning.

UNIT III: Bayesian and Computational Learning

12 Hours

Bayesian And Computational Learning: Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model.

UNIT IV: Instant Based Learning

12 Hours

Instant Based Learning: K- Nearest Neighbour Learning – Locally weighted Regression – Radial Bases Functions – Case Based Learning

UNIT V : Advanced Learning

12 Hours

Advanced Learning: Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules– Sets of First Order Rule–Induction on Inverted

Deduction–Inverting Resolution – Analytical Learning – Perfect Domain Theories – Explanation Base Learning – FOCL Algorithm – Reinforcement Learning –Task–Q-Learning – Temporal Difference Learning

2.B. Topics for Self Study

S.No.	Topics	Web Links
1	Artificial Neural network	https://www.tutorialspoint.com/artificial_neural_network/artificial_neural_network_pdf_version.htm/
2	Image recognition	https://towardsdatascience.com/deep-learning-for-image-classification-why-its-challenging-where-we-ve-been-and-what-s-next-93b56948fcef?gi=4e7bb8dc4b01/
3	Sentiment Analysis	https://web.stanford.edu/class/cs124/lec/sentiment.pdf/
4	Healthcare and Medical services	https://www.who.int/water_sanitation_health/hygiene/settings/hvchap10.pdf?ua=1/

2.C. Text Book(s):

1. Tom M. Mitchell, “**Machine Learning**”, First Edition, McGraw Hill Education Private Ltd., 2013.

2.D. Reference Books:

1. Ethem Alpaydin, “**Introduction to Machine Learning (Adaptive Computation and Machine Learning)**”, The MIT Press, 2004.
2. T. Hastie, R. Tibshirani, J. H. Friedman, “**The Elements of Statistical Learning**”, Springer; 1st edition, 2001.

2.E. Website Link:

1. <https://nptel.ac.in/courses/106/106/106106139//>
2. <https://nptel.ac.in/courses/106/106/106106202//>
3. <https://news.vidyaacademy.ac.in/wp-content/uploads/2018/10/NotesOnMachineLearningForBTech-1.pdf/>
4. <https://www.dgp.toronto.edu/~hertzman/411notes.pdf/>

3.SPECIFIC LEARNING OUTCOMES (SLO)

Unit/Section	Course Content	Learning Outcomes	Highest Bloom’s Taxonomic Level of Transaction
I	Overview of Machine Learning		
1.1	Introduction: Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning –	Recall the concept of learning(K1)	K1
		Identify the problems related to learning(K2)	

	Representation – Algorithm – Heuristic Space Search.	Classify the approaches to eliminate the learning issues(K4)	
II	Neural Networks and Genetic Algorithms:		
2.1	Neural Networks and Genetic Algorithms: Neural Network Representation – Problems – Perceptron – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evaluation and Learning.	Analyze the neural network algorithms(K2)	K2
		Categorize the models of evaluation and learning(K4)	
		Discuss the steps of genetic algorithms(K6)	
		Compare the neural network algorithm with genetic algorithm(K5)	
III	Bayesian And Computational Learning		
3.1	Bayesian And Computational Learning: Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network –EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model.	Justify the Bayes theorem(K5)	K3
		Distinguish between Gibbs algorithm and EM algorithm(K4)	
		Design the naive Bayes classifier(K6)	
		Compare finite and infinite hypothesis(K5)	
IV	Instant Based Learning		
4.1	Instant Based Learning: K-Nearest Neighbour Learning – Locally weighted Regression – Radial Bases Functions – Case Based Learning	Define the K nearest neighbour learning(K1)	K4
		Examine the locally weighted regression(K4)	
		Determine the functions of radial bases(K5)	
V	Advanced Learning		
5.1	Advanced Learning: Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules– Sets of First Order Rule–Induction on Inverted Deduction–Inverting Resolution –	Classify the different types of rules followed in learning sets(K4)	K5
		Define the steps of sequential covering algorithm and FOCL algorithm(K1)	
		Compare the various learning techniques(K5)	

	Analytical Learning – Perfect Domain Theories – Explanation Base Learning – FOCL Algorithm – Reinforcement Learning –Task-Q-Learning – Temporal Difference Learning.		
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4.MAPPING (CO, PO, PSO)

P19IT4:5	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	H	M	M	L	H	M	L	L	H	M	M	H	H
CO2	H	M	M	M	H	L	L	M	H	M	H	H	H
CO3	M	H	H	M	H	L	M	L	H	M	H	H	H
CO4	M	H	H	M	M	L	L	L	H	M	H	H	H
CO5	H	M	H	M	M	M	L	L	M	L	M	M	M
CO6	H	H	H	M	H	M	L	L	H	L	M	H	H

L-Low

M-Moderate

H- High

5.COURSE ASSESSMENT

METHODS DIRECT:

1. Continuous Assessment Test T1,T2 (Theory & Practical Components): Closed Book
2. Open Book Test.
3. Cooperative learning report, Assignment, Group Presentation, Group Discussion, Project Report, Field Visit Report, Poster Presentation, Seminar, Quiz (written).
4. Pre-Semester & End Semester Theory Examination.

INDIRECT

1. Course end survey (Feedback)

Core VII: SOFT COMPUTING

SEMESTER: IV

COURSE CODE: P19IT4: A

CREDITS: 5

HOURS/WEEK: 15

1.COURSE OUTCOMES

After the successful completion of this course the students will be able to

CO. No.	Course Outcomes	Level	Unit
CO1	Define fuzzy Set Theory	K2	I
CO2	Recall Mamdani Fuzzy, Sugeno Fuzzy and Tsukamoto Fuzzy Models	K2	I
CO3	Apply the Neural Networks with Supervised Learning, Unsupervised Learning and Competitive Learning Networks	K3	II
CO4	Inspect the Neuron Functions for Adaptive Networks	K4	III
CO5	Establish the Soft Computing for Color Recipe Prediction	K5	IV
CO6	Appraise the Application of Computational Intelligence in Soft Computing	K6	V

2.A. SYLLABUS

UNIT I: Introduction to Neuro

15 Hours

Introduction to Neuro – Fuzzy and Soft Computing – Fuzzy Sets – Basic Definition and Terminology – Set – Theoretic Operations – Member Function Formulation and Parameterization – Fuzzy Rules and Fuzzy Reasoning – Extension Principle and Fuzzy Relations –Fuzzy If Then Rules – Fuzzy Reasoning – Fuzzy Inference Systems– Mamdani Fuzzy Models –Sugeno Fuzzy Models – Tsukamoto Fuzzy Models – Input Space Partitioning and Fuzzy Modeling.

UNIT II: Derivative based Optimization

15 Hours

Derivative based Optimization – Descent Methods – The Method of Steepest Descent –Classical Newton’s Method – Step Size Determination – Derivative Free Optimization- Genetic Algorithms – Simulated Annealing – Random Search – Downhill Simplex Search.

UNIT III: Supervised Learning Neural Networks

15 Hours

Supervised Learning Neural Networks – Perceptrons – AdalineBackpropagationMultilayer perceptrons – Radial Basis Function Networks – Unsupervised Learning and Other Neural Networks – Competitive Learning Networks – Kohonen Self – Organizing Networks – Learning Vector Quantization – Hebbian Learning.

UNIT IV: Neuro Fuzzy Modeling:**15 Hours**

Adaptive Neuro – Fuzzy Inference Systems – Architecture – Hybrid Learning Algorithm – Learning Methods that Cross fertilize ANFIS and RBFN – Coactive NeuroFuzzy Modeling – Framework – Neuron Functions for Adaptive Networks – Neuro Fuzzy Spectrum.

UNIT V: Application of Computational Intelligence**15 Hours**

Printed Character Recognition – Inverse Kinematics Problems – Automobile Fuel Efficiency Prediction – Soft Computing for Color Recipe Prediction.

2.B. Topics for Self-Study:

S.No	Topics	Web Links
1	Neuro Fuzzy Control	https://whatis.techtarget.com/definition/soft-computing/
2	Fuzzy sets and Genetic Algorithm in Game Playing	https://www.igi-global.com/dictionary/soft-methods-automatic-drug-infusion/27620/
3	Soft Computing for color Recipe Predication	https://towardsdatascience.com/soft-computing-6cef872f7704/
4.	Neuro fuzzy Modeling	https://www.youtube.com/watch?v=7C19X6pJEuU/

2.C. Text Book:

1. J.S.R. Jang, C.T. Sun and E. Mizutani, “Neuro Fuzzy and Soft Computing”, PHI, PearsonEducation, 2004.

2.D. Reference Book(s):

1. Timothy J. Ross, “Fuzzy Logic with Engineering Application, “McGraw Hill, 1977.
2. Davis E. Goldberg, “Genetic Algorithms Search, Optimization and Machine Learning”, Addison Wesley, 1989.
3. S. Rajasekaran and G.A.V. Pai, “Neural Networks, Fuzzy Logic and Genetic Algorithms”, PHI, 2003. EmereoPtv Limited, July 2008.
4. Ahmar, Abbas, “Grid Computing - A Practical Guide to technology and Applications”, Charles River Media, 2003.

2.E. Web Links:

1. <https://www.digimat.in/nptel/courses/video/106105173/L01.html/>
2. <https://www.ktustudents.in/p/cs361-soft-computing-full-notes.html/>
3. <https://www.swayamprabha.gov.in/index.php/program/archive/13/>

3.SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Contents	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
I	Fuzzy Set Theory		
1.1	Fuzzy Set Theory: Introduction to Neuro – Fuzzy and Soft Computing – Fuzzy Sets – Basic Definition and Terminology – Set – Theoretic Operations – Member Function Formulation and Parameterization – Fuzzy Rules and Fuzzy Reasoning – Extension Principle and Fuzzy Relations –Fuzzy If Then Rules – Fuzzy Reasoning – Fuzzy Inference Systems– Mamdani Fuzzy Models –Sugeno Fuzzy Models – Tsukamoto Fuzzy Models – Input Space Partitioning and Fuzzy Modeling.	Define Neuro(K1) Classify Fuzzy and Soft Computing(K2) Label Fuzzy sets(K1) List Set theoretic operations,(K1) Member FunctionFormulation and Parameterization(K1). Rephrase Fuzzy Rules and Fuzzy Reasoning(K2) Show the Extension Principleand FuzzyRelations(K2). Label Fuzzy If Then Rules(K1) Name Fuzzy InferenceSystems(K1) Classify Mamdani Fuzzy Models, Sugeno Fuzzy Models, Tsukamoto Fuzzy Models(K2) Relate Input Space Partitioning and fuzzy Modeling(K2).	K2
II	Optimization		
2.1	Optimization: Derivative based Optimization – Descent Methods – The Method of Steepest Descent –Classical Newton's Method – Step Size Determination – Derivative Free Optimization Genetic Algorithms – Simulated Annealing – Random Search – Downhill Simplex Search.	Classify Derivative Based Optimization(k2). Name the Descent Methods(K1) Develop the Classical Newton's Method(K6). Organize the Step Size Determination(K3) Show the Genetic Algorithms(K2) Build the Simulated Annealing Plan the Random Search(K6). Discuss Downhill Simplex Search(K6)	K3
III	Neural Networks		

3.1	Neural Networks :Supervised Learning Neural Networks – Perceptron – Adaline Backpropagation Multilayer perceptron – Radial Basis Function Networks – Unsupervised Learning and Other Neural Networks – Competitive Learning Networks –	Define Supervised Learning Neural Networks(K1) Discuss the Unsupervised Define Perceptron, Adaline Back propagation, Multilayer perceptron(K6). Apply Radial Basis Function Networks(K1). What are the other neural network?(K1) Make use of Kohonen Self Categorize the Learning Vector Quantization and Hebbian Learning(K3).	K4
IV	Neuro Fuzzy Modeling		
4.1	Neuro Fuzzy Modeling : Adaptive Neuro – Fuzzy Inference Systems – Architecture – Hybrid Learning Algorithm – Learning Methods that Cross fertilize ANFIS and RBFN – Coactive NeuroFuzzy Modeling – Framework – Neuron Functions for Adaptive Networks – Neuro Fuzzy Spectrum.	Define Adaptive Neuro(K1) Relate the Fuzzy Inference Systems(K1) Construct the Hybrid Learning Algorithm(K6) Justify the Learning Methods that Cross fertilize ANFIS and RBFN (K5) Select the Framework, NeuronFunctions for Adaptive Networks(K3) Explain Neuro Fuzzy Spectrum(K5)	K5
V	Application of Computational Intelligence		
5.1	Application of Computational Intelligence: Printed Character Recognition – Inverse Kinematics Problems – Automobile Fuel Efficiency	Explain Character Recognition(K6) Test Automobile Fuel Efficiency Prediction Elaborate Soft Computing for Color Recipe Prediction(K6).	K6

	Prediction – Soft Computing for Color Recipe Prediction.		
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4. MAPPING SCHEME FOR THE PO, PSOS AND COS

P19IT4 : A	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	H	H	M	M	M	M	L	L	L	H	H	H	H
CO2	H	H	H	H	H	H	L	H	M	H	H	H	H
CO3	H	H	H	H	H	M	M	L	M	H	H	H	H
CO4	H	H	H	H	H	M	L	M	H	H	H	H	H
CO5	H	H	M	H	M	L	L	M	L	H	H	H	M
CO6	H	H	H	H	M	L	L	M	L	M	H	H	H

L-Low

M-Moderate

H- High

5. COURSE ASSESSMENT

METHODS DIRECT:

1. Continuous Assessment Test: T1, T2 (Theory & Practical Components): Closed Book
2. Open Book Test.
3. Cooperative Learning Report, Assignment, Group Presentation, Group Discussion, project Report, Field Visit Report, Poster Presentation, Seminar, Quiz (written).
4. Pre-Semester & End Semester Theory Examination

INDIRECT:

1. Course end survey (Feedback)

CORE VII: HUMAN COMPUTER INTERACTION

SEMESTER: IV

CREDITS: 5

COURSE CODE: P19IT4: B

HORUS/WEEK: 15

1. COURSE OUTCOMES

After the successful completion of this course the students will be able to

CO. No.	Course Outcomes	Level	Unit
CO1	Show HCI, User interface software tools, Models, Theories, and Frameworks	K1	I
CO2	Explain Usability Engineering Methods and Concepts	K3	II
CO3	Apply HCI techniques and concepts of software design	K3	II
CO4	Motivate Groupware and Cooperative Activity	K5	III
CO5	Estimate Media and Information	K6	IV
CO6	Elaborate Integrating Computation and Real Environments	K6	V

2. A. SYLLABUS

UNIT 1: Models, Theories, and Frameworks

15 Hours

Models, Theories, and Frameworks: A Effective Use and Reuse of HCI Knowledge – Macrotheory for System of Interactors – Design in the MoRAS – Distributed Cognition: Toward a New Foundation for Human-Computer Interaction Research. – User Interface Software and Tools: - Past, Present, and Future of User Interface Software Tools – Creating Creativity : User Interfaces for Supporting Innovations – Interaction Spaces for Twenty-First-Century Computing.

UNIT II: Usability Engineering Methods and Concepts

15 Hours

Usability Engineering Methods and Concepts: - The Strategic Use of Complex Computer Systems – User Interface Evaluation: How Cognitive Models can Help – HCI in the Global Knowledge-Based Economy: Designing to Support Worker Adaptation – A Reference Task Agenda for HCI – The Maturation of HCI: Moving beyond Usability toward Holistic Interaction.

UNIT III: Groupware and Cooperative Activity

15 Hours

Groupware and Cooperative Activity: Computer-Mediated Communications for Group Support: Past and Future – The Intellectual Challenge of CSCW: The Gap between Social Requirements and Technical Feasibility – Social Translucence: Designing Systems That Support Social Processes –Transcending the Individual Human Mind: Creating Shared Understanding through collaborative Design – The Development of Cooperation: Five Years of Participatory Design in Virtual School –Distance Matters.

UNIT III: Media and Information:**15 Hours**

Media and Information: Designing the User Interface for Multimodal Speech and Pen-Based Gesture Applications: State-of-the-Art Systems and Future Research Directions – Technologies of Information: HCI and Digital Library – Interface that Give and Take Advice – Beyond Recommender Systems: Helping People Help Each Other.

UNIT 5: Integrating Computation and Real Environments**15 Hours**

Integrating Computation and Real Environments: - Charting Past, Present, and Future Research in Ubiquitous Computing – Situated Computing: The Next Frontier for HCI Research – Room ware: Toward the Next Generation of Human – Computer Interaction based on an Integrated Design of Real and Virtual Worlds. – Emerging Framework for Tangible User Interfaces – HCI and Society: Learner-Centered Design: Reflections and New Directions – HCI Meets the “Real World”: Designing Technologies for Civic Sector Use – Beyond Blowing Together: Socio Technical Capital.

2.A. Topics for Self Study:

S.No.	Topics	Web Links
1.	Ambient technologies	https://www.youtube.com/watch?v=2lXh2n0aPyw&feature=player_embedd/
2.	Modeling Rich Interaction	https://www.slideshare.net/alanjohndix/hci-3e-ch-18-modelling-rich-interaction/
3.	Dialog notations and design	https://www.slideshare.net/alanjohndix/hci-3e-ch-16-dialogue-notations-and-design/
4.	Socio -Organizational issues and stakeholder requirements	https://ieeexplore.ieee.org/abstract/document/1232752/

2.B. Text Book:

1. John M. Carroll, “Human Computer Interaction–in the New Millennium”, Pearson Education, 2007.

2.C. Reference Book:

1. Alan Dix, Janet Finlay, Gregory D. Abowd, Russell Beale, “Human-Computer Interaction”, Pearson Education, 2009.

2.D. Web Links:

1. https://www.tutorialspoint.com/human_computer_interface/human_computer_interface_introduction.htm/
2. <https://www.tandfonline.com/toc/hhci20/current/>
3. <https://www.hcii.cmu.edu/academics/mhci/>

3.SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Contents	Learning Outcomes	Highest Bloom's Taxonomic Levels of Transaction
I	Human Computer Interaction		
1.1	Human Computer Interaction: Models, Theories, and Frameworks A Effective Use and Reuse of HCI Knowledge – Macro theory for System of Interactors – Design in the MoRAS	Recall the Use and Reuse of HCI Knowledge(K1)	K1
		Show Macro theory for System of Interactors(K1)	
		Label the Design in the MoRAS(K1)	
1.2	Distributed Cognition: Toward a New Foundation for Human-Computer Interaction Research.	List the New Foundation for Human(K1)	
		Define the Computer Interaction Research(K1).	
1.3	User Interface Software and Tools: Past, Present, and Future of User Interface Software Tools	Explain the Past, Present, and Future of User Interface Software Tools(K2).	
1.4	Creating Creativity: User Interfaces for Supporting Innovations – Interaction Spaces for Twenty-First-Century Computing.	Construct the User Interfaces for Supporting Innovations(K2).	
		Summarize Interaction Spaces for Twenty and First-Century Computing(K2).	
II	Usability Engineering Methods, Concepts and Evaluation		
2.1	Usability Engineering Methods, Concepts and Evaluation: Usability Engineering Methods and Concepts: -The Strategic Use of Complex Computer	Make Use of Complex Computer Systems(K3).	K3
2.2	Systems User Interface Evaluation: How Cognitive Models Can Help – HCI in the Global Knowledge	Justify How Cognitive Models Can Help the HCI in the Global Knowledge(K5).	
2.3	Based Economy: Designing to Support Worker Adaptation – A Reference Task Agenda for HCI	Build Design the worker adaptation(K3).	

		Explain the Reference TaskAgenda for HCI(K2)	
2.3	The Maturation of HCI: Moving beyond Usability toward Holistic Interaction.	Apply the maturation of HCI(K3)	
III	Groupware and Cooperative Activity		
3.1	Groupware and Cooperative Activity: Computer-Mediated Communications for Group Support: Past and Future	Recall the Past and future of communications for group support(K1).	K5
3.2	The Intellectual Challenge of CSCW: The Gap between Social Requirements and Technical Feasibility	Distinguish the Gap between Social Requirements and Technical Feasibility(K1)	
3.3	Social Translucence: Designing Systems That Support Social Processes	Develop the Social Translucence(K3)	
3.4	Transcending the Individual Human Mind: Creating Shared Understanding through collaborative Design	Create the Transcending the Individual Human Mind(K6).	
3.5	The Development of Cooperation: Five Years of Participatory Design in Virtual School – Distance Matters.	Evaluate the Development of Cooperation of virtual School and Distance Matters(K5).	
IV	Media Technology of Information system		
4.1	Designing the User Interface for Multimodal Speech and Pen-Based Gesture Applications: State-of-the-Art Systems and Future Research Directions.	Explain the User Interface for Multimodal Speech (K5)	K6
		List Pen- Based Gesture Applications(K4).	
4.2	Technologies of Information: HCI and Digital Library – Interface that Give and Take Advice Beyond Recommender Systems: Helping People Help Each Other	Compare the Technologies of Information between HCI and Digital Library(K6).	
		Discuss the Beyond Recommender Systems(K6)	
V	Integrating Computation and Real Environments		
5.1	Charting Past, Present, and Future Research in Ubiquitous Computing	Charting Past, Present, and Future Research in biquitous Computing(K6)	K6

5.2	Situated Computing: The Next Frontier for HCI Research – Room ware: Toward the Next Generation of Human – Computer Interaction based on an Integrated Design of Real and Virtual Worlds. – Emerging Framework for Tangible User Interfaces.	Explain the Next Frontier for HCI Research(K6).	
5.3	HCI and Society: Learner-Centered Design: Reflections and New Directions	Relate the HCI and Society(K6)	
5.4	HCI Meets the “Real World”: Designing Technologies for Civic Sector Use – Beyond Blowing Together: Socio Technical Capital.	Estimate the HCI Meets the “Real World”(K6)	

4.MAPPING SCHEME FOR THE PO, PSOS AND COS

P19IT4: B	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PSO 1	PS O 2	PS O 3	PSO 4
CO1	H	H	L	L	L	M	M	M	L	H	H	L	M
CO2	H	H	H	L	M	L	M	M	L	H	H	L	M
CO3	H	H	H	M	H	M	L	L	M	H	H	M	H
CO4	H	M	M	M	M	M	L	M	H	H	H	L	H
CO5	H	M	M	M	H	H	L	M	M	M	M	L	M
CO6	H	M	M	M	M	H	M	L	M	H	M	M	H

L-Low

M-Moderate

H- High

5.COURSE ASSESSMENT

METHODS DIRECT:

1. Continuous Assessment Test: T1, T2 (Theory & Practical Components): Closed Book
2. Open Book Test.
3. Cooperative Learning Report, Assignment, Group Presentation, Group Discussion, project Report, Field Visit Report, Poster Presentation, Seminar, Quiz (written).
4. Pre-Semester & End Semester Theory Examination

INDIRECT:

1. Course end survey (Feedback)

