

# **M.Sc. Information Technology**

## **Department of Information Technology**

### **SYLLABUS**

**(For Students admitted in the Academic year 2021 – 2022)**



## **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

  
Signature of the HOD

Dr. J. JOHN RAYBIN JOSE  
Associate Professor & Head  
Department of Information Technology  
Bishop Heber College (Autonomous)  
Tiruchirappalli - 620 017.

**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.

**(Syllabus applicable to the students admitted in the academic year 2021 – 2022)**

**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 CODE	Prerequisite	Hours Per Week	Credits	Marks		
							CIA	ESE	TOTAL
I	Core I	Object Oriented Programming with Java	P211T101		5	5	25	75	100
	Core II	Relational Database Systems	P211T102		5	5	25	75	100
	Core III	Advanced Operating Systems	P211T103		5	5	25	75	100
	Core Prac.-I	Java Programming Lab	P211T1P1	P211T101	6	3	40	60	100
	Core Prac.-II	Relational Database Systems Lab	P211T1P2	P211T102	5	3	40	60	100
	Elective-I	Multimedia Technologies	P211T1:1		4	4	25	75	100
Computer Graphics		P211T1:A							
Digital Image Processing		P211T1:B							
II	Core IV	Data Communication Networks	P211T204		4	4	25	75	100
	Core V	Web Programming	P211T205		4	4	25	75	100
	Core VI	Mobile Technologies	P211T206		4	4	25	75	100
	Core Prac.-III	Web Programming Lab	P211T2P3	P211T205	4	2	40	60	100
	Core Prac.-IV	Mobile Applications Development Lab	P211T2P4	P211T206	4	2	40	60	100
	Elective-II	Unified Modeling Language /	P211T2:2		4	4	25	75	100
		Object Oriented Analysis and Design /	P211T2:A						
		Principles of User Experience Design	P211T2:B						
Elective - III	Cryptography and Network Security /	P211T2:3		4	4	25	75	100	
	Cyber Crimes and Computer Forensics /	P211T2:C							
VLO	RI/MI	P17VL2:1 P17VL2:2		2	2	25	75	100	
III	Core VII	Programming with Python	P211T307	P211T101	5	5	25	75	100
	Core VIII	Internet of Things	P211T308	P211T204	5	5	25	75	100
	Core IX	Cloud Computing	P211T309		5	5	25	75	100
	Core Prac.- V	Python Programming Lab	P211T3P5	P211T307	6	3	40	60	100
	Core Prac.-VI	Internet of Things Lab	P211T3P6	P211T308	5	3	40	60	100
	Elective-IV	Software Engineering /	P211T3:4		4	4	25	75	100
Software Testing /		P211T3:A							
Software Project Management		P211T3:B							
IV	Core X	Big Data Analytics	P211T410		6	5	25	75	100
	Elective-V	Machine Learning	P211T4:5		4	4	25	75	100
		Soft Computing	P211T4:A						
		Human Computer Interaction	P211T4:B						
Core Project	PROJECT WORK	P211T4PJ		--	5	40	60	100	

Core Theory	: 10	Electives: 5	Total Credits	: 90
Core Practical	: 6	Core Project	1	Value Education : 1

# Programme Articulation Matrix

CO. No.	Course Name	COURSE CODE	Programme Outcomes and Programme Specific Outcomes															
			P1	OP2	OP3	OP4	OP5	OP6	OP7	OP8	OP9	OP10	OP11	OP12	SP O1	SP O2	SP O3	SP O4
1	Object Oriented Programming with Java	P21IT101	✓	✓	✓	✓	✓	✓							✓	✓	✓	
2	Relational Database Systems	P21IT102	✓	✓	✓	✓	✓	✓	✓						✓	✓	✓	
3	Advanced Operating Systems	P21IT103	✓	✓	✓	✓	✓	✓						✓	✓	✓	✓	✓
4	Java Programming Lab	P21IT1P1	✓	✓	✓	✓	✓	✓							✓	✓	✓	
5	Relational Database Systems Lab	P21IT1P2	✓	✓	✓	✓	✓	✓							✓	✓	✓	
6	Multimedia Technologies	P21IT1:1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
7	Computer Graphics	P21IT1:A	✓	✓	✓	✓	✓	✓	✓	✓					✓	✓	✓	
8	Digital Image Processing	P21IT1:B	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
9	Data Communication Networks	P21IT204	✓	✓	✓	✓	✓	✓						✓	✓	✓	✓	
10	Web Programming	P21IT205	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	
11	Mobile Technologies	P21IT206	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓	✓
12	Web Programming Lab	P21IT2P3	✓	✓	✓	✓	✓	✓	✓	✓					✓	✓	✓	✓
13	Mobile Applications Development Lab	P21IT2P4	✓	✓	✓	✓			✓	✓				✓	✓	✓	✓	✓
14	Unified Modeling Language	P21IT2:2	✓	✓	✓	✓	✓	✓							✓	✓	✓	
15	Object Oriented Analysis and Design	P21IT2:A	✓	✓	✓	✓	✓	✓						✓	✓	✓	✓	✓
16	Principles of User Experience Design	P21IT2:B	✓	✓	✓	✓	✓	✓							✓	✓	✓	
17	Cryptography and Network Security	P21IT2:3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
18	Cyber Crimes and Computer Forensics	P21IT2:C	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
19	Cyber Laws and its Applications	P21IT2:D	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
20	Programming with Python	P21IT307	✓	✓	✓	✓	✓	✓							✓	✓	✓	
21	Internet of Things	P21IT308	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓
22	Cloud Computing	P21IT309	✓	✓	✓	✓	✓	✓							✓	✓	✓	
23	Python Programming Lab	P21IT3P5	✓	✓	✓	✓	✓	✓							✓	✓	✓	
24	Internet of Things Lab	P21IT3P6	✓	✓	✓	✓	✓	✓	✓	✓					✓	✓	✓	
25	Software Engineering	P21IT3:4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
26	Software Testing	P21IT3:A	✓	✓	✓	✓	✓	✓							✓	✓	✓	
27	Software Project Management	P21IT3:B	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
28	Big Data Analytics	P21IT410	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
29	Machine Learning	P21IT4:5	✓	✓	✓	✓	✓	✓	✓						✓	✓	✓	
30	Soft Computing	P21IT4:A	✓	✓	✓	✓	✓	✓							✓	✓	✓	
31	Human Computer Interaction	P21IT4:B	✓	✓	✓	✓	✓	✓							✓	✓	✓	

## Core I: OBJECT ORIENTED PROGRAMMING WITH JAVA

**SEMESTER: I**  
**CREDITS: 5**

**COURSE CODE: P21IT101**  
**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	<a href="https://www.tutorialspoint.com/jsp/jsp_java_beans.htm">https://www.tutorialspoint.com/jsp/jsp_java_beans.htm</a>
2	Introspection	<a href="http://www.brainkart.com/article/Introspection---Java-Beans_10768/">http://www.brainkart.com/article/Introspection---Java-Beans_10768/</a>
3	Bound and constrained properties	<a href="http://www.brainkart.com/article/Bound-and-Constrained-Properties---Java-Beans_10769/">http://www.brainkart.com/article/Bound-and-Constrained-Properties---Java-Beans_10769/</a>
4	Java Bean API	<a href="http://www.brainkart.com/article/The-Java-Beans-API_10771/">http://www.brainkart.com/article/The-Java-Beans-API_10771/</a>

## 2.C. Text Book(s):

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

## 2.D. Reference Books:

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

## 2.E. Web Links:

- [www.tutorialspoint.com](http://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
<b>I</b>	<b>Fundamentals of Object-Oriented Programming</b>		
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)	
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)	
<b>II</b>	<b>Exception Handling</b>		
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)	
<b>III</b>	<b>The Collections Framework</b>		
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)	
<b>IV</b>	<b>Applet Class</b>		

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)	
4.2	AWT Classes - Window fundamentals – AWT controls – Layout Managers – Menus	Develop simple programs using applet(K6)	
		Define frame and windows(K1)	
		List the controls in AWT(K1)	
		Interpret programs using AWT controls(K5)	
4.3	<b>Swing</b> - JApplet – Icons and Labels – Text Fields – Buttons – Combo Boxes – Tabbed Panes – Scroll Panes – Tables – Trees.	Explain menu bars and menus(K2)	
		Define swing(K1)	
		Name the controls in swing(K1)	
		Explain the swing controls with sample programs(K2)	
		Compare tabbed panes and scroll panes(K4)	
<b>V</b>	<b>Java Database Connectivity</b>	Illustrate tables and trees with sample programs(K2)	
		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)	

#### 4. MAPPING (CO, PO, PSO)

P21IT101	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: P21IT102

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	<a href="https://www.youtube.com/watch?v=ubwn1QK3Sns">https://www.youtube.com/watch?v=ubwn1QK3Sns</a>
2	Document – oriented Database	<a href="https://www.youtube.com/watch?v=wjRGF650zVI">https://www.youtube.com/watch?v=wjRGF650zVI</a>
3	Distributed Database	<a href="https://www.youtube.com/watch?v=0_m5gPpzEY_Q">https://www.youtube.com/watch?v=0_m5gPpzEY_Q</a>
4	Embedded Database	<a href="https://www.youtube.com/watch?v=hv3AH6lDjEY">https://www.youtube.com/watch?v=hv3AH6lDjEY</a>

### 2.C. Text Book(s):

1. Abraham Silbercharz, Henry F.Korth and S. Sudharshan- “**Database System Concepts**” McGraw Hill International -4<sup>th</sup> 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
<b>I</b>	<b>Applications and Data Models, Languages and Structures</b>		
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)	
<b>II</b>	<b>Relational Model and Relational Algebra, Joins and DDLs</b>		
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).	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)	
<b>III</b>	<b>Integrity and Security, Relational Data base Design, Normal forms</b>		
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)	K4
		Discuss the disadvantages of BCNF over 3NF.(K6)	
		List the importance of normalization.(K4)	

<b>IV</b>	<b>Storage and file structure, file organization, Indexing and Hashing</b>		
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)	
<b>V</b>	<b>Transaction Management, concurrency Control</b>		
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	Explain the reason for the use of degree –two consistency.(K5)	
	– Insert and Delete operations – Weak levels of consistency – Concurrency in Index structures	Discuss the techniques for managing concurrency control.(K6)	

#### 4.MAPPING (CO, PO, PSO)

P21IT102	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	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: P21IT103**  
**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	<a href="https://www.tutlane.com/tutorial/android/android-architecture">https://www.tutlane.com/tutorial/android/android-architecture</a>
2	Environmental setup	<a href="https://www.tutlane.com/tutorial/android/android-development-environment-setup">https://www.tutlane.com/tutorial/android/android-development-environment-setup</a>
3	Fragments	<a href="https://www.tutlane.com/tutorial/android/android-fragments-with-examples">https://www.tutlane.com/tutorial/android/android-fragments-with-examples</a>
4	UI controls & Themes	<a href="https://www.tutlane.com/tutorial/android/android-ui-controls-textview-edittext-radio-button-checkbox">https://www.tutlane.com/tutorial/android/android-ui-controls-textview-edittext-radio-button-checkbox</a>

### 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”, 2<sup>nd</sup> 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](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
<b>I</b>	<b>Operating Systems Overview</b>		
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)	
<b>II</b>	<b>Process Management</b>		
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)	
<b>III</b>	<b>Memory Management</b>		

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)	
<b>IV</b>	<b>Distributed Operating Systems</b>		
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)	
<b>V</b>	<b>Real Time Operating Systems</b>		
5.1	Real Time Systems: Introduction- -Examples- Architectures, RTOS building blocks and 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)

<b>P21IT103</b>	<b>P O 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PO 8</b>	<b>PO 9</b>	<b>PSO 1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>
<b>CO1</b>	H	M	L	L	L	L	L	L	M	H	M	L	M
<b>CO2</b>	L	M	H	H	L	L	L	L	L	M	H	L	L
<b>CO3</b>	L	M	H	H	L	L	L	L	M	H	L	M	L
<b>CO4</b>	M	L	L	L	H	L	L	L	L	L	M	L	L
<b>CO5</b>	M	L	L	L	L	L	L	M	L	M	L	L	L
<b>CO6</b>	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: 3

COURSE CODE: P21IT1P1

HOURS/WEEK:6

### 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	<a href="https://www.javatpoint.com/programs-list#string">https://www.javatpoint.com/programs-list#string</a>
2	Write a program to create a singly linked list of n nodes and count the number of nodes	<a href="https://www.javatpoint.com/programs-list#singly-linked-list">https://www.javatpoint.com/programs-list#singly-linked-list</a>
3	Create a program to get an IP address	<a href="https://beginnersbook.com/2014/07/java-program-to-get-ip-address/">https://beginnersbook.com/2014/07/java-program-to-get-ip-address/</a>
4	Create a program to implement different sorting algorithms	<a href="https://www.w3resource.com/java-exercises/sorting/index.php">https://www.w3resource.com/java-exercises/sorting/index.php</a>

### 3. SPECIFIC LEARNING OUTCOMES (SLO):

Ex.No.	Lab Exercises	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
1	<p><b>Program to prepare student mark list using classes and objects</b>            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.</p>	<p>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.</p>	K3
2	<p><b>Program to prepare electricity bill using single inheritance</b>            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.</p>	<p>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.</p>	K3
3	<p><b>Program to display the product details using multilevel inheritance</b>            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.</p>	<p>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.</p>	K3
4	<p><b>Program to prepare the Paybill using hierarchical inheritance</b>            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.</p>	<p>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.</p>	K3



5	<p><b>Program to calculate the area of different shapes using interfaces</b></p> <p>Create an interface which declares methods of calculating area of different shapes</p> <p>Create a class to implement the methods declared in the interface.</p> <p>Create a main method and call the methods using objects.</p>	<p>Analyze and initialize variables.</p> <p>List the object access with interfaces.</p> <p>Examine with interfaces.</p> <p>Inspect the operation of methods.</p> <p>Take part in abstraction using interfaces.</p> <p>Examine the programs with total abstraction.</p>	K4
6	<p><b>Program to perform arithmetic operations using packages</b></p> <p>Create a directory and name the packages.</p> <p>Create packages and class for performing arithmetic operation</p> <p>Create a main method and call all the packages.</p>	<p>List the use of methods.</p> <p>Classify the modules in a program.</p> <p>Relate the classes into packages.</p> <p>Inspect the class scope within package</p>	K4
7	<p><b>Program to implement user defined exception</b></p> <p>Create a class exception and declare variables and methods.</p> <p>Declare user defined exceptions.</p> <p>Write exception handling mechanisms using try and catch blocks.</p> <p>Create a main method and call the methods using objects.</p>	<p>Explain the COURSE CODE with various try () blocks.</p> <p>Influence the types of exceptions.</p> <p>Evaluate with various catch blocks.</p> <p>Deduct new exceptions.</p> <p>Conclude on possible exceptions.</p> <p>Determine the COURSE CODE to handle user defined exceptions</p>	K5
8	<p><b>Program to apply the concept of multithreading in Bank transactions</b></p> <p>Creating a class bank includes bank transactions like deposit and withdraw.</p> <p>Create and initiate the threads.</p> <p>Start and run the thread for deposit and withdraw options.</p> <p>Create a main method and call the methods using objects.</p>	<p>Explain thread.</p> <p>Evaluate the operation of threads.</p> <p>Recommend with thread priority.</p> <p>Assess thread synchronization.</p> <p>Prioritize the threads.</p> <p>Interpret their operations with thread synchronization</p>	K5
9	<p><b>Program to add elements through collection methods</b></p> <p>Create a class which consists of collection classes and interfaces.</p>	<p>Evaluate the collection framework.</p> <p>Choose the collection classes and interfaces</p> <p>Interpret with object access and method scope</p>	K5

	Add the elements to the collection classes. Create a main method and call the methods using objects.		
10	<b>Program to move a ball using applet</b> 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.	Determine an Applet. Explain the use of applets. Justify shapes, reposition and repaint them using applets.	K5
11	<b>Program to perform simple calculator using AWT controls.</b> 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.	Elaborate the controls. Combine the various AWT controls. Develop an applet. Discuss the use of applets. Develop web forms using applets.	K6
12	<b>Program to create login module using swing.</b> Create a class consists of swing objects. Write event handling mechanism and manage the click events. Create a main method and validate login module.	Elaborate the controls. Develop an applet. Discuss the use of applets. Develop forms using applet and display in appletviewer.	K6
13	<b>To establish database connection, create and manipulate employee records using JDBC.</b> 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.	Construct the database. Elaborate the database operations. Create the table Formulate queries to perform various database operations.	K6

#### 4. MAPPING (CO, PO, PSO)

P21IT1P1	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: P21IT1P2

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.	<a href="https://www.scribd.com/doc/63350632/PL-SQL-Program-for-Adam-or-Not">https://www.scribd.com/doc/63350632/PL-SQL-Program-for-Adam-or-Not</a>
2	Create a program to build a simple web application using php and MySQL.	<a href="https://www.youtube.com/watch?v=2gxLcIUFs2U">https://www.youtube.com/watch?v=2gxLcIUFs2U</a>

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

### 3.SPECIFIC LEARNING OUTCOMES (SLO)

Ex.No.	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
1.	<p><b>To create DDL statements and simple queries.</b></p> <p>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</p>	<p>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</p>	K3
2.	<p><b>To create DML statements and simple queries.</b></p> <p>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.</p>	<p>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.</p>	K3

3.	<p><b>Queries using</b></p> <p>i) <b>WHERE clause, HAVING clause, LIKE operator, BETWEEN clause.</b></p> <p>ii) <b>Queries using logical operators. iii) Set operators.</b></p> <p><b>Sorting and grouping</b></p> <p>Create a table with columns and data types</p> <p>Make use of set operators like union, intersections and minus in the table</p> <p>sorting and grouping the columns in ascending and descending order.</p>	<p>Make use of all the logical operators.</p> <p>Identify the symbol of union.</p> <p>Apply conditions to the table.</p> <p>Build aggregation queries involving GROUP BY and HAVING clauses.</p> <p>Choose the correct format of LIKE operator.</p>	K3
4.	<p><b>To create Nested queries using Sql i) Sub queries.</b></p> <p><b>Join operators.</b></p> <p>Create a table with columns and data types</p> <p>Insert the values into the table.</p> <p>Make use of left, right outer join and full join in table</p>	<p>Experiment with the special attention of joint operations.</p> <p>Identify complex queries</p> <p>Utilize left outer join</p> <p>Develop nested queries</p> <p>Construct inner join query.</p> <p>Choose the correct symbol of right join</p>	K3
5.	<p><b>Built – in functions</b></p> <p>Use character functions</p> <p>Use mathematical functions</p> <p>Use string functions</p> <p>Use date functions</p>	<p>Make use of built-in functions</p> <p>Identify the DATE function</p> <p>– Build a query – for your age.</p> <p>Experiment with ceil (23.34)</p>	K3
6.	<p><b>Make use of Use of indexes, creating views and querying in views</b></p> <p>Create a table</p> <p>Create an index for that table.</p> <p>Create a view for another table.</p> <p>Insert into the view table.</p>	<p>Analyze the concept View in dbms.</p> <p>Discover the uses of index.</p> <p>Compare table and views</p> <p>Construct a view for a table. Test for index for a table.</p>	K4

7.	<b>Implementation of Functions in PL/SQL.</b> Create a function for Fibonacci. Pass values to the variable Call the function Return the value of the function	Define functions Compare functions and procedures. Interpret user defined function. Justify the need of functions.	K5
8.	<b>Implementation of Procedures</b> Create a procedure for total Pass values to the variable. Find pass and fail	Compare procedure from other programming languages. Determine execution between cursors and procedures Estimate procedure.	K5
9.	<b>Implementation Cursors in PL/SQL</b> Create a table inset values into table to retrieve one row at a time, make use of cursors.	Explain cursors. Estimate explicit cursors Choose the syntax for cursor Importance of implicit and explicit cursors. Evaluate the cursor attribute for SQL%ROWC OUNT	K5
10.	<b>Implementation of Triggers in PL/SQL</b> 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.	Criticize the benefits of trigger. Interpret referential integrity. Importance of trigger	K5

11.	<b>Implementation of Exceptions in PL/SQL</b> Create a table Add exception handlers. Use exceptions in a table.	Determine exceptions for the table. Explain the types of exceptions. Choose the system defined exceptions.	K5
12.	<b>Develop PL/SQL programs for the followings Case studies</b> i) Splitting of tables ii)Joining of Tables iii)Pay bill preparation create student table and split into student_info table. Joining 2 tables. Create real time applications in PL/SQL	Create various applications in PL/SQL. Discuss split and join tables. Build a query for splitting table.	K6

#### 4. MAPPING (CO, PO, PSO)

P2IIT1P2	PO									PS		PSO	
	O1	2	3	4	5	6	7	8	9	O1	O2	3	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: P21IT1: 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	<a href="https://www.youtube.com/watch?v=ikuSPBZjkhw">https://www.youtube.com/watch?v=ikuSPBZjkhw</a>
2	Multicast Backbone	<a href="https://www.youtube.com/watch?v=diYBfbc7PkA">https://www.youtube.com/watch?v=diYBfbc7PkA</a>
3	SMIL	<a href="https://www.youtube.com/watch?v=xqups1sSIHI">https://www.youtube.com/watch?v=xqups1sSIHI</a>
4	Hyper speech	<a href="https://www.youtube.com/watch?v=xjkPHchV6sM">https://www.youtube.com/watch?v=xjkPHchV6sM</a>

### 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](http://www.tutorialspoint.com)
2. [www.wisdomjobs.com](http://www.wisdomjobs.com)
3. [https://www.youtube.com/watch?v=Syeu\\_l3sAJE](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
<b>I</b>	<b>Overview of Multimedia System Design, Technologies and DB's</b>		
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)	
<b>II</b>	<b>Compression and Decompression, Data and File Format Standards</b>		
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)	

<b>III</b>	<b>Multimedia Application Design and Components</b>		
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)	
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)	
<b>IV</b>	<b>MM Authoring and User Interface, Hypermedia Applications</b>		
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)	
<b>V</b>	<b>Hypermedia Messaging, MM Message Standards</b>		
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)

P21IT1: 1	PO 1	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:P21IT1: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.B. Topics for Self Study:**

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

**2.C. Text Book(s):**

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

**2.D. Reference Books:**

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

**2.E. Web Links:**

- [www.tutorialspoint.com](http://www.tutorialspoint.com)
- [www.geeksforgeeks.org](http://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
<b>I</b>	<b>Output Primitives, Attributes of Output Primitives</b>		
1.1	Points and Lines Line Drawing algorithms - Loading frame Buffer - Line function.	Recall the core concepts of computer graphics.(K1) Build a line using a line drawing algorithm.(K2) List the line functions.(K3)	K2
1.2	Circle Generating algorithms - Ellipse - generating	Explain the Circle generating Algorithm.(K5)	

	Algorithms-Attributes of Output Primitives: Line Attributes - Curve attributes - Color and Grayscale Levels- Area Fill Attributes	Classify the various attributes of output primitives.(K4) Compare line and curve attributes.(K2)	
<b>II</b>	<b>2D Geometric Transformations, 2D Viewing</b>		
2.1	Basic Transformations – Matrix representations - Composite Transformations-Other Transformations.	Discuss transforms including translation, rotation and scaling.(K6) Explain composite Transformations.(K5) Apply basic Transformations in 2D images.(K3)	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)	
<b>III</b>	<b>3D Concepts, 3D Geometric Modeling and Transformations</b>		
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) How to construct a 3D object.(K1) Make use of the polygon surfaces in 3D representation.(K3) Discuss 3D object representations.(K6)	K4
3.2	Quadric Surfaces-Super Quadrics-Blobby Objects- Spline representations-3D Geometric Modeling and Transformations: Translation-Rotation-Scaling-Other Transformations	Compare translation, rotation and scaling in 3D.(K4) Relate 2D and 3D transformations.(K2)	



	-Composite Transformations -3D Transformation functions.	Categorize the types of spline representations.(K4)	
<b>IV</b>	<b>Visible –Surface Detection Methods</b>		
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)	
<b>V</b>	<b>Illumination Methods</b>		
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)

P21IT1: 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	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**

**COURSE CODE: P21IT1: 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	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	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. SYLLBUS

#### 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- Hotelling 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	<a href="https://www.youtube.com/watch?v=LBPdd2eECjw">https://www.youtube.com/watch?v=LBPdd2eECjw</a>
2	Medical field-Remote sensing	<a href="https://www.youtube.com/watch?v=augQQ-cWuTk">https://www.youtube.com/watch?v=augQQ-cWuTk</a>
3	Transmission and encoding	<a href="https://slideplayer.com/slide/4919385/">https://slideplayer.com/slide/4919385/</a>
4	Color Processing	<a href="https://www.youtube.com/watch?v=9BG7OUu3Qr_4">https://www.youtube.com/watch?v=9BG7OUu3Qr_4</a>

## 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 Transaction	
	Digital image processing			
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) Build an application of Digital image processing.(K3) List the elements of digital image processing.(K1)	K2	
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)		
<b>II Image Transform</b>				
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) Explain the properties of different types of image transform.(K2) Organize the steps in Discrete Fourier Transform.(K3) Demonstrate DCT in computer graphics.(K2)		K3
<b>III Image Enhancement and Restoration</b>				
3.1	Contrast stretching – intensity level slicing – Histogram equalization – spatial averaging – smoothing	Examine Histogram equalization(K4). Illustrate the steps of smoothing.(K2) Discuss the techniques in spatial and frequency domains.(K5)	K3	
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)		
<b>IV Image Compression</b>				
4.1	Huffman's coding- truncated	Justify the need of image compression.(K5)		K5

Huffman's coding-binary Codes, arithmetic coding, run length coding- transform coding- JPEG and MPEG coding.	Explain Run length encoding algorithm.(K5)
	Discuss Huffman coding algorithms for image compression.(K6)

		List out the various Image compression Standards.(K4)	
		Compare Spatial and frequency domain techniques of image compression.(K5)	
<b>V</b>	<b>Image Segmentation</b>		
5.1	Pixel based approach – Feature threshold – choice of feature – optimum threshold – threshold selecting method	Apply the techniques in image segmentation.(K6) Discuss Image segmentation in pixel-based approach.(K5) Explain the features of the threshold selection method.(K5)	K6
5.2	Region based approach – region growing – region splitting – region merging.	Explain region merging.(K2) Interpret region splitting.(K2) Discuss the steps of Region based segmentation.(K6)	

#### 4.MAPPING (CO, PO, PSO)

P21IT: 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	PSO 3	PSO 4
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).
3. Pre-Semester & End Semester Theory Examination.

##### INDIRECT:

1. Course-end survey.(Feedback)

## CORE COURSE – IV: DATA COMMUNICATION NETWORKS

**SEMESTER: II**  
**CREDITS: 4**

**COURSE CODE: P21IT204**  
**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	<a href="https://www.omniseacu.com/security/biometric-authentication.php">https://www.omniseacu.com/security/biometric-authentication.php</a>
2	Types of attacks	<a href="https://www.omniseacu.com/security/types-of-network-attacks.php">https://www.omniseacu.com/security/types-of-network-attacks.php</a>
3	Types of malwares	<a href="https://www.omniseacu.com/security/types-of-malwares.php">https://www.omniseacu.com/security/types-of-malwares.php</a>
4	Firewalls	<a href="https://www.omniseacu.com/security/infrastructure-and-email-security/firewalls.php">https://www.omniseacu.com/security/infrastructure-and-email-security/firewalls.php</a>
5	E- mail Security	<a href="https://www.omniseacu.com/security/infrastructure-and-email-security/e-mail-security.php">https://www.omniseacu.com/security/infrastructure-and-email-security/e-mail-security.php</a>

#### 2.C. Text Book(s):

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

#### 2.D. Reference Books

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

#### 2.E. Web Links:

1. [https://www.tutorialspoint.com/data\\_communication\\_computer\\_network/index.html](https://www.tutorialspoint.com/data_communication_computer_network/index.html)
2. <https://www.pinterest.com/mskuthar/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
<b>I</b>	<b>Introduction to Network and Communication Media</b>		
1.1	Overview: A Communication model - Data Communications – Networks – The Internet	Outline the purpose of communication (K2)	K2
		Identify components of the communication model. (K3)	
		Recognize types of networks.(K1)	
		Label the features of the internet. (K1)	
1.2	Protocol Architecture: The need for a Protocol Architecture – The TCP/IP protocol Architecture. – The OSI Model –Standardization within a Protocol Architecture	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)	
1.3	Data Transmission: Concepts & terminology–Analog & Digital Data Transmission – Transmission Impairments	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.	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)	
<b>II</b>	<b>Digital Data Communication Techniques</b>		

2.1	Digital Data Communication	Explain the digital communication techniques (K2)	K3
	Techniques: Asynchronous and Synchronous Transmission – Types of	List techniques to transmit digital data. (K1)	

	Errors–Error Detection – Error Correction	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) 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) Classify multiplexing mechanisms used in communication. (K2) Inspect the drawback of multiplexing techniques. (K4)	K3
<b>III</b>	<b>Switching and Asynchronous Transfer Mode</b>		
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) Elaborate switching concepts. (K6) Analyze drawbacks in different types of switching. (K4) Discuss circuit and packet switching. (K6)	K4
3.2	Asynchronous Transfer Mode: Protocol Architecture ATM Logical Connections – ATM Cells – Transmission of ATM Cells – ATM Service Categories.	Explain the purpose of an ATM. (K5) Define layers in the ATM. (K1) Discuss the functionalities of ATM layers. (K6) Inspect the services provided by ATM layers (K4)	
<b>IV</b>	<b>Routing and Local Area Network</b>		
4.1	Routing in Switched Networks:	Explain the purpose of routing algorithms. (K5)	

	Routing in Packet Switching Networks – Least Cost Algorithms.	Discuss the routing algorithms used in networks. (K6) Compare the least cost using routing algorithms in a network (K4) Inspect algorithm with example. (K4)	
4.2	Congestion Control in Data Networks: Effects of Congestion – CongestionControl - Traffic Management. Control - Traffic Management.	Define problems occurred in data transmission. (K1) Explain the situation of congestion. (K2) Identify a problem when congestion occurred. (K3) Explain how to manage the transmission when congestion occurred. (K5)	K5
	Local Area Networks: LAN Overview: Background – Topologies and Transmission Media – LAN Protocol Architecture – Bridges – Layer2 and Layer3 Switches.	Explain the topologies used in LAN. (K2) Identify protocol architecture used in LAN. (K3) Discuss the hardware used in OSI layers. (K6) Compare switch and bridge in transmission of digital data. (K4)	
<b>V</b>	<b>Communication Architecture Protocols and Internet Applications</b>		
5.1	Internetwork Protocols: Basic Protocol Functions – Principles of Internetworking Internet Protocol Operation Internet Protocol – IPV6.	Explain the concepts used in internetworking. (K4) Illustrate the layers in IP protocol.(K2) Discuss the various fields in IP protocol architecture. (K6) Compare IPv4 and IPv6. (K5) Examine the necessity of IPv6. (K4)	
5.2	Transport Protocols: Connection Oriented Transport Protocol Mechanisms – TCP – UDP.	Define connection oriented and connectionless protocol. (K1) Identify the protocols used in transport layer. (K3) Discuss the architecture of TCP and UDP. (K6) Discuss the features of TCP and UDP. (K6)	K6
5.3	<b>Internet Applications:</b> Electronic Mail – SMTP and MIME – Network	Define how an email works. (K1)	

	Management (SNMP) – Internet Directory Service – Web Access - HTTP.	Discuss the components involved in the email communication process. (K6)	
		Examine the purpose of SMTP and MIME protocol in the email process. (K4)	
		Discuss how the web pages are accessed through networking protocols. (K6)	
		Explain how the web documents are organized in internet directories. (K5)	

#### 4. MAPPING (CO, PO, PSO)

P21IT204	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
CO	L	L	L	L	M	L	M	M	H	M	L	H	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, Field Visit Report, Seminar, Quiz (written).
- 3.Pre-Semester & End Semester Theory Examination

##### INDIRECT:

1. Course end survey (Feedback)

## Core V: WEB PROGRAMMING

**SEMESTER: II**

**COURSE CODE: P21IT205**

**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	<a href="https://www.tutorialspoint.com/html5/index.htm">https://www.tutorialspoint.com/html5/index.htm</a>
2	CSS 3	<a href="https://www.tutorialspoint.com/css/css3_tutorial.htm">https://www.tutorialspoint.com/css/css3_tutorial.htm</a>
3	Bootstrap	<a href="https://getbootstrap.com/docs/4.4/getting-started/introduction/">https://getbootstrap.com/docs/4.4/getting-started/introduction/</a>
4	Xamarin	<a href="https://dotnet.microsoft.com/apps/xamarin">https://dotnet.microsoft.com/apps/xamarin</a>

## 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/>

## 3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit / Section	Course Contents	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
<b>I HTML and XHTML</b>			
1.1	<b>HTML and XHTML:</b> Structuring Documents for the Web - Links and Navigation - Images, Audio, and Video - Tables – Forms – Frames.	Demonstrate the concepts in HTML Relate the tags available in HTML Summarize the multimedia operations Illustrate the concepts of Tables, Forms and Frames	K2
<b>II CSS and JavaScript</b>			
2.1	<b>CSS and JavaScript:</b> Cascading Style Sheets - More Cascading Style Sheets - Learning JavaScript - Working with JavaScript - HTML5.	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
<b>III JQuery and C#</b>			
3.1	<b>JQuery and C#:</b> Introduction to jQuery - Selecting and Filtering –	Identify the Concepts in JQuery	K3



	Events - Arrays and Iteration – AJAX	Make use of selection and filtering concepts in JQuery Model a web Page with AJAX controls	
3.2	<b>Introducing C#:</b> What is the .NET Framework? - What is C#? Writing a C# Program Variables and Expressions Flow Control – Functions.	Discover the features of .NET Framework – Analyze how to write a C# program – Examine the expressions, Flow Control and Functions in C#	K4
<b>IV Defining Classes</b>			
4.1	<b>Defining Classes:</b> Class Definitions in C# - System Object – Constructors and Destructors.	Explain the concepts of classes and objects in C# Importance of Constructors and Destructor in C# programming	K5
4.2	<b>Defining Class Members:</b> Member Definitions – Interface Implementation.	Explain Member definitions and its use Interpret the implementation of Interface using C#	K5
<b>V Web Programming</b>			
5.1	<b>Web Programming</b> :ASP.NET Web Programming – Web Services – Deploying Web Applications.	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)

P21IT205	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**

**COURSE CODE: P21IT206**

**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 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:**

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

#### **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**”, 2<sup>nd</sup> 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	
<b>I</b>	<b>Basics of Communication Technologies</b>			
1.1	<b>Basics of Communication Technologies:</b> Types of Telecommunication Networks – Components of Wireless Communication System – Architecture of Mobile Telecommunication Systems Wireless Networking Standards– WLAN– Bluetooth Technology	Recall the concepts of Wireless Communications and Server applications 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	K2	
1.2	<b>Introduction to Mobile Computing and Wireless Networking</b> 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	<b>MAC Protocols</b> 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		
<b>II</b>	<b>Mobile Internet Protocol</b>			
2.1	<b>Mobile Internet Protocol</b>	Define Mobile IP Interpret the Features of Mobile IP		K3

	Mobile IP – Packet Delivery – Overview – Desirable Features – Key	Demonstrate the Key Mechanism used in Mobile IP	
	Mechanism – Route Optimization – DHCP	Analyze and conclude how the Route Optimization works Test the job of Dynamic Host Configuration Protocol	
2.2	<b>Mobile Transport Layer</b> 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	<b>Mobile Databases</b> 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	
<b>III</b>	<b>Mobile Ad Hoc Networks (MANETs)</b>		
3.1	<b>Mobile Ad Hoc Networks (MANETs)</b> 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
	<b>Wireless Sensor Networks (WSNs)</b> Introduction – WSN versus MANET – Applications – Architecture of the Sensor	Define WSN Compare WSN and MANET Explain the architecture of the sensor node List the challenges in the effective DSN	

	Node – Challenges in the Design of an effective DSN – Characteristics of Sensor Networks – WSN	Illustrate the characteristics of sensor networks Classify WSN routing protocols	
	Routing Protocols – Target Coverage		
	<b>Operating Systems for Mobile Computing</b> 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	
<b>IV</b>	<b>Introduction to Android, Activities, User Interface, Views</b>		
4.1	<b>Introduction to Android, Activities, User Interface, Views:</b> 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
<b>V</b>	<b>Content Providers, Messaging, Networking, Publishing Android Applications</b>		
5.1	<b>Content Providers, Messaging, Networking, Publishing Android Applications:</b> Content Providers – Messaging Location Based Services – Networking – Developing Android Services – Publishing Android Applications.	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	K6

	Analyze, how to perform repeated tasks in a service
	Analyze how an activity and a service communicate

#### 4.MAPPING (CO, PO, PSO)

P21IT206	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: P21IT2P3**  
**HOURS/WEEK 4**

### 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
	<b>HTML, CSS, JavaScript and JQuery:</b>
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.
	<b>ASP.NET with C#:</b>
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	<a href="https://docs.microsoft.com/en-us/dotnet/api/system.web.ui.webcontrols.menu?view=netframework-4.8">https://docs.microsoft.com/en-us/dotnet/api/system.web.ui.webcontrols.menu?view=netframework-4.8</a>
2	CSS3	<a href="https://www.w3schools.com/css/">https://www.w3schools.com/css/</a>
3	Bootstrap 4	<a href="https://www.w3schools.com/bootstrap4/bootstrap_get_started.asp">https://www.w3schools.com/bootstrap4/bootstrap_get_started.asp</a>

## 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).	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.	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.	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
		Analyze and apply the appropriate validations in the HTML form controls	K4

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).	Build Web Pages using forms for College Students Admission Process 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.	Discover the features of Java Script	
6	Write a program using Java Script and JQuery to display the calculator in a web page.	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.	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).	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.	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	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.	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.	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.	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.	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.	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)

P21IT2P3	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:**

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 – IV: MOBILE APPLICATIONS DEVELOPMENT LAB

**SEMESTER: II**

**CREDITS: 2**

**COURSE CODE: P21IT2P4**

**HOURS/WEEK 4**

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

## 3.SPECIFIC LEARNING OUTCOMES (SLO)

Ex. No.	Course Content	Learning Outcomes	Level
1	<b>Create simple application to display “Hello World” with text and background colors</b> 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	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	<b>Create an application to display toast(message)</b> 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	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><b>Create an application to demonstrate list view.</b>  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  Build, debug and run the application in AVD</p>	<p>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.  Solve with AVD to run the application.</p>	K3
4	<p><b>Create an application to validate a login module.</b>  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</p>	<p>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.</p>	K3
	<p>Build, debug and run the application in AVD</p>	<p>Develop event handling mechanism for clicking the button.  Solve AVD to run the application</p>	
5	<p><b>Create an application to change the color of the screen using menu options.</b>  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</p>	<p>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.</p>	K3
6	<p><b>Create an application to change the image displayed on the screen using radio button.</b>  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</p>	<p>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.</p>	K3

7	<p><b>Create an application to demonstrate alert dialog box.</b>  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.  Build, debug and run the application in AVD</p>	<p>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.</p>	K4
8	<p><b>Create an application to demonstrate countdown timer.</b>  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</p>	<p>Classify the components of forms.  Analyze the timer objects.  Discover the mechanism to perform countdown activities.  Examine with AVD to run the application.</p>	K4
	<p>Check the output by pressing the button</p>		
9	<p><b>Create an application to create a new contact using Intent.</b>  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.</p>	<p>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.</p>	K5
10	<p><b>Create an application to call specific entered number by user in the edit text.</b>  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</p>	<p>Choose the components of forms.  Determine the components using views.  Formulate the mechanism to handle the events.  Justify with AVD to run the application.</p>	K5



11	<p><b>Create an application to animate a bitmap.</b>          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.</p>	<p>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.</p>	K3
12	<p><b>Create an application to play a media file from the sd card.</b>          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</p>	<p>Choose the components of forms.          Determine the media file to the drawable component          Assess the components using views          Formulate the mechanism to handle the events          Justify with AVD to run the application</p>	K5
13.	<p><b>Create an application to make database operations.</b>          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</p>	<ul style="list-style-type: none"> <li>● Choose the components of forms.</li> <li>● Build the mechanism to handle the events</li> <li>● Solve with AVD to run the application</li> </ul>	K6
14.	<p><b>Create an application using images and spinner objects.</b>          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</p>	<ul style="list-style-type: none"> <li>● Identify the components of forms</li> <li>● Select the images to the drawable component</li> <li>● Collect the components using views</li> <li>● Construct the event handling mechanism for operating the spinner</li> <li>● Experiment with AVD to run the application</li> </ul>	K3

15	<p><b>Create an application to take pictures using native application.</b>          Create a new activities and design the UI using android controls          Modify the activity to gain access to the native camera application          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</p>	<ul style="list-style-type: none"> <li>• Choose the components of forms</li> <li>• Determine the camera activity to the android manifest file</li> <li>• Formulate the event handling mechanism to handle camera objects</li> <li>• Justify with AVD to run the application</li> </ul>	K5
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#### 4.MAPPING (CO, PO, PSO)

P21IT2P4	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: P21IT2:2**

**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.	<a href="https://link.springer.com/chapter/10.1007/978-3-642-48673-9_13">https://link.springer.com/chapter/10.1007/978-3-642-48673-9_13</a>
2	Reuse of components.	<a href="https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.157.2982&amp;rep=rep1&amp;type=pdf">https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.157.2982&amp;rep=rep1&amp;type=pdf</a>
3	Reuse of frameworks black box framework, white box frame.	<a href="http://www.copypasteisforword.com/notes/object-oriented-frameworks">http://www.copypasteisforword.com/notes/object-oriented-frameworks</a>
4	Reuse of patterns Architectural pattern and Design pattern.	<a href="https://www.developer.com/design/article.php/3309461/using-design-patterns-in-uml.htm">https://www.developer.com/design/article.php/3309461/using-design-patterns-in-uml.htm</a>

### 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](http://www.tutorialspoint.com)
2. [https://en.wikipedia.org/wiki/Unified\\_Modeling\\_Language](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
<b>I</b>	<b>Introduction to Unified Modeling Language, Basic Structural Modeling</b>		
1.1	Introduction to Unified Modeling Language: Principles of Modeling Object Oriented Modeling Introduction to UML.	Recall OO modeling(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)	K1
<b>II Advanced Structural Modeling</b>			
2.1	Advanced Structural Modeling: Advanced Classes – Advanced Relationships – Interfaces, Types and Roles – Packages - Instances – Object diagrams.	Explain the concepts of advanced modeling.(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)	K2
<b>III Basic Behavioral Modeling</b>			
3.1	Basic Behavioral Modeling: Interactions – Use Cases – Use Case Diagrams – Interaction Diagrams – Activity Diagrams.	Label requirements for interactions.(K1) 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)	K6
<b>IV Advanced Behavioral Modeling</b>			
4.1	Advanced Behavioral Modeling: Events and Signals – State Machines – Processes and Threads	Classify events and signals.(K2) Recall various types of processes.(K1)	

	– Time and Space – State chart Diagrams.	Label the terms used in the state chart diagram.(K1) Identify the keywords used in time and space.(K3)	K3
		Apply a state machine to model the lifetime of objects.(K3)	
<b>V</b>	<b>Architectural Modeling</b>		
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) 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)	K6

#### 4.MAPPING (CO, PO, PSO)

P21IT2:2	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: P21IT2: 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

**2.B. Topics for Self Study:**

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

**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)**

t/Secti on	Course Content	Learning Outcomes	Highest Blooms Taxonomic Level of Transaction
<b>I</b>	<b>Uml Diagrams</b>		
1.1	Introduction to OOAD - Unified Process - UML diagrams - Use Case-Class Diagrams - Interaction	Recall Object oriented concepts (K1) Explain the necessity of UML diagrams. (K2)	



	Diagrams - State Diagrams - Activity Diagrams Package, Component and Deployment Diagrams.	Explain different types of UML diagrams. (K2) Identify the components in UML diagrams.(K3) Discuss various UML diagrams. (K4)	K2
<b>II</b>	<b>Design And Patterns</b>		
2.1	GRASP-Designing objects with	Define blueprint of an Objects (K1)	K3
	responsibilities-Creator-Information expert-Low Coupling-High Cohesion-Controller-Design Patterns-Creational-Factory method-Structural-Bridge-Adapter-Behavioural-Strategy-Observer.	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)	
<b>III</b>	<b>Case Study</b>		
3.1	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	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)	
<b>IV</b>	<b>Applying Design Patterns</b>		
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)	
<b>V</b>	<b>Coding and Testing</b>		
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)	
		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)	K6
	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)

P21IT2: 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
<b>CO1</b>	H	L	L	L	L	L	L	L	L	H	L	L	L
<b>CO2</b>	L	H	M	L	L	L	L	L	L	M	H	L	L
<b>CO3</b>	L	M	M	H	L	L	L	L	L	L	H	L	M
<b>CO4</b>	L	M	L	M	L	L	L	L	M	M	L	L	L
<b>CO5</b>	L	M	L	L	L	L	L	L	L	L	H	M	L
<b>CO6</b>	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: P21IT2: 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	<a href="https://www.toptal.com/designers/prototyping/user-testing-prototypes">https://www.toptal.com/designers/prototyping/user-testing-prototypes</a>
2	Iterating the Prototype and Further User Testing	<a href="https://xd.adobe.com/ideas/process/user-testing/process-user-testing-iterative-usability-testing-best-practices/">https://xd.adobe.com/ideas/process/user-testing/process-user-testing-iterative-usability-testing-best-practices/</a>
3	Designing Alternatives	<a href="https://www.coursera.org/lecture/user-experience-design/design-alternatives-OOby">https://www.coursera.org/lecture/user-experience-design/design-alternatives-OOby</a>

## 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 Level of Transaction
<b>I</b>	<b>The Tao of UXD</b>		
1.1	The Tao of UXD: What Is User Experience Design – About UX Designers – Where UX Designers	Recall user experience design and designer.(K1)	

	Live? The Project Ecosystem: Identify the Type of Site - Choose Your Hats.	Tell where the designer lives.(K1) Identify what type of project site is choose.(K3)	K1
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)	
<b>II</b>	<b>User Research</b>		
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) 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)	K2
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)	
<b>III</b>	<b>Organizing the Content</b>		
3.1	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.	Recall the architecture of application structure.(K1) List the patterns of application software.(K1) Illustrate the navigation, signpost, and wayfinding.(K2) Estimate the cost of navigation and models.(K6) Utilize the design conventions and patterns.(K3)	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)	

<b>IV</b>		<b>Doing Things</b>	
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)	
<b>V</b>		<b>Using social media</b>	
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)

<b>P21IT2: B</b>	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PO 8</b>	<b>PO 9</b>	<b>PS O 1</b>	<b>PS O 2</b>	<b>PS O 3</b>	<b>PS O 4</b>
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**

**COURSE CODE: P21IT2:3**

**CREDITS: 4**

**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**

**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**

**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: WirelessSecurity 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	<a href="http://uou.ac.in/foundation-course/">http://uou.ac.in/foundation-course/</a>
2	Cyber Law	<a href="https://www.tutorialspoint.com/information_security_cyber_law/quick_guide.htm/">https://www.tutorialspoint.com/information_security_cyber_law/quick_guide.htm/</a>
3	Block chain technology	<a href="https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-cs26/">https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-cs26/</a>
4	Steganography and Biometrics	<a href="https://www.igi-global.com/chapter/steganography-using-biometrics/184201/">https://www.igi-global.com/chapter/steganography-using-biometrics/184201/</a>

#### 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/](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

<b>1</b>	<b>Computer and Network Security Concepts and Number theory</b>		
<b>1.1</b>	<b>Computer and Network Security Concepts:</b> 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)	<b>K1</b>
		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)	
<b>1.2</b>	<b>Introduction to Number Theory:</b> 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)	
<b>II</b>	<b>Symmetric and Asymmetric cipher</b>		
<b>2.1</b>	<b>Symmetric cipher: Classical Encryption Techniques:</b> Cipher Model - Substitution Techniques - Transposition Techniques - Rotor Machines – Steganography – DES – AES	Build the techniques to replace the characters of the plain text(K3)	<b>K2</b>
		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)	
<b>2.2</b>	<b>Block Cipher Operation:</b> Multiple Encryption and Triple DES - Electronic COURSE CODE Book - Cipher Block Chaining Mode - Cipher Feedback Mode - Output Feedback Mode - Counter Mode –RC4.-	Discuss the public key cryptosystem(K6)	
		Illustrate the steps of RSA algorithm(K2)	

2.3	<b>Asymmetric cipher: Public Key Cryptography and RSA:</b> 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)	
<b>III Data Integrity Algorithms, Digital signature and user Authentication</b>			
3.1	<b>Cryptography Data Integrity Algorithms:</b> 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	<b>Digital Signature: RSA –PSS Digital Signature Algorithm</b>	Apply RSA in Digital signature (K3)	
		Compare RSA and PSS algorithm(K2)	
3.3	<b>Key Management and Distribution:</b> 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	<b>User Authentication:</b> Kerberos.	Select Kerberos system for key distribution(K3)	
<b>IV Transport Level Security and Wireless Network Security</b>			
4.1	<b>Transport Level Security:</b> 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	<b>Wireless Network Security:</b> Wireless Security - Wireless Security - IEEE 802.11 Wireless LAN Overview -	Build the overview of wireless security(K3)	
	IEEE 802.11i Wireless LAN Security	Design IEEE 802.11i wireless LAN security(K6)	
V	<b>Electronic Mail Security and IP Security</b>		
5.1	<b>Electronic Mail Security:</b> 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)	
5.2	<b>IP Security:</b> 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

P21IT2:3	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: P21IT2: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**

**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 and Defense**

**12 Hours**

Cyber Threats and Defense – 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**

**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	<a href="http://www.iibf.org.in/documents/cyber-laws-chapter-in-legal-aspects-book.pdf/">http://www.iibf.org.in/documents/cyber-laws-chapter-in-legal-aspects-book.pdf/</a>
2.	Types of Cyber Law	<a href="http://osou.ac.in/eresources/introduction-to-indian-cyber-law.pdf/">http://osou.ac.in/eresources/introduction-to-indian-cyber-law.pdf/</a>
3.	Trade Mark Law	<a href="https://www.wipo.int/edocs/pubdocs/en/wipo_pub_653.pdf/">https://www.wipo.int/edocs/pubdocs/en/wipo_pub_653.pdf/</a>
4.	Cyber terrorism	<a href="https://www.usip.org/sites/default/files/sr119.pdf/">https://www.usip.org/sites/default/files/sr119.pdf/</a>

## 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 Einfinger 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/](http://www.dbs.com/act/assets.pdf/)

## 3.SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom’s Taxonomy
<b>I</b>	<b>Introduction Cyber Crime</b>		
1.1	<b>Introduction Cyber Crime – Cyber Crime Defined – Computer Crime</b>	Define the basic terminology of cyber crime.(K1)	K2

	Technology – Computer Crime on the Internet – Financial Computer Crime – White Collar Computer Crime – Crime Offender or Victim.	Identify the crime on the internet(K3) Classify the types of computer crime(K4)	
1.2	<b>Cyber Crime Cases</b> – 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)	
<b>II</b>	<b>Cyber Threats and Defence</b>		
2.1	<b>Cyber Threats and Defence</b> – 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) Justify the different methods of defensive measures.(K5) Asses the solution to the threats(K5)	K3
<b>III</b>	<b>Cyber Security Overview</b>		
3.1	<b>Cyber Security Overview</b> – 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) Classify the types of attacks and malware(K4) Identify the motivation of attackers(K3)	K4
<b>IV</b>	<b>Intrusion Detection / Prevention System</b>		
4.1	<b>Intrusion Detection / Prevention System</b> – Overview – The Approaches used for IDS / IPS – Network Based IDS / IPS – Host Based IDS / IPS – Honeypots – The	Categorize the intrusion detection and prevention system(K4)	K6
	Detection of Polymorphic Metamorphic Worms – Distributed Intrusion Detection Systems and	Design the distributed Intrusion detection system(K6)	

	Standards –SNORT – The Tipping Point IPS – The McAfee Approach to IPS – The Security Community’s Collective Approach to IDS / IPS.	Build the security using antivirus software(K6)	
<b>V</b>	<b>The Forensic Process</b>		
5.1	<b>The Forensic Process</b> – 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	<b>Documenting the Investigation</b> – 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	<b>The Justice System</b> – 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

P21IT2:C	PO1	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: P21IT2: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	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

**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

**12 Hours**

Cyber-crime Investigation: 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

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
<b>I</b>	<b>Introduction, Typology of cybercrime and Cyber terrorism:</b>		
<b>1.1</b>	<b>Introduction:</b> 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)	
<b>1.2</b>	<b>Typology of cybercrime:</b> Cybercrime- Cyber criminals – computer crime – reason for	Distinguish the cybercrime and computer crime(K4)	
	cybercrime –types of cybercrime- crime against economy- prevention of cybercrime – cyber ethics -	Classify the types of cyber crime (K4) Asses the prevention techniques of cyber crime((K5)	
<b>1.3</b>	<b>Cyber terrorism:</b> Definition –tool- reason for cyber terrorism – Danger of cyber terrorism –efforts of combining cyber terrorism	Identify the reason and danger of cyber terrorism(K3)	
<b>II</b>	<b>Domain Name and trade Mark Law</b>		
<b>2.1</b>	<b>Domain Name and trade Mark Law:</b> 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)	
<b>III</b>	<b>Digital (Electronic) Signature</b>		
<b>3.1</b>	<b>Digital (Electronic) Signature:</b> 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)	
<b>IV</b>	<b>Cybercrime Invesitigation and Preventive measures of Cybercrime</b>		
<b>4.1</b>	<b>Cybercrime Invesitigation:</b> Precautions at the search site –Steps for the seize –Computer forensics-	Test for the precautions followed by searching the web site(K4)	
<b>4.2</b>	<b>Preventive measures of Cybercrime:</b> Classification of	Classify the cyber crimes(K4)	

## 2.A. Topics for Self-Study:

	Cybercrimes - Remedial measures to combat cybercrime - Combating Cybercrimes through Legislation - Prevention of Cyber Crime – Preventive Measures	Justify the preventive measures of cyber crimes(K5)	K5
<b>V</b>	<b>Applications of Cyber Law</b>		
<b>5.1</b>	<b>Applications of Cyber Law: Online Banking – Network Service Provider – Ecommerce – E-Governance</b>	Improve the applications of cyber law.(K6)	K6
<b>S.No.</b>	<b>Topics</b>	<b>Web Links</b>	
1	Cyber Crime Cases	<a href="http://www.itu.int/ITU-D/cyb/cybersecurity/docs/Cybercrime%20legislation%20EV6.pdf/">http://www.itu.int/ITU-D/cyb/cybersecurity/docs/Cybercrime %20legislation%20EV6.pdf/</a>	
2	Cyber Threats	<a href="file:///C:/Users/SaiKrish/Downloads/ACS_Cybersecurity_Guide.pdf/">file:///C:/Users/SaiKrish/Downloads/ACS_Cybersecurity_Guide.pdf/</a>	
3	Cyber defences	<a href="https://niti.gov.in/sites/default/files/2019-07/CyberSecurityConclaveAt_VigyanBhavanDelhi_1.pdf/">https://niti.gov.in/sites/default/files/2019-07/CyberSecurityConclaveAt_VigyanBhavanDelhi_1.pdf/</a>	
4	Forensic process	<a href="https://www.researchgate.net/publication/255614731_Mapping_Process_of_Digital_Forensic_Investigation_Framework/">https://www.researchgate.net/publication/255614731_Mapping_Process_of_Digital_Forensic_Investigation_Framework/</a>	

## 2.B. Text Book(s):

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

## 2.C. 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.D. Web Links:

1. [https://heimdalsecurity.com/pdf/cyber\\_security\\_for\\_beginners\\_ebook.pdf/](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://www.uou.ac.in/sites/default/files/slm/FCS.pdf/>

## 4. MAPPING (CO, PO, PSO)

P21IT2P :D	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	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)

## Core Course – VII : PROGRAMMING WITH PYTHON

**SEMESTER:III**  
**CREDITS: 5**

**COURSE CODE : P21IT307**  
**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 concept of user Defined function and make use of the built in functions	K3	II
CO3	Determine the Importance of file programs and Exceptions handling	K3	II
CO4	Develop programs using classes and Objects.	K4	III
CO5	Determine the Importance of database architecture and functions	K5	IV
CO6	Build CGI and GUI applications	K6	V

### 2.A SYLLABUS

#### **UNIT - 1 Introduction to Python, Strings, Lists, Tuples and Dictionaries** **15 Hours**

Introduction to Python: Introduction – Python Overview – Control Statements – Iteration – Input from Keyboard- Strings and Lists: Strings – Compound Data type – String Formatting Operator – String Formatting Functions - Lists – Values and accessing elements – Lists are Mutable – Built-in list operators – Built-in List methods - Tuples and Dictionaries: Tuples – Creating Tuples – Basic Tuple Operations – Built-in Tuple Functions - Dictionaries

#### **UNIT – 2 Functions, Files and Exceptions** **15 Hours**

Functions: Introduction– Built-in Functions– User Defined Functions– Python Recursive functions– The anonymous functions– Writing python scripts- Files and Exceptions: Text Files– File creation– 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 – 3 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

#### **UNIT – 4 Database and Network Programming** **15 Hours**

Database Programming: Python DB-API-Object Relational Mappers-Non Relational Database– Network Programming: Client Server Architecture–Sockets-Network programming in Python–Socket Server Module

#### **UNIT – 5 GUI and Web Programming** **15 Hours**

**GUI Programming** : Tkinter Programing – Tkinter Examples - **Web Programming**: Building CGI Application – using UNICODE with CGI – Advanced CGI

### 2.B. Topics for Self-Study

S.No.	Topics	Web Links
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1	Python - Multithreaded Programming	<a href="https://www.tutorialspoint.com/python/python_multithreading.htm">https://www.tutorialspoint.com/python/python_multithreading.htm</a>
2	Scientific Python	<a href="https://raw.githubusercontent.com/jrjohansson/scientific-python-lectures/master/Scientific-Computing-with-Python.pdf">https://raw.githubusercontent.com/jrjohansson/scientific-python-lectures/master/Scientific-Computing-with-Python.pdf</a>
3	Python for DataScience	<a href="https://www.tutorialspoint.com/python_data_science/index.htm">https://www.tutorialspoint.com/python_data_science/index.htm</a>
4	Game Development	<a href="https://inventwithpython.com/makinggames.pdf/">https://inventwithpython.com/makinggames.pdf/</a>

## 2.C. Text Book(s):

1. Balagurusamy E, “**Introduction to Computing and Problem Solving Using Python**”, 1<sup>st</sup> Edition, McGraw Hill Education(India) Private Limited, 2017.
2. Wesley J.Chun, “**Core Python Applications Programming**”, 3<sup>rd</sup> Edition, Prentice Hall, 2012.

## 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/](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 Levels of Transaction
<b>I</b>	<b>Introduction to Python, Strings, Lists, Tuples and Dictionaries</b>		
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)	
1.3	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)	
		Interpret the results of string functions(K5)	
		Categorize the string functions.(K4)	
		Interpret the results of string functions(K5)	
		Categorize the string functions.(K4)	
		Interpret the results of string functions(K5)	
		Categorize the string functions.(K4)	
		Interpret the results of string functions	
1.4	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.(K4)	
		Compare the functionality of list tuples and dictionaries(K4)	
		Make use of list functions(K3)	
<b>II</b>	<b>Functions, Files and Exceptions</b>		
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)	
2.2	Files: Text Files – Opening a File – Closing a File – File Object Attributes –	Recall the file concepts(K1)	

	Reading from a file – Writing to a file – Renaming a file – Deleting a file – File related methods. – Directories	Create programs using file concepts(K6)	
2.3	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)	
<b>III</b>	<b>Classes and Objects</b>		
3.1	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) 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)	K4
<b>IV</b>	<b>Database and Network Programming</b>		
4.1	Database Programming: Python DB-API-Object Relational Mappers-Non Relational Database	Choose the appropriate API to establish the database connectivity in Python(K5) Adapt python with ORM to all kind of relational databases(k6) Asses the interaction between python and NoSQL(K5)	K5
4.2	Network Programming: Client Server Architecture–Sockets-Network programming in Python–Socket Server Module	Design the client server architecture using Sockets(K6) Develop Socket programing using TCP and UDP(K6) Interpret the functionality of TCP server and Client application using Socket Server Module(K5)	
<b>V</b>	<b>GUI and Web Programming</b>		
5.1	GUI Programming : TKinter Programing – Tkinter Examples	Elaborate the widgets available in Tkinter(k6)	K6
5.2	Web Programming: Building CGI Application – using UNICODE with CGI – Advanced CGI	Design form and Result page using CGI(k6) Create CGI Application using UNICODE(k6)	



		Analyze multipart form submission and file uploading(K4)	
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#### 4. MAPPING (CO, PO, PSO)

<b>P21IT3 07</b>	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PO 8</b>	<b>PO 9</b>	<b>PSO 1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>
<b>CO1</b>	M	M	H	H	M	H	M	L	H	H	H	H	M
<b>CO2</b>	M	M	H	H	M	H	M	L	M	M	H	M	H
<b>CO3</b>	M	H	H	H	M	H	M	L	M	M	H	M	H
<b>CO4</b>	M	H	H	H	H	H	M	M	M	H	H	M	H
<b>CO5</b>	H	H	H	H	H	H	H	M	H	M	H	H	H
<b>CO6</b>	H	H	H	H	H	H	H	M	H	M	H	H	H

#### 5. COURSE ASSESMENT

##### 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 VIII: INTERNET OF THINGS

**SEMESTER: III**  
**CREDITS: 5**

**COURSE CODE: P21IT308**  
**HOURS/WEEK 5**

### 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 – Physical Design of IoT – Logical Design of IoT – IoT Enabling Technologies – IoT Levels & Deployment Templates.

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

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**

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**

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**

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.N o.	Topics	Web Links
1	NodeMcu	<a href="https://www.nodemcu.com/index_en.html">https://www.nodemcu.com/index_en.html</a>
2	Arduino	<a href="https://www.arduino.cc/en/Guide">https://www.arduino.cc/en/Guide</a>

3	IOT Projects	<a href="https://nevonprojects.com/iot-projects/">https://nevonprojects.com/iot-projects/</a>
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## 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](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=PL9ooVrP1hQOGccfBbP5tJWZ1\\_hv5sIUWJI](https://www.youtube.com/watch?v=LlhmzVL5bm8&list=PL9ooVrP1hQOGccfBbP5tJWZ1_hv5sIUWJI)

## 3.SPECIFIC LEARNING OUTCOMES (SLO)

Unit / Section	Course Contents	Learning Outcomes	Highest Bloom’s Taxonomic Level of Transaction
<b>I</b>	<b>Introduction to Internet of Things</b>		
1.1	<b>Introduction to Internet of Things:</b> Introduction – Physical Design of IoT – Logical Design of IoT – IoT Enabling Technologies – IoT Levels & Deployment Templates.	Tell Introduction of IoT Demonstrate the designs of IoT Explain IoT enabling technologies Compare different levels and Deployment Templates of IoT	K2
	<b>II Domain Specific IoTs</b>		
2.1	<b>Domain Specific IoTs:</b> Introduction – Home automation – Cities – Environment – Energy – Retail – Logistics – Agriculture – Industry – Health & Lifestyle	Applications of IoT Identify IoT in different domains Make use of IoT in all domains	K3

2.2	<b>IoT and M2M:</b> Introduction – M2M – Difference between IoT and M2M – SDN and NFV for IoT – Software Defined Networking – Network Function Virtualization.	Apply M2M in IoT Identify the difference between IoT and M2M Make use of SDN and NFV for IoT Organize SDN and NFV	K3
<b>III IoT Platforms Design Methodology</b>			
3.1	<b>IoT Platforms Design Methodology:</b> Introduction – IoT Design Methodology	Analyze design methodology of IoT Discover the steps involved in IoT Design Methodology	K4
3.2	<b>IoT Physical Devices and Endpoints:</b> What is an IoT device – Exemplary Device:	Analyze the devices and endpoints of IoT List the other IoT Devices	
	Raspberry Pi – About the Board – Linux on Raspberry Pi – Raspberry Pi Interfaces – Programming Raspberry Pi with Python – Other IoT devices.	Distinguish different IoT devices Examine how to program Raspberry Pi with Python	K4
<b>IV Case Studies Illustrating IoT Design</b>			
4.1	<b>Case Studies Illustrating IoT Design:</b> 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.	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
<b>V Data Analytics for IoT</b>			
5.1	<b>Data Analytics for IoT:</b> Introduction – Apache Hadoop – Using Hadoop MapReduce for Batch Data Analysis – Apache Oozie – Apache Spark – Apache Storm – Using Apache Storm for Real-time data analysis.	Build Data analytics application for IoT using Apache Hadoop Elaborate Apache Oozie, Spark and Storm Construct Real-time data analysis using Apache Storm	K6
5.2	<b>Tools for IoT:</b> Introduction – Chef – Chef case studies – Puppet – Puppet case study.	Discuss Tools for IoT Formulate Chef case study Adapt puppet Case study	K6

#### 4.MAPPING (CO, PO, PSO)

P21IT308	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 Course – IX: CLOUD COMPUTING

Semester - III  
CREDITS: 5

COURSE CODE : P21IT309  
HOURS/WEEK: 5

### 1. COURSE OUTCOMES

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

CO. No.	Course Outcomes	Level	Unit
CO1	Summarize the fundamentals and essentials. of Cloud Computing	K2	I
CO2	Review various cloud computing concepts and technologies	K3	I
CO3	Explain the services and fundamentals of Hadoop	K3	II
CO4	Design and development of Cloud applications	K4	III
CO5	Determine data center and business Applications	K5	IV
CO6	Understanding various concepts on Cloud security	K6	V

### 2. A. SYLLABUS

#### UNIT – 1: Introduction and Concepts

15 Hours

Introduction–Characteristics–Cloud Models–Cloud Services Examples–Cloud - based Services and Applications– **Cloud Concepts and Technologies:-** Virtualization– Load Balancing– Scalability and Elasticity– Deployment– Replication– Monitoring– Software Defined Networking Network Function Virtualization–Map Reduce–Identity and Access Management–Service Level Agreements-Billing.

#### UNIT – 2: Cloud Services and Platforms

15 Hours

Compute Services – Storage Services – Database Services – Application Services – Content Delivery Services – Analytics Services – Deployment and Management Services – Identity and Access Management Services – Open Source Private Cloud Software – **Hadoop and MapReduce** : - Apache Hadoop – Hadoop MapReduce Job Execution – Hadoop Schedulers – Hadoop Cluster Setup.

#### UNIT – 3: Cloud Application Design

15 Hours

Introduction– Design Consideration for Cloud Applications – Reference Architecture for Cloud Applications – Cloud Application Design Methodologies – Data Storage Approaches – **Python for Cloud** – Python for Amazon Web Services – Python for Google Cloud Platform – Python for Windows Azure – Python for MapReduce – Python Packages of Interest – Python Web Application Framework (Django). – **Cloud Application Development in Python:** - Design Approaches – Image Processing App – Document Storage App – MapReduce App – Social Media Analytics App.

#### UNIT – 4: Big Data Analytics

15 Hours

Introduction – Clustering Big Data – Classification of Big Data – Recommendation Systems – **Multimedia Cloud:** - Introduction – Case Study: Live Video Streaming App – Streaming Protocols – Case Study: Video Transcoding App – **Cloud Application Benchmarking and Tuning:** - Introduction – Workload Characteristics – Application Performance Metrics – Design Considerations for a Benchmarking Methodology – Benchmarking Tools – Deployment Prototyping – Load Testing and Bottleneck Detection Case Study – Hadoop Benchmarking Case Study.

#### UNIT – 5: Cloud Security

15 Hours

Introduction–CSA Cloud Security Architecture–Authentication–Authorization–Identity and Access Management– Data Security– Key Management– Auditing– **Cloud for Industry,**

**Healthcare & Education:-** Cloud Computing for Healthcare–Cloud Computing for Energy Systems–Cloud Computing for Transportation Systems–Cloud Computing for Manufacturing Industry–Cloud Computing for Education.

## 2.C. TEXT BOOK

1. Arshdeep Bahga, Vijay Madiseti, “**Cloud Computing – A Hands-on Approach**”, Universities Press (India) Pvt. Ltd., Hyderabad, 2014.

## 2.D. REFERENCE BOOKS

1. Rajkumar Buyya, James Broberg, Andrzej Goscinsky, “**Cloud Computing Principles and Paradigms**”, Wiley India Pvt. Ltd., 2011.
2. Barrie Sosinsky, “**Cloud Computing Bible**”, 1<sup>st</sup> Edition, Wiley India Pvt. Ltd., New Delhi, 2011.

## 2.E. Web Links:

1. [https://onlinecourses.nptel.ac.in/noc20\\_cs20/preview](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
<b>I</b>	<b>INTRODUCTION AND CONCEPTS</b>		
1.1	Introduction–Characteristics–Cloud Models–Cloud Services Examples–Cloud - based Services and Applications–	Define the cloud computing(K1) Summarize the characteristics of Cloud(K2) Explain cloud service and Application(K6)	K3
1.2	<b>Cloud Concepts and Technologies:-</b> Virtualization– Load Balancing– Scalability and Elasticity– Deployment– Replication– Monitoring– Software Defined Networking Network Function Virtualization–Map Reduce–Identity and Access Management–Service Level Agreements-Billing.	Recall virtualization(K3)	
		Explain Load Balancing (K6)	
		Construct scalability and Elasticity(K3)	
		Classify deployment(K3)	
		Apply Replication(K3)	
		Construct software defined networking(K3)	
		Interpret Network Function	

		Virtualization (K2)	
		Examine Map Reduce(K4)	
		Build Identity and Access Management (K3)	
		Explain Service Level Agreements (K2)	
		Classify billing of cloud concept. (K2)	
<b>II</b>	<b>CLOUD SERVICES AND PLATFORMS</b>		
2.1	Compute Services – Storage Services – Database Services – Application Services – Content Delivery Services – Analytics Services – Deployment and Management Services – Identity and Access Management Services – Open Source Private Cloud Software	Explain Compute Services (K3)	K3
		Classify Storage Services (K3)	
		Categorize database Service (K4)	
		Construct different Application service (K2)	
		Summarize Content Delivery Services (K2)	
		Recall Analytics Services(K1)	
		Summarize Deployment and Management Services(K2)	
		Illustrate an Identity and Access Management Services(K2)	
		List Open Source Private Cloud Software()	
2.2	<b>Hadoop and MapReduce</b> :Apache Hadoop – Hadoop MapReduce Job Execution – Hadoop Schedulers – Hadoop Cluster Setup.	Classify Apache Hadoop (K4)	
		Summarize Hadoop MapReduce Job Execution (K2)	
		Show Hadoop Schedulers (K1)	
		Explain Hadoop Cluster Setup(K2)	
<b>III</b>	<b>CLOUD APPLICATION DESIGN</b>		



3.1	Introduction– Design Consideration for Cloud Applications – Reference Architecture for Cloud Applications – Cloud Application Design Methodologies – Data Storage Approaches –	Define (K1)	K4
3.2	<b>Python for Cloud</b> – Python for Amazon Web Services – Python for Google Cloud Platform – Python for Windows Azure – Python for MapReduce – Python Packages of Interest – Python Web Application Framework (Django).	Develop Python for Amazon Web Services (K6)	
		Classify Python for Google Cloud Platform (K4),	
		Experiment Python for Windows Azure (K4).	
		Interpret Python Packages of Interest	
		Develop Python for MapReduce (K6)	
		Examine Python Web Application Framework (Django).	
3.2	<b>Cloud Application Development in Python:</b> - Design Approaches – Image Processing App – Document Storage App – MapReduce App – Social Media Analytics App.	Recall Design Approaches (K1)	
		Classify Image Processing App (K4)	
		Make use of Social Media Analytics App. (K3)	
<b>IV</b>	<b>BIG DATA ANALYTICS</b>		
4.1	Introduction – Clustering Big Data – Classification of Big Data – Recommendation Systems –	Apply Clustering Big Data (K3).	K5
		Classify Classification of Big Data (K5)	
		Construct Recommendation Systems (K6)	
4.2	<b>Multimedia Cloud:</b> - Introduction – Case Study: Live Video Streaming App – Streaming Protocols – Case Study: Video Transcoding App	Experiment with Live Video Streaming App (K5)	
		Develop. Streaming Protocols (K3)	
		Inspect. Streaming Protocols (K3)	

4.3	<b>Cloud Application Benchmarking and Tuning:</b> - Introduction – Workload Characteristics – Application Performance Metrics – Design Considerations for a Benchmarking Methodology – Benchmarking Tools – Deployment Prototyping – Load Testing and Bottleneck Detection Case Study – Hadoop Benchmarking Case Study.	Discover Workload Characteristics (K4)	
		Construct Application Performance Metrics (K3)	
		Design Considerations for a Benchmarking Methodology (K6)	
		Examine Benchmarking Tools (K4)	
		Plan Deployment Prototyping(K3)	
		Develop Load Testing and Bottleneck Detection Case Study (K6)	
<b>V</b>	<b>CLOUD SECURITY</b>		
5.1	Introduction–CSA Cloud Security Architecture–Authentication– Authorization–Identity and Access Management– Data Security– Key Management– Auditing	Describe (K6)	K6
Classify CSA Cloud Security Architecture (K4)			
Categorize Authentication (K4)			
Evaluate Authorization (K5)			
Design Identity and Access Management			
Construct Data Security– Key Management– Auditing			
5.2	<b>Cloud for Industry, Healthcare &amp; Education:-</b> Cloud Computing for Healthcare–Cloud Computing for Energy Systems–Cloud Computing for Transportation Systems–Cloud Computing for Manufacturing Industry– Cloud Computing for Education.	Originate Cloud Computing for Healthcare (K6).	
Discuss Cloud Computing for Energy Systems (K6)			
Analyze Cloud Computing for Transportation Systems (K4)			

		Design Cloud Computing for Manufacturing (K6)	
		Estimate Industry-Cloud Computing for Education. (K6)	

#### 4.MAPPING SCHEME FOR THE PO, PSOS AND COS

P21IT3 09	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	PSO 4
CO1	H	H	H	H	H	H	H	H	H	H	M	H	H
CO2	H	H	H	H	H	H	H	M	H	H	M	H	H
CO3	H	H	H	H	H	H	H	H	H	M	H	H	H
CO4	H	H	H	H	H	H	H	H	H	M	H	H	H
CO5	M	M	M	H	H	H	H	H	H	M	H	H	H
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, Poster Presentation, Seminar, Quiz (written).
4. Pre-Semester & End Semester Theory Examination

##### INDIRECT:

1. Course end survey (Feedback)

## Core Practical Course – V : PYTHON PROGRAMMING LAB

SEMESTER:III

C

COURSE CODE : P21IT3P5

CREDITS: 3

HOURS /WEEK: 6

### 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	1-4
CO2	Construct the program using built in functions of List and string	K3	5,6
CO3	Test for mapping using Dictionary	K4	7, 8
CO4	Asses the execution speed of the program using recursion	K5	9, 10
CO5	Demonstrate Database and Networking Connectivity	K5	11, 12
CO6	Develop GUI and Web Programming	K6	13, 14

### 2.A.SYLLABUS

Ex.No	Exercises
1	Program to demonstrate basic operations.
2	Program using control statement.
3	Program using user defined functions.
4	Program to demonstrate string manipulation.
5	Program using lists.
6	Program using tuples
7	Program using Dictionaries
8	Program using File Manipulations
9	Program to demonstrate exception handling.
10	Programs using classes and objects
11	Program using databases
12	Program to implement Socket programming
13	Program to demonstrate GUI programming
14	Program to demonstrate web programming.

### 2.B. Topics for Self Study

S.No.	Topics	Web Links
1	Create and import user defined module	<a href="https://www.programiz.com/python-programming/modules">https://www.programiz.com/python-programming/modules</a>
2	Create a Python program to	<a href="https://www.edureka.co/blog/python-program-merge-">https://www.edureka.co/blog/python-program-merge-</a>

	implement merge sort	sort/
3	Create a Python program to implement linked list	<a href="https://www.edureka.co/blog/linked-list-in-python/">https://www.edureka.co/blog/linked-list-in-python/</a>
4	Create a program to find the transpose of the given matrix	<a href="https://www.tutorialspoint.com/python-program-to-find-the-transpose-of-a-matrix/">https://www.tutorialspoint.com/python-program-to-find-the-transpose-of-a-matrix/</a>

### 3. SPECIFIC LEARNING OUTCOMES (SLO)

Ex. No.	Lab Exercises	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
1	<b>Program to demonstrate the Basic Operations</b> Calculate the average of numbers in a given list	<ul style="list-style-type: none"> <li>Choose decision making statements in Python</li> <li>Make use of arithmetic operators.</li> <li>Construct python program to calculate the sum and average</li> <li>Organize the flow of control.</li> <li>Plan the results.</li> </ul>	K3
2	<b>Program using Control Statements</b> Accept a three digits And print all possible combination from the digits	<ul style="list-style-type: none"> <li>Select the looping statement. Build a Python program to print all possible combination of digits.</li> <li>Develop a program to count the number of digits</li> <li>Organize the flow of control.</li> <li>Experiment with the results.</li> </ul>	K3
3	<b>Programs using user Defined Function</b> Generating Fibonacci numbers using recursive function	<ul style="list-style-type: none"> <li>Make use of recursive function.</li> <li>Build a Python program to print Fibonacci series of given integer value using recursion.</li> <li>Develop a program to find the length of the string and also flatten a nested list using recursion</li> <li>Experiment with the results..</li> </ul>	K3
4	<b>Programs to manipulate the string</b> Count the number of vowels in a string	<ul style="list-style-type: none"> <li>Apply string functions.</li> <li>Develop a Python program to count the number of vowels in a strings</li> <li>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.</li> <li>Construct the program to check common letters in two input string</li> <li>Experiment with the results.</li> </ul>	K3
5	<b>Programs Using List</b> Remove the duplicate items from a list	<ul style="list-style-type: none"> <li>Make use of list in Python</li> <li>Develop a Python program to remove the duplicate elements</li> <li>Construct a program to swap the first and last value and find the union and intersection of two list</li> </ul>	K3

		<ul style="list-style-type: none"> <li>Experiment with the results.</li> </ul>	
6	<b>Program using tuples</b> Find the minimum and maximum element in the tuple	<ul style="list-style-type: none"> <li>Make use of tuple in Python</li> <li>Develop a Python program to find the minimum and maximum element in tuple</li> <li>Construct a program to find the modulo of tuple elements</li> <li>Experiment with the results.</li> </ul>	K3
7	<b>Programs using Dictionary</b> Add a key-value pair to the dictionary	<ul style="list-style-type: none"> <li>List the Dictionary function.</li> <li>Examine a Python program to add a key-value pair to the Dictionary</li> <li>Inspect a program to map two lists into dictionary and also find the sum of all the items in dictionary</li> <li>Test the results.</li> </ul>	K4
8	<b>Programs using File Manipulations</b> Count the number of words in a text file.	<ul style="list-style-type: none"> <li>Determine the file operations.</li> <li>Interpret a Python program to count the number of words in a Text file</li> <li>Justify a program to copy the contents of one file into another file and also display the content of file in reverse order</li> <li>Evaluate the results.</li> </ul>	K4
9	<b>Program to demonstrate exception handling.</b> Handle Multiple Exceptions	<ul style="list-style-type: none"> <li>Determine the Keywords of Exception Handling</li> <li>Interpret a Python program to Handle multiple exception</li> <li>Justify a program to create a user defined exception</li> <li>Evaluate the results.</li> </ul>	K5
10	<b>Programs using classes and objects</b> Create a class which performs basic calculator operations	<ul style="list-style-type: none"> <li>Construct classes and objects.</li> <li>Develop a Python program to create a class which performs basic calculator operations.</li> <li>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</li> <li>Test the results.</li> </ul>	K5
11	<b>Program using databases</b> Establish database connection with MySQL to create and manipulate employee records	<ul style="list-style-type: none"> <li>Construct the python Database connectivity with MySQL</li> <li>Develop a Python program to create and manipulate employee records</li> <li>Create a student table to perform DML operations</li> <li>Test the results.</li> </ul>	K5

12	<b>Program to implement Socket programming</b> Implement client server communication using TCP	<ul style="list-style-type: none"> <li>Select the built in methods of Socket Module</li> <li>Develop a Python program to establish the connection between client and server using TCP</li> <li>Create a program to transfer file using FTP</li> <li>Test the results</li> </ul>	K5
13	<b>Program to demonstrate GUI programming</b> Implement the basic calculator	<ul style="list-style-type: none"> <li>Choose the appropriate widgets from Tkinter</li> <li>Develop a Python program to create a basic calculator operations.</li> <li>Create a Python program to design a login form using Tkinter</li> <li>Test the results</li> </ul>	K6
14	<b>Program to demonstrate web programming.</b> Design an application for online registration form	<ul style="list-style-type: none"> <li>Choose the appropriate tag from Gtml</li> <li>Develop a Python program to create an online registration form .</li> <li>Create a Python program to a feedback form using CGI</li> <li>Test the results</li> </ul>	K6

#### 4.MAPPING (CO, PO, PSO)

P21IT3 P5	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)

1.

## Core Practical VI: INTERNET OF THINGS LAB

SEMESTER: III  
CREDITS: 3

COURSE CODE: P21IT3P6  
HOURS/WEEK 5

### 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	<a href="https://create.arduino.cc/projecthub/chanhj/water-quality-monitoring-system-ddcb43?ref=tag&amp;ref_id=iot&amp;offset=2">https://create.arduino.cc/projecthub/chanhj/water-quality-monitoring-system-ddcb43?ref=tag&amp;ref_id=iot&amp;offset=2</a>
2	IoT Pet Feeder	<a href="https://create.arduino.cc/projecthub/circuito-io-team/iot-pet-feeder-10a4f3?ref=tag&amp;ref_id=iot&amp;offset=3">https://create.arduino.cc/projecthub/circuito-io-team/iot-pet-feeder-10a4f3?ref=tag&amp;ref_id=iot&amp;offset=3</a>
3	IOT Smart Energy Grid	<a href="https://nevonprojects.com/iot-smart-energy-grid/">https://nevonprojects.com/iot-smart-energy-grid/</a>
4	IOT Car Parking System	<a href="https://nevonprojects.com/iot-car-parking-system/">https://nevonprojects.com/iot-car-parking-system/</a>

### 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"> <li>• Construct a module with Raspberry Pi, Potentiometer and LED</li> <li>• Apply python programming to interface with GPIO in Pi</li> <li>• Identify the output from analog and digital ports</li> </ul>	K3
2	Interfacing 7 Segment RGB LED.	<ul style="list-style-type: none"> <li>• Construct a module with Raspberry Pi, 7 Segment Display and RGB LED</li> <li>• Apply python programming to interface with GPIO in Pi</li> <li>• Identify the output from 7 Segment display and RGB LED</li> </ul>	K3
3	Temperature Measurement with LCD Interface.	<ul style="list-style-type: none"> <li>• Construct a module with Raspberry Pi, Temperature Sensor and 6x4 LCD display</li> <li>• Apply python programming to interface with GPIO in Pi</li> <li>• Identify the output from temperature sensor and display in LCD display</li> </ul>	K3
4	Interfacing DC Motor, Stepper Motor and Servo Motors.	<ul style="list-style-type: none"> <li>• Analyze DC motor, Stepper motor and Servo motor</li> <li>• Examine the motors interfacing with Raspberry pi</li> <li>• Test for the results from DC motor, Stepper motor and Servo motor</li> </ul>	K4
5	IR Remote and IR Receiver Interfacing.	<ul style="list-style-type: none"> <li>• Analyze IR receiver and remote</li> <li>• Examine the IR sensor and interface with Raspberry Pi</li> <li>• Test for the results to manually change the IR remote operation</li> </ul>	K4
6	Interfacing Wi-Fi and GSM with Controllers	<ul style="list-style-type: none"> <li>• Evaluate Wi-Fi and GSM module</li> <li>• Conclude the connections with Raspberry Pi Using Python</li> <li>• Determine the result from Wi-Fi module as control</li> <li>• Determine the result from GSM module as text messages</li> </ul>	K5

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

#### 4. MAPPING (CO, PO, PSO)

P21IT3P6	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:

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-IV A: SOFTWARE ENGINEERING

**SEMESTER: III**

**COURSE CODE: P21IT3:4**

**CREDITS: 4**

**HOURS/WEEK:4**

### 1. COURSE OUTCOMES:

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

<b>CO. No.</b>	<b>Course Outcomes</b>	<b>Leve I</b>	<b>Unit</b>
<b>CO1</b>	Tells the members and Needs of Software Engineering.	K1	I
<b>CO2</b>	Recall the process modeling and Life cycle of Software Engineering.	K1	I
<b>CO3</b>	Identify how to plan and manage the project.	K3	II
<b>CO4</b>	Examine the requirement specification notations.	K4	III
<b>CO5</b>	Interpret the architectural styles, standards and procedures.	K5	IV
<b>CO6</b>	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	<a href="https://www.ecpi.edu/blog/most-important-technological-advances-software-developers">https://www.ecpi.edu/blog/most-important-technological-advances-software-developers</a>
2	Cleanroom software development	<a href="https://www.youtube.com/watch?v=XNENtRpYy2o">https://www.youtube.com/watch?v=XNENtRpYy2o</a>
3	Apply Software engineering concepts in Web application	<a href="https://www.youtube.com/watch?v=rwGTkaUuzXQ">https://www.youtube.com/watch?v=rwGTkaUuzXQ</a>
4	Agile software development life cycle	<a href="https://relevant.software/blog/agile-software-development-lifecycle-phases-explained">https://relevant.software/blog/agile-software-development-lifecycle-phases-explained</a>

**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:**

- <http://www.qucis.queensu.ca/Software-Engineering/reading.html>  
<http://infolab.stanford.edu/~burback/watersluice/watersluice.html>  
<https://www.youtube.com/watch?v=sB2iQSvrcG0>  
<https://www.youtube.com/watch?v=4b1D1QFEel0>

**3.SPECIFIC LEARNING OUTCOMES (SLO):**

Unit ctio n	Course Content	Learning Outcomes	Highest Bloom’s Taxonomic Level of Transactio n
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) Tell the tools and techniques used for software engineering.(K1)	
		Identify the members of the development team.(K3)	K1
	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)	
<b>II Planning and managing the project</b>			
2.1	Planning and managing the project: Tracking progress – Project personnel – Effort estimation.	Plan and schedule the project.(K6) Identify the persons involved in the project.(K3) Estimate effort involved while managing the project.(K6)	K1
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)	
<b>III Capturing the requirements</b>			
3.1	Capturing the requirements: The requirement process – Types of Requirements – Characteristics of requirements – Expressing requirements – Additional requirements notations – Prototyping requirements	Define the process requirements.(K1)	K3
		Tells how to express and characterize the requirements.(K1)	
		Inspect the captured notation.(K4)	
		Create the prototype for the captured requirement.(K6)	
3.2	Requirements Documentation – Participants in the requirements	Explain the people who participate in the requirement.(K2)	

	process – Requirements validation – Measuring requirements – Choosing requirements specification Techniques.	Illustrate the requirement in the form of documentation.(K2)	
		Classify the requirement specification.(K2)	
		Explain the requirements using specification techniques.(K2)	
<b>IV</b>	<b>Designing the system</b>		
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)	
<b>V</b>	<b>Testing Strategies</b>		
5.1	Testing Strategies: 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	Build the various types of testing done on software.(K5)	K6
		Choose the testing strategies for projects.(K3)	
		Plan appropriate testing for developed software.(K3)	
		Create functional and nonfunctional testing.(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)

P21IT3: 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: P21IT3: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	Analyze 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

**12 Hours**

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	<a href="https://www.edureka.co/blog/software-testing-strategies/">https://www.edureka.co/blog/software-testing-strategies/</a>
2	Strategy along with testcase design	<a href="https://reqtest.com/testing-blog/test-case-design-techniques/">https://reqtest.com/testing-blog/test-case-design-techniques/</a>
3	Testing Principles	<a href="https://www.guru99.com/software-testing-seven-principles.html">https://www.guru99.com/software-testing-seven-principles.html</a>
4	Concepts of testing	<a href="https://techazzist.wordpress.com/2012/05/04/basic-concepts-of-software-testing/">https://techazzist.wordpress.com/2012/05/04/basic-concepts-of-software-testing/</a>
5	Strategies and tactics for Extreme programming.	<a href="http://agilemodeling.com/essays/agileModelingXP.htm">http://agilemodeling.com/essays/agileModelingXP.htm</a>

**2.C. Text Book(s):**

1. Srinivasan Desikan, Gopalswamy 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](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
<b>I</b>	<b>Software Development Life Cycle Models, White Box, Black Box Testing</b>		
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) Outline the various process models for software development.(K2)	K1
		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) 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) Identify why, when, where and how to do black box testing.(K3)	
<b>II</b>	<b>Integration, System and Acceptance Testing</b>		
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) Relate the testing with the previous and next phase.(K1) Identify the bugs and send them to the development team.(K3)	K2
2.2	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.	Defines the importance of system testing.(K1) Explain the functional and non-functional testing.(K2) Identify the satisfactory level of testing.(K3) Tell the test plan in each phase.(K1)	
<b>III</b>	<b>Performance and Regression Testing</b>		

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)	
<b>IV</b>	<b>Internationalization (I18n) Testing, Ad hoc Testing and Usability and Accessibility Testing</b>		
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)	
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 do Usability Testing? – How to Achieve Usability? – Quality Factors – Aesthetics Testing – Accessibility Testing – Tools – Lab Setup – Test Roles	Define usability testing.(K1)	
		When, how to achieve usability.(K1)	
		Outline the quality factors.(K2)	
		Identify tools and lab setup of testing.(K3)	
		Apply aesthetic and accessibility testing.(K3)	
<b>V</b>	<b>Test Planning, Management, Execution and Reporting, Software Test Automation</b>		

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)	K6
		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)

P21IT3: 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**

**CREDITS: 4**

**COURSE CODE: P21IT3: B**

**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 Contracts – 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	<a href="https://xbosoft.com/definition-software-quality/">https://xbosoft.com/definition-software-quality/</a>
2	Software Measures	<a href="https://www.tutorialspoint.com/software_quality_management/software_quality_measurement_metrics.htm">https://www.tutorialspoint.com/software_quality_management/software_quality_measurement_metrics.htm</a>
3	Product Vs. Process Quality Management.	<a href="https://www.ease.io/manufacturing-quality-control-the-difference-between-product-and-process-audits/">https://www.ease.io/manufacturing-quality-control-the-difference-between-product-and-process-audits/</a>
4	External Standards.	<a href="https://www.gristprojectmanagement.us/software-2/external-standards.html">https://www.gristprojectmanagement.us/software-2/external-standards.html</a>

**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 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) Illustrate the activities covered in the project.(K2) Identify what should be included in project.(K3) Organize the activities of the project plan.(K3)	K1
<b>II Project Evaluation</b>			
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) 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)	K2
<b>III Activity Planning</b>			
3.1	Activity Planning: Objectives – Project Schedule – Sequencing and Scheduling Activities –Network	What are the objectives of the project proposed?(K1)	
	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.	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)	K3
<b>IV Monitoring and Control</b>			
4.1	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	Explain the structure of the system.(K2) Identify the data required for development.(K3) Classify the priority according to importance.(K2) Construct the contracts for developing subsystems.(K6)	K5

	Management – Acceptance.	Demonstrate the stages in contract.(K2)	
<b>V</b>	<b>Managing People and Organizing Teams</b>		
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)

P21IT3: B	P O1	O 2	O 3	O 4	O 5	O 6	O 7	O 8	O 9	PS O 1	PS O 2	PS O 3	PS O 4	PS O
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)



## COURSE – X: BIG DATA ANALYTICS

**SEMESTER: 1V**  
**CREDITS : 5**

**COURSE CODE : P21IT410**  
**HOURS/WEEK: 6**

### 1. COURSE OUTCOMES

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

CO. No.	Course Outcome	Level	Unit
CO1	Explain the building blocks of Big Data. Identify Big Data and its Business Implications	K2	I
CO2	Examine the big data using intelligent techniques.	K3	II
CO3	Explain access and process Data on Distributed File System	K4	III
CO4	List the components of Hadoop and Hadoop Eco-System		
CO5	Discuss programming tools PIG & HIVE in Hadoop echo system.	K6	III
CO6	Explain the applications using Map Reduce Concepts	K5	IV

### 2. A. SYLLABUS

#### UNIT – 1: Introduction to Big Data

**12 Hours**

Introduction to Big Data: Characteristics and Types of Digital Data: Unstructured, Semi- structured and Structured - Introduction to Big Data - Sources of Big Data - Characteristics and Necessity of Big Data – Big Data Terminologies – Big Data Architecture - Challenges of Big Data – Data Environment Vs Big Data Environment – Data in Data warehouse Vs Hadoop Environment - Key Roles for the New Big Data Ecosystem - Big Data Applications.

#### UNIT – 2: Introduction to Big Data Analytics

**12 Hours**

Introduction to Big Data Analytics: Big Data Analytics - Business Intelligence Vs Data Science, Different types of Analytics: Current Analytical Architecture, Drivers of Big Data, Emerging Big Data Ecosystem and a New Approach to Analytics – Classification of Analytics – Data Analytics Life Cycle – IBM Big Data Strategy - Data Scientist: Skills and Responsibilities.

#### UNIT – 3: Big Data Management

**12 Hours**

Big Data Management: Introduction to NoSQL Database– Features – Types of NoSQL Database – Merits and Demerits of NoSQL – Applications – Introduction to NewSQL , MangoDB and Apache Cassandra– Needs and Characteristics - SQL Vs NoSQL Vs NewSQL. - **Big Data Use Cases:** Patterns for Big Data Deployment: IT for IT Log Analytics, Fraud Detection Pattern, the Social Media Pattern, Big Data and Energy Sector, Risk Patterns for Modelling and Management.

#### UNIT – 4: Introduction to Hadoop

**12 Hours**

Introduction to Hadoop: Features – Advantages–Versions – Hadoop Ecosystem – Hadoop Architecture - Hadoop Distributions – Hadoop Vs SQL – DBMS Vs Hadoop. **Big Data: From the Technology Perspective:** Application Development in Hadoop: Pig and PigLatin – Hive – Jaql – Getting Data into Hadoop: Basic Copy Data – Flume – Other Hadoop Components: Zookeeper – Hbase – Oozie –Lucene – Avro.

#### UNIT – 5: Hadoop Distributed File System

**12 Hours**

Hadoop Distributed File System: Design – Concepts – Command Line Interface- Hadoop File System: Interfaces: HTTP, C and FUSE. MapReduce – Types- Input and Output Formats – Features. Introduction to YARN: Components – Applications. Data Serialization in Hadoop.

## 2.B. Topics for Self Study:

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

## 2.C. Text Book(s):

1. Seema Acharya, Subhashini Chellappan, “**Big Data and Analytics**”, Wiley Publication, 2016.
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 Judith Hurwitz, Alan Nugent, Dr. Fern Halper, Marcia Kaufman, “**Big Data for Dummies**”, John Wiley & Sons, Inc., 2013.
- 2 Tom White, “**Hadoop: The Definitive Guide**”, O’Reilly Publications, 2011.

## 2.E. Web Links:

1. [www.tutorialspoint.com](http://www.tutorialspoint.com)
2. [www.guru99.com](http://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	
<b>I</b>	<b>Introduction to Big Data</b>		
1.1	Characteristics and Types of Digital Data: Unstructured, Semi- structured and Structured - Introduction to Big Data - Sources of Big Data - Characteristics and Necessity of Big Data – Big Data Terminologies – Big Data Architecture - Challenges of Big Data – Data Environment Vs Big Data Environment – Data in Data warehouse Vs Hadoop Environment - Key Roles for the New Big Data Ecosystem - Big Data Applications.	Recall database.(K1)	
		Outline data mining concepts (K2)	
		Classify the different types of data.(K2)	
		Determine the evolution of Big Data.(K5)	
		Relate Data Mining, data warehouse and Big Data.(K2)	
		List out the importance of Big Data.(K4)	
		Discuss the challenges in huge volume of data.(K6)	
		Explain the components of Big data Architecture.(K2)	

		Explain the applications of Big Data.(K5)	
		Relate Data Warehouse with Hadoop system.(K2)	
		Summarize the major issues in data mining.(K2)	
		Compare the advantages of Data mining, data warehouse and Big data Eco system.(K4)	
<b>II</b>	<b>Introduction to Big Data Analytics</b>		
2.1	Big Data Analytics - Business Intelligence Vs Data Science, Different types of Analytics: Current Analytical Architecture, Drivers of Big Data, Emerging Big Data Ecosystem and a New Approach to Analytics – Classification of Analytics – Data Analytics Life Cycle – IBM Big Data Strategy - Data Scientist: Skills and Responsibilities.	What is Big Data Analytics?(K1)	
		Explain types of analytics.(K5)	
		Discuss Analytical Architecture.(K6)	
		Examine types of drivers in Big Data (K4).	
		List the responsibilities of Data Scientist. (K4)	
		Discuss the strategies in IBM. (K5)	
<b>III</b>	<b>Big Data Management</b>		
3.1	Introduction to NoSQL Database– Features – Types of NoSQL Database– Merits and Demerits of NoSQL – Applications – Introduction to NewSQL , MangoDB and Apache Cassandra– Needs and Characteristics - SQL Vs NoSQL Vs NewSQL. - <b>Big Data Use Cases:</b> Patterns for Big Data Deployment: IT for IT Log Analytics, Fraud Detection Pattern, the Social Media Pattern, Big Data and Energy Sector, Risk Patterns for Modelling and Management.	Recall types of Database.(K1)	
		Examine the features of NoSQL(K2)	
		Classify the types of NoSQL.(K4)	
		Explain applications of NoSQL.(K5)	
		Compare SQL Vs NoSQL Vs NewSQL (K4)	
		Discuss the IT for IT Log use case of Big data.(K6)	
		How is big data handled effectively in social media?(K1)	
Prioritize information management challenges in big data.(K5)			
<b>IV</b>	<b>Introduction to Hadoop</b>		
	Features – Advantages–Versions – Hadoop Ecosystem – Hadoop	Discuss the history of Hadoop.(K6)	

4.1	Architecture - Hadoop Distributions – Hadoop Vs SQL – DBMS Vs Hadoop. <b>Big Data: From the Technology Perspective:</b> Application Development in Hadoop: Pig and PigLatin – Hive – Jaql – Getting Data into Hadoop: Basic Copy Data – Flume – Other Hadoop Components: Zookeeper – Hbase – Oozie –Lucene	Compare data in warehouse, SQL vs DBMS and Hadoop.(K5)	
		How Hadoop is well suited for Big data Insights.(K1)	
		Explain various components used in Hadoop system.(K5)	
		Discuss built -in functions in Jaql.(K6)	
		List of the steps of Pig Latin operations.(K4)	
		Compare Hive database system with normal database.(K5)	
<b>V</b>	Hadoop Distributed File System		
5.1	Design – Concepts – Command Line Interface- Hadoop File System: Interfaces: HTTP, C and FUSE. MapReduce – Types- Input and Output Formats – Features. Introduction to YARN: Components – Applications. Data Serialization in Hadoop.	Compare Name node and server node in Hadoop File system.(K4)	
		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)	
		Discuss Data serialization in HDFS.(K6)	
		Classify I/O Formats (K4)	
		Explain the necessity of YARN and its components. (K5)	

#### 4.MAPPING (CO, PO, PSO)

<b>P2IIT4 10</b>	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PO 8</b>	<b>PO 9</b>	<b>PS O 1</b>	<b>PS O 2</b>	<b>PSO 3</b>	<b>PSO 4</b>
CO1	L	L	L	M	H	L	H	M	L	H	L	M	M
CO2	L	L	M	M	H	L	L	L	M	L	M	H	H
CO3	L	L	H	M	M	M	L	L	M	L	H	L	L
CO4	M	L	L	L	L	L	L	L		L	M	L	L
CO5	L	M	H	H	M	M	L	L	M	L	H	H	H
CO6	L	M	L	L	M	L	L	L	M	M	H	L	M

**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, Poster Presentation, Seminar, Quiz(written).

### **INDIRECT:**

1. Course-end survey.(Feedback)

## Elective - V: MACHINE LEARNING

SEMESTER: IV  
CREDITS: 4

COURSE CODE: P21IT4:5  
HORUS/WEEK: 4

### 1. COURSE OUTCOMES

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

S.No.	Course Outcomes	Level	Unit
1	Understanding the ability to identify the relevant algorithms for a specific application.	K1	I
2	Compare the Parametric and Multivariate methods	K2	II
3	Identify the concept behind Dimensionality reduction and clustering	K3	III
4	Categorize Decision trees and Rule based models	K4	IV
5	Build the advanced learning rules	K5	V
6	Improve the usage of Reinforcement learning techniques	K6	V

### 2.A. SYLLABUS

#### UNIT – 1: Introduction

12 Hours

What Is Machine Learning?- Examples of Machine Learning Applications- Supervised Learning: Vapnik-Chervonenkis (VC) Dimension- Probably Approximately Correct (PAC) Learning- Noise- Regression- Dimensions of a Supervised Machine Learning Algorithm- Bayesian Decision Theory: Classification- Utility Theory- Association Rules

#### UNIT – 2: Parametric Methods

12 Hours

Maximum Likelihood Estimation- The Bayes' Estimator- Parametric Classification- Regression Model Selection Procedures. Multivariate Methods: Multivariate Data- Parameter Estimation- Estimation of Missing Values- Multivariate Classification- Tuning Complexity

#### UNIT – 3: Dimensionality Reduction

12 Hours

Subset Selection- Principal Components Analysis- Factor Analysis- Multidimensional Scaling Linear Discriminant Analysis- Isomap. Clustering: Mixture Densities- k-Means Clustering- Expectation-Maximization Algorithm- Mixtures of Latent Variable Models- Supervised Learning after Clustering- Hierarchical Clustering- Choosing the Number of Clusters.

#### UNIT – 4: Decision Trees

12 Hours

Univariate Trees- Pruning- Rule Extraction from Trees- Learning Rules from Data- Multivariate Trees. Local Models: Radial Basis Functions- Incorporating Rule-Based Knowledge- Normalized Basis Functions. Bayesian Estimation: Estimating the Parameter of a Distribution- Bayesian Estimation of the Parameters of a Function

#### UNIT – 5: Advanced Learning

12 Hours

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	<a href="https://www.tutorialspoint.com/artificial_neural_network/artificial_neural_network_pdf_version.htm/">https://www.tutorialspoint.com/artificial_neural_network/artificial_neural_network_pdf_version.htm/</a>
2	Image recognition	<a href="https://towardsdatascience.com/deep-learning-for-image-classification-why-its-challenging-where-we-ve-been-and-what-s-next-93b56948fcef?gi=4e7bb8dc4b01/">https://towardsdatascience.com/deep-learning-for-image-classification-why-its-challenging-where-we-ve-been-and-what-s-next-93b56948fcef?gi=4e7bb8dc4b01/</a>
3	Sentiment Analysis	<a href="https://web.stanford.edu/class/cs124/lec/sentiment.pdf/">https://web.stanford.edu/class/cs124/lec/sentiment.pdf/</a>
4	Healthcare and Medical services	<a href="https://www.who.int/water_sanitation_health/hygiene/setting/hvchap10.pdf?ua=1/">https://www.who.int/water_sanitation_health/hygiene/setting/hvchap10.pdf?ua=1/</a>

## 2.C. Text Book(s):

1. Ethem Alpaydin, "Introduction to Machine Learning", Second Edition, The MIT Press, Cambridge, 2010.
2. Tom M. Mitchell, "Machine Learning", First Edition, McGraw Hill Education Private Ltd., 1997..

## 2.D. Reference Books:

1. Mehryar Mohri, Afshin Rostamizadeh, Ameet Talwalkar, "Foundations of Machine Learning", second edition, The MIT Press, 2018.

## 2.E. Website Link:

1. <https://nptel.ac.in/courses/106/106/106106139//>
2. <https://nptel.ac.in/courses/106/106/106106202//>

## 3.SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
<b>I</b>	<b>Introduction</b>		
<b>1.1</b>	What Is Machine Learning? - Examples of Machine Learning Applications- <b>Supervised Learning:</b> Vapnik-Chervonenkis (VC) Dimension- Probably Approximately Correct (PAC) Learning- Noise- Regression- Dimensions of a Supervised Machine Learning Algorithm- <b>Bayesian Decision Theory:</b> Classification- Utility Theory- Association Rules	Recall the concept of Machine learning(K1)	K2
		Infer the notions related to Supervised learning(K3)	
		Classify various approaches to comprehend the Decision theory based on Bayes algorithm(K4)	
<b>II</b>	<b>Parametric Methods</b>		

2.1	Maximum Likelihood Estimation- The Bayes' Estimator- Parametric Classification- Regression- Model Selection Procedures. <b>Multivariate Methods:</b> Multivariate Data- Parameter Estimation- Estimation of Missing Values- Multivariate Classification- Tuning Complexity	Analyze classification algorithms(K4) Categorize the models of evaluation and learning(K4) Discuss the steps of Multivariate estimation technique(K6)	K4
III	<b>Dimensionality Reduction</b>		
3.1	Subset Selection- Principal Components Analysis- Factor Analysis- Multidimensional Scaling- Linear Discriminant Analysis- Isomap. <b>Clustering:</b> Mixture Densities- k-Means Clustering- Expectation-Maximization Algorithm- Mixtures of Latent Variable Models- Supervised Learning after Clustering- Hierarchical Clustering- Choosing the Number of Clusters.	Justify the Principal Component Analysis(K5) Examine the Multidimensional scaling of data(K4) Implement dimensionality reduction using Isomap(K6) Observe the real-time application of Expectation Maximization Algorithm(K5)	K4
IV	<b>Decision Trees</b>		
4.1	Univariate Trees- Pruning- Rule Extraction from Trees- Learning Rules from Data- Multivariate Trees. Local Models: Radial Basis Functions- Incorporating Rule-Based Knowledge- Normalized Basis Functions. Bayesian Estimation: Estimating the Parameter of a Distribution- Bayesian Estimation of the Parameters of a Function	Investigate the learning rules incorporated based on the data(K1) Examine the Radial basis function(K4) Determine the Bayesian Estimation by the distribution of the parameters(K5)	K5
V	<b>Advanced Learning</b>		
5.1	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 – <b>Reinforcement Learning:</b> Task– Q-Learning – Temporal Difference Learning. Analytical Learning – Perfect Domain Theories – Explanation	Classify the different types of rules followed in learning sets(K4) Define the steps of sequential covering algorithm and FOCL algorithm(K1) Compare the various learning techniques(K5)	K6



	Base Learning – FOCL Algorithm – Reinforcement Learning –Task–Q-Learning – Temporal Difference Learning.		
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#### 4. MAPPING (CO, PO, PSO)

P21IT4:5	P O1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	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	L	L	L	H	M	M	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	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**

**- 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**  
**CREDITS: 4**

**COURSE CODE: P21IT4: A**  
**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	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 – Perceptron – Adaline Backpropagation Multilayer perceptron's – Radial Basis Function Networks – Unsupervised Learning and Other Neural Networks – Competitive Learning Networks – Korhonen 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	<a href="https://whatis.techtarget.com/definition/soft-computing/">https://whatis.techtarget.com/definition/soft-computing/</a>
2	Fuzzy sets and Genetic Algorithm in Game Playing	<a href="https://www.igi-global.com/dictionary/soft-methods-automatic-drug-infusion/27620/">https://www.igi-global.com/dictionary/soft-methods-automatic-drug-infusion/27620/</a>
3	Soft Computing for color Recipe Predication	<a href="https://towardsdatascience.com/soft-computing-6cef872f7704/">https://towardsdatascience.com/soft-computing-6cef872f7704/</a>
4.	Neuro fuzzy Modeling	<a href="https://www.youtube.com/watch?v=7C19X6pJEuU/">https://www.youtube.com/watch?v=7C19X6pJEuU/</a>

**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

			<b>Transaction</b>
<b>I</b>	<b>Fuzzy Set Theory</b>		
1.1	<b>Fuzzy Set Theory:</b> 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)	K2
		Classify Fuzzy and Soft Computing(K2)	
		Label Fuzzy sets(K1)	
		List Set theoretic operations,(K1)	
		Member Function Formulation and Parameterization(K1).	
		Rephrase Fuzzy Rules and Fuzzy Reasoning(K2)	
		Show the Extension Principle and Fuzzy Relations(K2).	
		Label Fuzzy If Then Rules(K1)	
		Name Fuzzy Inference Systems(K1)	
		Classify Mamdani Fuzzy Models, Sugeno Fuzzy Models, Tsukamoto Fuzzy Models(K2)	
	Relate Input Space Partitioning and fuzzy Modeling(K2).		
<b>II</b>	<b>Optimization</b>		
2.1	<b>Optimization:</b> 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).	K3
		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)	
<b>III</b>	<b>Neural Networks</b>		
3.1	<b>Neural Networks</b> :Supervised	Define Supervised Learning Neural Networks(K1)	K4

	Learning Neural Networks – Perceptron – Adaline Backpropagation Multilayer perceptron – Radial Basis Function Networks – Unsupervised Learning and Other Neural Networks – Competitive Learning Networks –	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).	
<b>IV</b>	<b>Neuro Fuzzy Modeling</b>		
4.1	<b>Neuro Fuzzy Modeling</b> : 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
<b>V</b>	<b>Application of Computational Intelligence</b>		
5.1	<b>Application of Computational Intelligence</b> : Printed Character Recognition – Inverse Kinematics Problems – Automobile Fuel Efficiency Prediction – Soft Computing for Color Recipe Prediction.	Explain Character Recognition(K6) Test Automobile Fuel Efficiency Prediction Elaborate Soft Computing for Color Recipe Prediction(K6).	K6

#### 4. MAPPING SCHEME FOR THE PO, PSOS AND COS

P21IT4 : 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. COURE 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**

**COURSE CODE: P21IT4: 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	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.N	Topics	Web Links
1.	Ambient technologies	<a href="https://www.youtube.com/watch?v=2lXh2n0aPyw&amp;feature=player_embedd/">https://www.youtube.com/watch?v=2lXh2n0aPyw&amp;feature=player_embedd/</a>
2.	Modeling Rich Interaction	<a href="https://www.slideshare.net/alanjohndix/hci-3e-ch-18-modelling-rich-interaction/">https://www.slideshare.net/alanjohndix/hci-3e-ch-18-modelling-rich-interaction/</a>
3.	Dialog notations and design	<a href="https://www.slideshare.net/alanjohndix/hci-3e-ch-16-dialogue-notations-and-design/">https://www.slideshare.net/alanjohndix/hci-3e-ch-16-dialogue-notations-and-design/</a>
4.	Socio -Organizational issues and stakeholder requirements	<a href="https://ieeexplore.ieee.org/abstract/document/1232752/">https://ieeexplore.ieee.org/abstract/document/123275 2/</a>

**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:**

- [https://www.tutorialspoint.com/human\\_computer\\_interface/human\\_computer\\_interface\\_introduction.htm/](https://www.tutorialspoint.com/human_computer_interface/human_computer_interface_introduction.htm/)
- <https://www.tandfonline.com/toc/hhci20/current/>
- <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	
<b>I</b>	<b>Human Computer Interaction</b>			
1.1	<b>Human Computer Interaction:</b> 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	<b>Distributed Cognition:</b> Toward a New Foundation for Human-Computer Interaction Research.	List the New Foundation for Human(K1)		
		Define the Computer Interaction Research(K1).		
1.3	<b>User Interface Software and Tools:</b> Past, Present, and Future of User Interface Software Tools	Explain the Past, Present, and Future of User Interface Software Tools(K2).		
1.4	<b>Creating Creativity:</b> 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).		
<b>II</b>	<b>Usability Engineering Methods, Concepts and Evaluation</b>			
2.1	<b>Usability Engineering Methods, Concepts and Evaluation:</b> Usability Engineering Methods and Concepts: - The Strategic Use of Complex Computer	Make Use of Complex Computer Systems(K3).	K3	
2.2		<b>Systems User Interface Evaluation:</b> 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		<b>Based Economy:</b> 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)	
<b>III</b>	<b>Groupware and Cooperative Activity</b>		
3.1	<b>Groupware and Cooperative Activity:</b> Computer-Mediated Communications for Group Support: Past and Future	Recall the Past and future of communications for group support(K1).	K5
3.2	<b>The Intellectual Challenge of CSCW:</b> The Gap between Social Requirements and Technical Feasibility	Distinguish the Gap between Social Requirements and Technical Feasibility(K1)	
3.3	<b>Social Translucence:</b> Designing Systems That Support Social Processes	Develop the Social Translucence(K3)	
3.4	<b>Transcending the Individual Human Mind:</b> Creating Shared Understanding through collaborative Design	Create the Transcending the Individual Human Mind(K6).	
3.5	<b>The Development of Cooperation:</b> Five Years of Participatory Design in Virtual School – Distance Matters.	Evaluate the Development of Cooperation of virtual School and Distance Matters(K5).	
<b>IV</b>	<b>Media Technology of Information system</b>		
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	<b>Technologies of Information:</b> 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)	
<b>V</b>	<b>Integrating Computation and Real Environments</b>		
5.1	Charting Past, Present, and Future Research in Ubiquitous Computing	Charting Past, Present, and Future Research in ubiquitous Computing(K6)	K6

5.2	<b>Situated Computing:</b> 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	<b>HCI and Society:</b> Learner-Centered Design: Reflections and New Directions	Relate the HCI and Society(K6)	
5.4	<b>HCI Meets the “Real World”:</b> Designing Technologies for Civic Sector Use – Beyond Blowing Together: Socio Technical Capital.	Estimate the HCI Meets the “Real World”(K6)	

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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:**

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##### **INDIRECT:**

1. Course end survey (Feedback)

