MASTER OF COMPUTER APPLICATIONS

SYLLABUS

(Under Choice Based Credit System)
Applicable for the students admitted
from 2019 – 2020 onwards

PG DEPARTMENT OF COMPUTER APPLICATIONS

Bishop Heber College (Autonomous)

(Nationally Reaccredited at the A+ Level by NAAC)
(Recognized by UGC as "College with Potential for Excellence")

Tiruchirappalli-620 017

Name of the Department : PG Department of Computer Applications
Name of the Programme : Master of Computer Applications (MCA)

BISHOP HEBER COLLEGE
MCA OUTCOME BASED EDUCATION
2019 -2020 ONWARDS

VISION

Develop next generation software professionals of high calibre to cater to the various needs of the IT Industry through effective teaching and learning process and to involve in advanced research by imbibing ethical values in order to provide solutions to the problems of our society.

MISSION

1. Enrich the students with a deep insight on the latest technologies by providing globally competant curriculum.
2. Develop, evaluate, synthesize and apply the acquired computing knowledge to cater to the needs of the society by collobarating with industries and corporate sectors.
3. Enable the students to become experts, researchers, academicians, entrepreneurs in the field of computer applications with a commitment to lifelong learning.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOS)

1. Graduates shall become a successful professional in the field of computer applications and in various multi-disciplinary industries either as an employee or an entrepreneur.

   Related to M1 & M2

2. Graduates shall become effective researchers and academicians, leading or participating in efforts to address social, technical and business challenges in an ethical manner.

   Related to M2 & M3

3. Graduates shall be engaged in lifelong learning and professional development through self study and by updating new technologies.

   Related to M1,M2 &M3

PROGRAMME OUTCOMES (POs)

On completion of Masters in Computer Applications, students would have acquired the following competencies to:

- **PO1**: **Computational Knowledge:** Apply the knowledge of computer applications to design, develop, test and maintain the software using the latest technologies.
- **PO2:Problem Analysis**: Identify and analyze complex problems and formulate appropriate solutions.

- **PO3:Design and Development of Solutions:** Design and develop customized frameworks for small to large enterprises.
- **PO4: Conduct Investigations of Complex Computing problems:** Utilize the research-based knowledge and research methods for the analysis and interpretation of data to provide valid conclusions in real-time applications.
- **PO5: Modern Tool Usage**: Identify and apply the appropriate techniques necessary for innovative software solutions, resources and modern computing tools to perform complex computing activities.
- **PO6: Project Management and Finance:** Manage multidisciplinary projects and assess societal, environmental, health, safety, legal and cultural issues.
- **PO7: Professional Ethics:** Function efficiently both as a member and team leader exhibiting professional skills with human values and ethics.
- **PO8: Communication Efficacy:** Communicate effectively with the computing community and the society to enhance documentations, presentations and to use appropriate opportunity according to their intelligence.
- **PO9: Life-long Learning:** Engage in independent and continuous learning as a computing professional and able to upgrade the skill sets for the lifelong betterment of the individual and society at large.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

On successful completion of the program learners would have acquired the following competencies:

- **PSO1**: Apply the acquired knowledge to design Graphical User Interfaces, develop websites, design new operating systems and manage databases.
- **PSO2**: Analyze the real-time data and predict the future outcome by using Machine Learning, Deep learning and Analytical tools.
- **PSO3**: Exhibit the programming skills to provide solutions to meet the needs of the industry.
- **PSO4**: Use the managerial skills and financial knowledge to become a successful entrepreneur and provide employability to the needed community.

MCA COURSE STRUCTURE 2019 – 2020

(For the candidates admitted from the academic year 2019-2020 onwards)

Eligibility:

A candidate who is a graduate in Mathematics or Physics or Chemistry or Statistics or Computer Science or Information Technology or Industrial Electronics or Applied Science (with Mathematics as an allied subject or Major Subject) or B.Com. or B.B.A. or B.E. / B.Tech except Computer Science in Engineering Branch) / AMIE of this University or from a recognized University or an examination accepted by the Syndicate as equivalent thereto.

Lateral Entry: PGDCA / B.Sc. Computer Science / B.Sc. Information Technology / B.C.A. / B.Sc. Software Development

Sem	Course	Subject Code	Subject Title	Hrs/ Week	Credit	Int. Mark	Ext. Mark	Mark
I	Core I	P18CA101	Programming in Java	6	5	25	75	100
	Core II	P18CA102	Mathematical Foundations of Computer Science	5	5	25	75	100
	Core III	P18CA103	Internet Programming	5	5	25	75	100
	Core IV	P19CA104	Digital Computer Fundametals and Architecture	6	5	25	75	100
	Core Prac.I	P18CA1P1	Programming in Java Lab	4	2	40	60	100
	Core Prac.II	P18CA1P2	Internet Programming Lab	4	2	40	60	100
			Total	**30**	**24**	**180**	**420**	**600**
II	Core V	P18CA205	Programming in .NET Technology	4	4	25	75	100
	Core VI	P18CA206	Probability and Statistics	4	3	25	75	100
	Core VII	P18CA207	Linux Programming	4	4	25	75	100
	Core VIII	P19CA208	Data Structures and Algorithms	4	3	25	75	100
	Core Prac.III	P18CA2P3	Programming in .NET- Lab	4	2	40	60	100
	Core Prac.IV	P18CA2P4	Programming in Linux – Lab	4	2	40	60	100
	Elective I	P19CA2:1	Computer Graphics	4	3	25	75	100
		P19CA2:2	Computer Simulation and Modelling					
	VLO	P17VL2:1/ P17VL2:2	RI / MI	2	2	25	75	100
			Total	**30**	**23**	**225**	**570**	**800**
III	Core IX	P18CA309	Software Engineering	4	4	25	75	100
	Core X	P18CA310	Resource Management Techniques	4	4	25	75	100
	Core XI	P18CA311	Database Systems	4	4	25	75	100
	Core XII	P18CA312	Operating Systems	4	4	25	75	100
	Core Prac.V	P18CA3P5	Multimedia Lab	4	2	40	60	100
	Core Prac.VI	P18CA3P6	Database Systems Lab	4	2	40	60	100
	Elective II	P19CA3:1	Accounting and Financial Management	4	4	25	75	100
		P19CA3:2	Enterprise Resource Planning					
		P19CA3:3	Management Information Systems					
	SBC I*	P18CAPS1	Communication and Life skills	2	-	-	-	
			Total	**30**	**24**	**205**	**495**	**700**

Sem	Course	Subject Code	Subject Title	Hrs/ Week	Credit	Int. Mark	Ext. Mark	Mark
IV	Core XIII	P18CA413	Programming in PHP with MySql	4	3	25	75	100
	Core XIV	P18CA414	Computer Communication Networks	4	4	25	75	100
	Core XV	P18CA415	Smart devices Programming	4	4	25	75	100
	Core XVI	P18CA416	Datawarehousing and Data Mining	4	4	25	75	100
	Core Prac. VII	P18CA4P7	Programming in PHP with MySql Lab	4	2	40	60	100
	Core Prac. VIII	P18CA4P8	Smart devices programming Lab	4	2	40	60	100
	Elective III	P19CA4:1	Artificial Intelligence	4	4	25	75	100
		P19CA4:2	Soft Computing					
		P19CA4:3	Genetic Algorithms					
	SBC I*	P18CAPS1	Communication Life skills	2	2	40	60	100
			Total	**30**	**25**	**245**	**555**	**800**
V	Core XVII	P18CA517	Programming in Python	5	4	25	75	100
	Core XVIII	P18CA518	Compiler Design	5	4	25	75	100
	Core XIX	P18CA519	Bigdata Analytics and Management	4	4	25	75	100
	Core Prac. IX	P18CA5P9	Programming in Python Lab	4	3	40	60	100
	Core Project-I	P18CA5PJ	Mini Project	4	3	40	60	100
	Elective IV	P19CA5:1	Cloud Computing	4	4	25	75	100
		P19CA5:2	Mobile Computing					
		P19CA5:3	Parallel Computing					
	Elective V	P19CA5:4	Organizational Behaviour	4	3	25	75	100
		P19CA5:5	Business Intelligence					
		P19CA5:6	Human Resource Management					
			Total	**30**	**25**	**205**	**495**	**700**
VI	Core XX	P18CA620	Internet of Things	5	5	25	75	100
	Core XXI	P18CA621	Data Analytical Tools	5	4	25	75	100
	Core Project-II	P18CA6PJ	Project	20	10	-	-	100
			Total	**30**	**19**	**50**	**150**	**300**
Total				**180**	**140**	**1110**	**2685**	**4000**

S.No.	Courses	No. of Courses
1	Core Courses	21
2	Core Practical Courses	9
3	Elective	5
4	Skill Based Courses	1
5	Value Education	1
6	Mini Project	1
7	Core Project	1
	Total	**39**

Articulation Matrix

S.No.	COURSE CODE	COURSE TITLE	CORRELATION WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES											
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
1	P18CA101	Programming in Java	H	M	H	M	M	L	L	L	M	H	M	L	
2	P18CA102	Mathematical Foundations of Computer Science	H	H	M	M	H	M	L	M	M	M	M	M	M
3	P18CA103	Internet Programming	H	M	H		L		M	L	L	H	L	H	H
4	P19CA104	Digital Computer Fundametals and Architecture	H	H	M	H	M	M	M	M	H	H	M	L	M
5	P18CA1P1	Programming in Java Lab	H	H	H	M	H	H	H	H	H	H	H	H	H
6	P18CA1P2	Internet Programming Lab	H		H		H	M	H	L	M	H	H	H	H
7	P18CA205	Programming in .NET Technology	H	H	H	H	H	H	H	H	H	H	H	H	H
8	P18CA206	Probability and Statistics	H	M	M	H	M	M	M	M	M	M	M	M	M
9	P18CA207	Linux Programming	H	H	M	H	M	M	M	M	H	H	H	M	M
10	P19CA208	Data Structures and Algorithms	M	H	M	H	M	H	H	M	H	M	H	M	M

S.No.	COURSE CODE	COURSE TITLE	CORRELATION WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES												
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
11	P18CA2P3	Programming in .NET- Lab	H	M	H	M	H	H	H	H	H	H	H	H	H
12	P18CA2P4	Programming in Linux – Lab	H	H	H	M	H	H	H	H	H	H	H	H	H
13	P19CA2:1	Computer Graphics	H	H	M	M	H	M	M	M	M	H	M	M	M
14	P19CA2:2	Computer Simulation and Modelling	H	L	M	M	H	H	H	H	H	H	H	H	H
15	P17VL2:1/ P17VL2:2	RI / MI													
16	P18CA309	Software Engineering	H	H	H	M	M	H	M	M	M	M	H	M	M
17	P18CA310	Resource Management Techniques	H	H	H	M	L	L	M	H	M	L	H	H	M
18	P18CA311	Database Systems	H	M	L	M	H	H	H	H	H	H	H	H	M
19	P18CA312	Operating Systems	H	H	M	H	H	H	M	H	H	H	H	M	M
20	P18CA3P5	Multimedia Lab	H	M	M	M	H	L	M	H	H	H	L	L	L
21	P18CA3P6	Database Systems Lab	H	H	H	H	H	M	M	H	H	H	L	L	L
22	P19CA3:1	Accounting and Financial Management	M	H	M	L	M	H	L	L	M	M	L	H	H
23	P19CA3:2	Enterprise Resource Planning	H	H	M	L	L	H	M	L	M	H	M	L	H
24	P19CA3:3	Management Information Systems	M	M	H	M	M	L	M	M	M	L	M	M	L
25	P18CAPS1	Communication and Life skills	M	L	H	L	L	H	H	H	H	H	H	M	H
26	P18CA413	Programming in PHP with MySql	H	M	M	H	H	H	H	M	M	M	H	H	M
27	P18CA414	Computer Communication Networks	H	H	H	H	H	H	M	M	M	L	H	M	M
28	P18CA415	Smart devices Programming	H	H	H	H	H	H	M	M	M	L	H	M	M
29	P18CA416	Datawarehousing and Data Mining	H	M	H	M	M	M	M	M	L	H	M	M	H
30	P18CA4P7	Programming in PHP with MySql Lab	H	H	M	H	M	M	H	M	H	H	L	H	M
31	P18CA4P8	Smart devices programming Lab	H	H	H	M	H	H	H	H	H	H	H	H	H

S.No.	COURSE CODE	COURSE TITLE	CORRELATION WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES												
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
32	P19CA4:1	Artificial Intelligence	H	H	H	M	H	H	M	M	H	H	H	M	H
33	P19CA4:2	Soft Computing	H	H	M	H	H	H	M	M	H	H	H	M	M
34	P19CA4:3	Genetics Algorithms	H	M	M	H	M	M	L	L	L	M	M	M	_
35	P19CAPS1	Communication Life skills	M	L	H	L	L	H	M	H	H	H	H	M	H
36	P18CA517	Programming in Python	H	H	H	M	M	L	L	L	M	H	M	L	L
37	P18CA518	Compiler Design	H	H	M	H	H	H	H	H	H	H	M	H	H
38	P18CA519	Bigdata Analytics and Management	H	H	H	H	H	H	H	M	H	H	H	M	M
39	P18CA5P9	Programming in Python Lab	H	H	H	M	M	L	L	L	M	H	M	L	L
40	P18CA5PJ	Mini Project	H	H	H	H	H	H	H	H	H	H	H	H	H
41	P19CA5:1	Cloud Computing	H	L	H	M	H	H	H	H	H	H	H	H	H
42	P19CA5:2	Mobile Computing	H	L	M	H	M	M	L	M	M	L	M	M	M
43	P19CA5:3	Parallel Computing	M	M	H	M	M	L	L	M	M	L	M	M	L
44	P19CA5:4	Organizational Behaviour	L	M	M	L	L	M	H	M	M	L	L	M	H
45	P19CA5:5	Business Intelligence	H	M	M	L	M	M	H	M	H	H	H	H	H
46	P19CA5:6	Human Resource Management	L	L	M	_	L	H	M	M	M	L	M	H	H
47	P18CA620	Internet of Things	H	H	H	H	H	H	H	H	M	H	H	M	H
48	P18CA621	Data Analytical Tools	H	H	H	H	H	M	M	M	M	H	H	M	L
49	P18CA6PJ	Project	H	H	H	H	H	H	H	H	H	H	H	H	H

Core I: PROGRAMMING IN JAVA

SEMESTER: I **CODE: P18CA101**
CREDITS: 5 **HOURS/WEEK: 6**

1. COURSE OUTCOMES

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

S.No.	Course Outcomes	Level	Unit Covered
CO1	Recall about evolution and features of java and OOPs basics	K1	I
CO2	Construct applications using the concept of package, interface, multithreading and exception handling	K6	II
CO3	Develop web-based applications using Applet	K6	III
CO4	Apply event handling on AWT and Utilize Swing components in developing real time applications	K6	III
CO5	Access database through Java programs, using Java Data Base Connectivity (JDBC)	K6	IV
CO6	Invoke the remote methods in an application using Remote Method Invocation (RMI)	K6	V

2A. Syllabus

UNIT I - Evolution and Overview of Java **18 Hours**

The History and Evolution of Java: The Creation of Java – The Byte Code – The Java Buzzwords. An Overview of Java- Introducing Classes - Methods and Classes – Inheritance.

UNIT II - Exceptions and Multi-Thread Programming **18 Hours**

Packages and Interfaces – Exception Handling – Multi-Threaded Programming- String Handling.

UNIT III - Collections and Input / Output **18 Hours**

The Collections Framework: Collections Overview – The Collection Interfaces – The Collection Classes (ArrayList, LinkedList, HasSet, TreeSet) – Accessing a Collection via an Iterator – utility classes:StringTokenizer, Date, Scanner. Input/Output: File- the Stream classes- Byte Streams- the Character Streams

UNIT IV- Applet and AWT **18 Hours**

The Applet class – Event Handling- AWT: Working with windows, Graphics and Text – using AWT controls, Layout Managers and Menus.

UNIT V- Swing and JDBC **18 Hours**

Introducing Swing - Exploring Swing - Java Database Connectivity – Java Remote Method Invocation (RMI) – Servlets

B. TOPICS FOR SELF-STUDY

S.No.	Topics	Web Link
1	Frameworks	https://www.javatpoint.com/what-is-framework-in-java
2	Spring	https://www.tutorialspoint.com/spring/index.htm
3	Hibernate	https://www.javatpoint.com/hibernate-tutorial
4	Strut	https://www.tutorialspoint.com/struts_2/index.htm

C. Text Books:

1. Herbert Schildt,, "JAVA™ : Complete Reference", Ninth Edition, McGraw Hill, 2014.
2. Ivan Bayross, "Web Enabled Commercial Application Development using Java 2", BPB Publications, 2013. (Unit-V : Java Database Connectivity)

D. Reference Books:

1. Ken Arnold, James Gosling, David Holmes, "Java™ Programming Language", Fourth Edition, Addison Wesley Profession, 2005.
2. Paul J. Deitel, Harvey M. Deitel, "Java™ for Programmers",Second Edition**,** PHI Publications, 2011.

E. Web links:

1. **www.geeksforgeeks.org**
2. **www.codeproject.com**
3. **www.stackoverflow.com**

3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit covered /Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
I	**The History and Evolution of Java**		
1.1	The Creation of Java	Recall the History of Java programming	K1
1.2	The Byte Code	Outline the importance of Byte Code	K6
1.3	Java Buzzwords	Explain the Java Buzzwords	K6
	An Overview of Java		
1.4	Overview of Java	Recall the basics of Java Programming	K1
	Introducing Classes		
1.5	Classes	Create a Class and access the members of the class using objects	K6
1.6	Methods	Construct Programs using Methods	K6
	Inheritance		
1.7	Inheritance and its types	Evaluate inheritance and its types	K4

Unit covered /Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
II	**Packages**		
2.1	Packages	Create packages and import them	K6
	Interfaces		
2.2	Interfaces	Illustrate the mechanisms in interfaces	K2
	Exception Handling		
2.3	Exception Handling	Create exceptions and handle the same with catch	K6
2.4	User Defined Exceptions	Illustrate User defined exceptions	K2
	Multi-Threaded Programming		
2.5	By Extending a Thread Class	Construct programs by extending a thread class	K6
2.6	By implementing Runnable Interface	Construct programs by implementing runnable interfaces	K6
	String Handling		
2.7	Strings	Create programs with string handling functions.	K6
III	**The Collections Framework**		
3.1	Collections Overview	Identify the various collection classes.	K3
3.2	The Collection Interfaces	Discuss the various collection interfaces.	K4
3.3	Collection Classes	Compare Collection classes such as ArrayList, LinkedList, HasSet and TreeSet	K5
3.4	Accessing a Collection via an Iterator	Illustrate accessing collection with an iterator	K2
	Utility classes		
3.5	StringTokenizer	Write a Java Program to Illustrate StringTokenizer	K2
3.6	Date	Write a Java Program to Illustrate Date Class	K2
3.7	Scanner	Apply Scanner Class in Java	K5
	Input/output		
3.8	File	Illustrate reading and writing operations on files	K2
3.9	The Stream classes	Apply Stream classes	K3
3.10	Byte Streams	Apply Byte Streams in Programs	K3
3.11	The Character Streams	Illustrate with Character Streams	K2
IV	**The Applet class**		
4.1	Creating Applets	Create applets and the run them using applet viewer	K6
4.2	Applet Life Cycle	Illustrate applet life cycle	K2
4.3	Passing Parameters with Applets	Construct applet programs by passing parameters	K6
	Event Handling		
4.4	AWT	Apply AWT controls	K3
4.5	Working with Windows	Write a Java Program to Illustrate Windows	K2
4.6	Graphics and Text	Recall the basics of Graphics and Text	K3
4.7	Using AWT controls	Construct programs using different AWT controls	K6

Unit covered /Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
	Layout Managers and Menus		
4.8	Layouts	Recall the basics of layouts	K1
4.9	Types of Layouts	Create Java programs using different layouts	K6
4.10	Menus	Apply menus in Java programs	K6
V	**Introducing Swing**		
5.1	Exploring Swing	Compare the working procedure of Swings with AWT controls	K4
	Java Database Connectivity		
5.2	Database Operations	Create a Java program to insert, delete and update into a database	K6
	Java Remote Method Invocation (RMI)		
5.3	RMI	Develop programs by invoking remote methods	K6
	Servlets		
5.4	Servlets	Construct servlet programs	K6

4. MAPPING (CO, PO, PSO)

P18CA101	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	H	H	H	M	M	H	M	L	M	H	M	L	-
CO2	H	H	H	M	M	L	L	L	M	H	M	L	-
CO3	H	M	H	M	M	L	L	L	M	H	M	L	-
CO4	H	M	H	M	M	L	L	L	M	H	M	L	-
CO5	H	M	H	H	L	L	L	L	L	H	L	L	-
CO6	H	M	H	M	L	M	L	L	L	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. Cooperative Learning Report, Assignment, Group Presentation, Group Discussion, Project Report,Seminar, Quiz (written).
4. Pre-Semester & End Semester Theory Examination

INDIRECT:

1. Course end survey (Feedback)

COURSE COORDINATOR **HEAD OF THE DEPARTMENT**

Dr.T.CYNTHIA Dr.R.THAMARAI SELVI

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Core II: MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

SEMESTER: I **CODE: P18CA102**
CREDITS: 5 **HOURS/WEEKS: 5**

1. COURSE OUTCOMES

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

S.No.	Course Outcomes	Level	Unit
CO1	Make use of Boolean algebra and Boolean Functions	K3	I
CO2	Design Digital Networks – Switching Circuits	K5	I
CO3	Identify the Shortest Paths in Weighted Graphs	K4	II
CO4	Verify Grammars and Languages	K6	III
CO5	Design the finite state machine and Equivalent Machines	K5	IV
CO6	Analyze and apply the concept of recurrence relations and sorting algorithm	K4	V

2A. Syllabus

UNIT I - Boolean Algebra **15 Hours**

Lattices and Algebraic Systems – Principle of Duality – Basic Properties of Algebraic Systems Defined by Lattices – Distributive and Complemented Lattices – Boolean Lattices And Boolean Algebras – Uniqueness of Finite Algebras – Boolean Functions and Boolean Expressions - Propositional Calculus – Design and Implementation of Digital Networks – Switching Circuits.

UNIT II - Graphs and Planar Graphs **15 Hours**

Introduction – Basic Terminology – Multigraphs and Weighted Graphs –Paths and Circuits – Shortest Paths in Weighted Graphs – Eulerian Paths and Circuits – Hamiltonian Paths and Circuits. Trees and Cut-Sets: Trees – Rooted Trees – Prefix Codes – Binary Search Trees -Spanning Trees and Cut-Sets – Minimum Spanning Trees.

UNIT III - Computability and Formal Languages **15 Hours**

Introduction – Russell's Paradox and Non computability –Ordered Sets – Languages – Phrase Structure Grammars – Types of Grammars and Languages.

UNIT IV - Finite State Machines **15 Hours**

Introduction – Finite State Machines – Finite State Machines as Models as Physical System – Equivalent Machines – Finite State Machines as Language Recognizers.

UNIT V - Recurrence Relations and Recursive Algorithms **15 Hours**

Introduction – Recurrence Relations – Linear Recurrence Relations with Constant Coefficients – Homogeneous Solutions – Particular Solutions –Total Solutions – Solutions by the Method of Generating Functions – Sorting Algorithms.

B. TOPICS FOR SELF-STUDY

S.No	Topics	Web Link
1	Application of graph theory in computer science	**https://www.researchgate.net/publication/332012041_applications_of_graph_theory_in_computer_science_an_overview**
2	Finite state machine	**https://flaviocopes.com/finite-state-machines/**
3	Grammars and languages	**https://www.tutorialspoint.com/automata_theory/chomsky_classification_of_grammars.htm**
4	Recurrence relations	**https://randerson112358.medium.com/recurrence-relation-475d4a4eaed1**

C. Text Book:

1. C.L.Liu, Elements of Discrete Mathematics, McGraw Hill, Second Edition, 1985.

D. Reference Books:

1. J.P.Tremblay, R.Manohar, Discrete Mathematical Structures with Application to Computer Science, McGraw Hill, 2001.
2. NarasinghDeo, Graph Theory, PrenticeHall of India, 2004

E. Web links:

1. **https://onlinecourses.swayam2.ac.in/cec20_ma02/preview**
2. **https://onlinecourses.nptel.ac.in/noc20_cs37/preview**

3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
I	**Boolean Algebra**		
1.1	Lattices and Algebraic Systems	Identify the lattices	K4
1.2	Principle of Duality	Explain the concept of principle of duality.	K4
1.3	Basic Properties of Algebraic Systems Defined by Lattices	Construct the algebraic system.	K3
1.4	Distributive and Complemented Lattices	Distinguish the difference between distributive and complemented lattices	K4
1.5	Boolean Lattices and Boolean Algebras	Compare the properties of Boolean lattices and algebras.	K4
1.6	Uniqueness of Finite Algebras	Explain the uniqueness of finite algebras	K4
1.7	Boolean Functions and Boolean Expressions	Create Boolean expressions	K5

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
1.8	Design and Implementation of Digital Networks	Design digital networks	K5
1.9	Switching circuits	Construct switching circuits	K5
II	**Graphs and Planar Graphs**		
2.1	Introduction – Graph	Construct the graph	K5
2.2	Multigraphs and Weighted Graphs	Compare multi and weighted graphs	K4
2.3	Paths and Circuits	Compare paths and circuits.	K4
2.4	Shortest Paths in Weighted Graphs	Choose the Shortest Paths in Weighted Graphs	K6
2.5	Eulerian Paths and Circuits	Identify the Eulerian paths and constructs	K4
2.6	Hamiltonian Paths and Circuits	Identify the Hamiltonian paths and constructs	K4
2.7	Trees	Construct the trees	K3
2.8	Rooted Trees	Discuss the rooted trees	K2
2.9	Prefix Codes	Make use of Prefix codes	K3
2.10	Binary Search Trees	Use binary search tree concepts	K3
2.11	Spanning Trees and Cut-Sets	Identify the cut sets	K4
2.12	Minimum Spanning Trees	Explain the concept of minimum spanning trees	K4
III	**Computability and Formal Languages**		
3.1	Introduction- Grammars and languages	Relate grammars and languages.	K1
3.2	Russell's Paradox and Noncomputability	Construct examples for Russel'sparadox	K3
3.3	Ordered Sets	Construct an ordered set.	K3
3.4	Languages	Determine the different type of languages	K6
3.5	Phrase Structure Grammars	Identify the phrase structure grammar	K4
3.6	Types of Grammars and Languages	Design the languages corresponding to their grammars	K5
IV	**Finite State Machine**		
4.1	Introduction – Finite state machines	Explain about finite state machine	K4
4.2	Finite State Machines	Construct a finite state machine.	K3
4.3	Finite State Machines as Models as Physical System	Determine own examples for finite state machine	K6
4.4	Equivalent Machines	Identify the equivalent state machines	K4
4.5	Finite State Machines as Language Recognizers	Justify that finite state machine can be expressed as a language recognizer	K6

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
V	**Recurrence Relations and Recursive Algorithms**		
5.1	Introduction	Explain the recurrence relations.	K2
5.2	Recurrence Relations	Identify the recurrence relations	K4
5.3	Linear Recurrence Relations with Constant Coefficients	Solve the linear recurrence relations	K3
5.4	Homogeneous Solutions	Solve homogeneous solutions.	K3
5.5	Particular Solutions	Determine the particular solution.	K6
5.6	Total solutions	Construct the total solution.	K3
5.7	Solutions by the Method of Generating Functions	Identify the corresponding generating function	K4
5.8	Sorting Algorithms	Make use of sorting algorithms	K3

4. MAPPING (CO, PO, PSO)

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

L-Low M-Moderate H- High

5. COURSE ASSESSMENT METHODS

DIRECT:

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

INDIRECT:

1. Course end survey (Feedback)

COURSE COORDINATOR — Dr.D.KARTHIGA

HEAD OF THE DEPARTMENT — Dr.R.THAMARAI SELVI

****

Core III: INTERNET PROGRAMMING

SEMESTER: 1 **CODE: P18CA103**
CREDITS: 5 **HOURS/WEEKS: 5**

1. COURSE OUTCOMES

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

S. No.	Course Outcomes	Level	Unit
CO1	Define the basics of HTML5 tags with semantic elements.	K1	I
CO2	Outline the web applications using tables and multimedia	K2	II
CO3	Build an appropriate primitives and operations in JavaScript.	K3	III
CO4	Distinguish the web pages to interact by using JavaScript and DOM concepts	K4	IV
CO5	Adapt events and event handlers for Dynamic web application	K6	V
CO6	Design a web application with secure and user-friendly with angular web framework	K6	V

2A. Syllabus

UNIT I - Overview of Basic Html Tags **15 Hours**

Getting Started with HTML – Formatting Text by using Tags – using Lists and Backgrounds – Creating Hyperlinks and Anchors – Introduction to Style Sheets – Formatting Text by using Style Sheets – Formatting Paragraphs by using Style Sheets.

UNIT II - Multimedia Tags and Overview of Java Script **15 Hours**

Displaying Graphics – Creating Division Based Layouts – Creating Tables – Formatting Tables – Creating User Forms – Incorporating Sound and Video – Canvas. **The Basics of Java Script:** Overview of Java Script – Object Oriented and Java Script – General Syntactic Characteristics – Primitives, Operations, and Expressions – Screen Output and Keyboard Input – Control Statements – Object Creation and Modification.

UNIT III - Arrays, Functions and Event Handling **15 Hours**

Arrays – Functions – An Example – Constructors – Pattern Matching Using Regular Expressions – Another Example – Errors in Scripts. **Java Script and XHTML Documents:** The Java Script Execution Environment – The Document Object Model –Element Access in Java Script. **Events and Event Handling**: Handling Events from Body Elements – Handling Events from Button Elements – Handling Events from Text Box and Password Elements – The DOM 2 Event Model – The Navigator Object – DOM Tree Traversal and Modification.

UNIT IV - Dynamic HTML **15 Hours**

Dynamic Documents with Java Script: Introduction – Positioning Elements – Moving Elements – Element Visibility – Changing Colors and Fonts – Dynamic Content – Stacking Elements – Locating the Mouse Cursor – Reacting to a Mouse Click – Slow Movement of Elements – Dragging and Dropping Elements.

UNIT V - Angular JS an Overview **15 Hours**

Introduction to Angular JS: Introduction – Understanding Directives – Creating Controllers – Working with Angular JS Expression – Making Use of AngularJS Filters – Understanding AngularJS Modules – Exploring AngularJS Services – Learning AngularJS Views

B. TOPICS FOR SELF-STUDY

S.No	Topics	Web Link
1	Classical Inheritance In JavaScript	https://www.crockford.com/javascript/inheritance.html#:~:text=JavaScript%20is%20a%20class%2Dfree,inheritance%20instead%20of%20classical%20inheritance.&text=Little%20type%2Dsafety%20is%20obtained,explicit%20casting%20of%20object%20references.
2	HTTP/HTTPS/1 And 2, web sockets	https://www.grotto-networking.com/WebDevTopics.html#httphttps1-and-2-websockets
3	Angularis Animations	https://docs.angularjs.org/guide/animations
4	Working with Remote Web Services	https://www.youtube.com/watch?v=oTzNRv6X51o

C. Text Books:

1. FaitheWempen, "HTML5 Step by Step", First edition, Microsoft Press, 2011.
2. Robert W. Sebesta, "Programming the World Wide Web", Pearson Education, Seventh Edition, 2014.
3. Felix Alvaro, "ANGULARJS: Easy AngularJS for Beginners", Kindle Edition, 2016.

D. Reference Book:

1. Joel Skylar, "Principles of Web Design: The Web Technologies Series," Fifth Edition, 2011.

E. Web links:

1. https://www.javatpoint.com/html5-tutorial
2. https://angular.io/start

3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit covered/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
I	**Overview of Basic Html Tags**		
1.1	Getting Started with HTML	Recall the basic HTML tags	K1
1.2	Formatting Text by using Tags	Compare html tag with html5	K2
1.3	Using Lists and Backgrounds	Make use of lists and backgrounds	K3
1.4	Creating Hyperlinks and Anchors	Apply hyperlinks in web page	K3
	Designing web using Style Sheets		

Unit covered/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
1.5	Introduction to Style Sheets	Recall various styles in designing	K1
1.6	Formatting Text by using Style Sheets	Apply the style sheet to use different styles for text and background	K3
1.7	Formatting Paragraphs by using Style Sheets.	Create paragraph to organize the content	K6
II	**Multimedia Tags and Overview of Java script**		
2.1	Displaying Graphics	Build web page using graphics	K3
2.2	Creating Division Based Layouts	Categorize content using division layouts	K4
2.3	Creating Tables – Formatting Tables Creating User Forms	Build table and forms using various elements	K6
2.4	Incorporating Sound and Video	Construct web page for video and audio content	K6
2.5	Canvas	Construct geometric shapes using canvas	K6
	Basics of Java Script		
2.6	Overview of Java Script	Relate java script in html5	K2
2.7	Object Oriented and Java Script	Apply object oriented in java script	K3
2.8	General Syntactic Characteristics	Identify the basic scripts and general syntactic	K3
2.9	Primitives, Operations, and Expressions	List out the types of operations and expressions	K4
2.10	Screen Output and Keyboard Input	Choose the screen output and keyboard input	K5
2.11	Control Statements – Object Creation and Modification	Examine the control statements	K4
III	**Arrays, Functions and Event Handling**		
3.1	Arrays	Experiment with arrays in JS	K3
3.2	Functions	Examine functions in JS	K4
3.3	Constructors	Apply constructors	K3
3.4	Pattern Matching Using Regular Expressions	Illustrate the pattern matching	K2
	Java Script and XHTML Documents		
3.5	The Document Object Model	Explain the DOM concept	K2
3.6	Element Access in Java Script	List out the elements in java script	K4
	Events and Event Handling		
3.7	Handling Events from Body/Button Elements	Categorize events for button and body elements	K4
3.8	Handling Events from Text Box and Password Elements	Evaluate text and password event handling for validation	K5

Unit covered/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
3.9	The DOM 2 Event Model	Analyze DOM2 event model	K4
3.10	The Navigator Object/ DOM Tree Traversal and Modification	Adapt tree traversal for DOM	K6
IV	**Dynamic Html**		
4.1	Introduction to Java Script	Explain script in web design	K2
4.2	Positioning Elements	Utilize cursor to position elements	K3
4.3	Moving Elements	Make use of cursor to move elements	K3
4.4	Changing Colors and Fonts	Change the web page color and fonts	K6
4.5	Dynamic Contents – Stacking Element	Determine the stack elements for dynamic operation	K5
4.6	Mouse Click Event	Build web page for mouse click event	K6
4.7	Dragging and Dropping Elements	Adapt mouse event to drag and drop element	K6
V	**Angular JS an Overview**		
5.1	Introduction to AngularJS	Define angular JS in web design	K1
5.2	Understanding Directives	Illustrate directives in angularJS	K2
5.3	Creating Controllers	Analyze various controllers	K4
5.4	Working with AngularJS Expression	Apply expression to operate data	K3
5.5	Making Use of AngularJS Filters	Choose filter to format data	K5
5.6	Understanding AngularJS Modules	Adapt modules to define application	K6
5.7	Exploring AngularJS Services – Learning AngularJS Views	Discuss the advance trends in angular js	K6

3. **MAPPING (CO, PO, PSO)**

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**H**	**M**	**H**	**-**	**L**	**-**	**M**	**H**	**M**	**H**	**L**	**H**	**M**
CO2	**H**	**-**	**M**	**-**	**-**	**-**	**-**	**M**	**L**	**L**	**L**	**H**	**-**
CO3	**H**	**L**	**H**	**-**	**L**	**M**	**-**	**-**	**L**	**H**	**H**	**H**	**L**
CO4	**H**	**M**	**L**	**-**	**M**	**-**	**M**	**L**	**M**	**H**	**M**	**H**	**M**
CO5	**H**	**M**	**H**	**-**	**H**	**-**	**L**	**M**	**L**	**H**	**M**	**H**	**M**
CO6	**H**	**M**	**H**	**M**	**M**	**L**	**H**	**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. Assignment, Group Presentation, Group Discussion, Project Report, Seminar, Quiz (written).
4. Pre-Semester & End Semester Theory Examination

INDIRECT:

1. Course end survey (Feedback)

COURSE COORDINATOR **HEAD OF THE DEPARTMENT**

Dr. M. LOVELIN PONN FELCIAH Dr.R.THAMARAI SELVI

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Core III: DIGITAL COMPUTER FUNDAMENTALS AND ARCHITECTURE

SEMESTER: I **CODE: P19CA104**
CREDITS: 5 **HOURS/WEEKS: 6**

1. COURSE OUTCOMES

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

S.No.	Course Outcomes	Level	Unit
CO1	Apply Number Systems-to convert numbers from one form to another	K3	I
CO2	Recall all binary codes	K1	I
CO3	Develop k-map to design Boolean expression	K6	II
CO4	Create the basic building blocks	K6	III
CO5	Design RS flipflops, JK flipflops, D-flipflops, registers and n-modcounters	K6	IV
CO6	Determine the central processing unit	K5	V

2A. Syllabus

UNIT I - Number System **18 Hours**

Number Systems – Binary Arithmetic – Binary codes.

UNIT II - Logic Gates **18 Hours**

Logic Gates and Logic Circuits – Boolean Algebra – Karnaugh Map.

UNIT III - Arithmetic Building Blocks and Circuits **18 Hours**

Arithmetic Building Blocks: Half Adder – Full Adder – Controlled Inverter –The Adder–Subtracter. **Data Processing Circuits:** Multiplexer – Demultiplexer – Decoder – Encoder.

UNIT IV- Flip-Flops,Registers and Counters **18 Hours**

Flip–Flops: RS Flip Flop – Edge Triggered RS Flip Flop – Edge Triggered D Flip Flop – JK Flip Flop – JK Master Slave Flip Flop. **Registers:** Types of Registers – **Counters:** Asynchronous Counters – Synchronous Counters – MOD Counters – Decade Counters – Pre–Settable Counters.

UNIT V - Central Processing Unit **18 Hours**

Central Processing Unit: General Register Organization – Stack Organization – Instruction Formats – Addressing Modes – Data Transfer And Manipulation – Program Control – Reduced Instruction Set Computer – CISC characteristics – RISC Characteristics.

B. TOPICS FOR SELF-STUDY

S.No	Topics	Web Link
1	Distributed Computing	**www.wiley.com**
2	Digital Systems	**www.geeksforgeeks.org**
3	Data communication	**https://www.tutorialspoint.com/**

4	Gate Level Minimization	**www.geeksforgeeks.org**

C. Text Books:

1. V.Vijayendran, "Digital Fundamentals", S.ViswanathanPvt.,Ltd., 2008.
2. Donald P Leach., Albert Paul Malvino, "Digital Principles and Applications", TMH, Fifth Edition 2005.
3. Morris Mano M, "Computer System Architecture", Prentice Hall of India, Third Edition, 2008.

D. Reference Book:

1. ThomasL.Floyd, "Digital Fundmentals",Eleventh Edition ,Pearson publication,2015,

E. Web Links:

1. **https://onlinecourses.nptel.ac.in/noc18_ee33**
2. **https://nptel.ac.in/courses/106103180/W1A1**
3. **https://www.tutorialspoint.com/computer_logical.../digital_number_system.htm**

3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
I	**Number System**		
1.1	Number Systems- Decimal, Binary, Octal and Hexa decimal	Classify the various number systems	K4
1.2	Binary Arithmetic Addition, Subtraction Multiplication, Division	Solve using binary arithmetic	K6
1.3	Complements	Illustrate 2's complement with an example	K2
1.4	Binary codes.	Elaborate on binary codes	K6
II	**Logic Gates**		
2.1	Logic Gates	List out the basic logic gates	K4
2.2	Logic Circuits	Simplify the logic circuit using gates	K4
2,3	Boolean Algebra,	Apply Boolean algebra for simplifying a circuit	K3
2.4	Karnaugh Map	Construct a karnaugh map for the given expression	K6
III	**Arithmetic Building Blocks and Circuits**		
3..1	Arithmetic Building Blocks	Elaborate on the basic arithmetic building blocks	K6
3.2	Half Adder	Explain about half adders	K5
3.3	Full Adder	Design a full adder using the logic gates	K6

3.4	Controlled Inverter, The Adder–Subtracter.	Illustrate the use of a controlled inverter	K2
3.5	The Adder-Subtractor	Build an adder-subtractor using logic gates	K6
3.6	Data Processing Circuits: Multiplexer	Explain Multiplexer	K5
3.7	Demultiplexer	Discuss on demultiplexers	K6
3.8	Decoder , Encoder	Construct a 4*16 decoder	K6
IV	**Flip-Flops, Registers and Counters**		
4.1	RS Flip Flop	Discuss on RS Flip-Flops	K6
4.2	Edge Triggered RS Flip Flop	Illustrate on edge triggered RS flip flop	K2
4.3	D Flip Flop	Construct D flip flop using gates	K6
4.4	JK Flip Flop	Explain JK Flip Flop	K5
4.5	Master Slave Flip Flop	Elaborate on JK Master Slave flip flop	K6
4.6	Types of Registers	Design a parallel in parallel out register.	K6
47	Asynchronous Counters	Compare synchronous and asynchronous counters	K5
4.8	Synchronous Counters	Illustrate on synchronous counters	K2
4.9	MOD Counters	Classify MOD counters	K2
4.10	Decade Counters	Explain about decade counter	K5
4.11	Pre–Settable Counters.	Discuss on pre-settable counters	K6
V	**Central Processing Unit**		
5.2	Stack organization	Distinguish between memory stack and register stack	K4
5.3	Instruction Formats	Classify the basic computer instruction formats	K4
5..4	Addressing Modes	Discuss the addressing modes	K6
5.5	Data Transfer And Manipulation , Program control	Elaborate on the types of interrupts	K6
5.6	RISC characteristics	Elaborate on RISC characteristics	K6

4. MAPPING (CO, PO, PSO)

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

CO6	**H**	**H**	**H**	**H**	**H**	**M**	**H**	**M**	**M**	**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, Poster Presentation, Seminar, Quiz (written).
4. Pre-Semester & End Semester Theory Examination

INDIRECT:

1. Course end survey (Feedback)

COURSE COORDINATOR **HEAD OF THE DEPARTMENT**

Dr.A. FLORENCE DEEPA Dr.R.THAMARAI SELVI

****

Core Practical I: PROGRAMMING IN JAVA LAB

SEMESTER: I **CODE: P18CA1P1**
CREDITS: 2 **HOURS/WEEKS: 4**

1. COURSE OUTCOMES

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

S.No.	Course Outcomes	Level	Exercise
CO1	Demonstrate the concept of package, interface.	K2	1,2,3,4
CO2	Demonstrate exception handling mechanism.	K6	5
CO3	Develop a java program to handle multithreads.	K3	6
CO4	Make use of collections and IO streams.	K2	7,8
CO5	Apply event handling on AWT and Swing components.	K3	9,10,11
CO6	Develop a Java program to manipulate database, using Java Data Base Connectivity (JDBC)	K6	12,13

2A. Syllabus

1. Classes and Objects.
   Create Student Class with the following data and methods.
   Member Data : regno, name, course, java_mark, dbms_mark, os_mark, total, average and result.
   Member Methods: readData(), processData(), display()
   Create 5 objects for students and display the mark sheet.
2. Inheritance.
   Create a class Employee with employee details such as Emp_Name, E_ID, Age, Sex, Date_of_Join etc., define a sub class Salary of Employee with details like LIC, HRA, DA and TA. Calculate salary of the employee by inheriting Employee details.
3. Interfaces.
   Define an interface Bank with a method rateofInterest() and implement the same with classes SBI, PNB and Axis.
4. Packages.
   Create packages like Pack and MyPack and import the same into some user defined classes.
5. Exceptions handling.
   Create a try block that is likely to generate three types of exception (handle ArithmeticException, ArrayIndexOutOfBoundsException, FileNotFoundException) using try and then incorporate necessary catch blocks to catch and handle them appropriately.
   Create an user defined Exception.
6. Multithreading.
   Create a class Parent by extending a Thread class and also create a class as Child and illustrate the concept of multithreading by applying thread class methods.
7. Collection Interfaces.
   Write a program to create a List(Books) using ArrayList and add items to the list and traverse the items through Iterator.

8. I/O Streams.
   Create a class named InputStreamReaderExample and read the contents of the file using the methods FileInputStream() and InputStreamReader().
9. Applet programming.
   Design Traffic Signals using Applet methods.
10. Applying AWT concepts.
    Design a Registration form with AWT Controls.
11. Applying swing concepts.
    Develop a java swing Frame to retrieve the records form the Job Portal database table
    Design a scientific Calculator using swing components.
12. JDBC.
13. Design a web application for Student details with database operations insert, delete and update.

B. TOPICS FOR SELF-STUDY

S.No.	Topics	Web Links
1	Advanced Swing	**https://docs.oracle.com/javase/tutorial/uiswing/misc/index.html**
2	Security in Java	**https://www.javatpoint.com/java-security-package**
3	Java RMI	**https://docs.oracle.com/javase/8/docs/technotes/guides/rmi/hello/hello-world.html**
4	Java Network	**https://www.javatpoint.com/java-networking**

C. Text Books:

1. Herbert Schildt,, "JAVA™ : Complete Reference",Ninth Edition, McGraw Hill, 2014.
2. Ivan Bayross, "Web Enabled Commercial Application Development using Java 2", BPB Publications, 2013. (Unit-V : Java Database Connectivity)

D. Reference Books:

1. Ken Arnold, James Gosling, David Holmes, "Java™ Programming Language", Fourth Edition, Addison Wesley Profession, 2005.
2. Paul J. Deitel, Harvey M. Deitel, "Java™ for Programmers",Second Edition**,** PHI Publications, 2011.

E. Web links:

1. https://github.com
2. https://swayam.gov.in/NPTEL

3. SPECIFIC LEARNING OUTCOMES (SLO)

Ex.No.	Lab Exercises	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction

1	Classes and Objects Create Student Class with the following data and methods. Member Data : regno, name, course, java_mark, dbms_mark, os_mark, total, average and result. Member Methods: readData(), processData(), display() Create 5 objects for students and display the mark sheet.	Develop a Java Program with class and object	K6
2	Inheritance Create a class Employee with employee details such as Emp_Name, E_ID, Age, Sex, Date_of_Join etc., define a sub class Salary of Employee with details like LIC, HRA, DA and TA. Calculate salary of the employee by inheriting Employee details	Create a java program using inheritance	K6
3	Interfaces Define an interface Bank with a method rateofInterest() and implement the same with classes SBI, PNB and Axis.	Build a java program implementing interfaces	K6
4	Packages. Create packages like Pack and MyPack and import the same into some user defined classes.	Develop a java program using packages	K6
5	Exceptions handling Create a try block that is likely to generate three types of exception (handle ArithmeticException ArrayIndexOutOfBoundsException, FileNotFoundException) using try and then incorporate necessary catch blocks to catch and handle them appropriately	Create a java program to handle exceptions	K6
6	Multithreading Create a class Parent by extending a Thread class and also create a class as Child and illustrate the concept of multithreading by applying thread class methods.	Design a Java program to handle multithreads	K6
7	Collection Interfaces	Create a program to create a List(Books) using ArrayList and add items to the list and traverse the items through Iterator	K6
8	I/O Streams Create a class named InputStreamReaderExample and read the contents of the file using the methods FileInputStream() and InputStreamReader().	Build a java program to read the contents of the file using IO Streams	K6
9	Applet programming	Design traffic signals using	K6

	Design Traffic Signals using Applet methods.	Applet	
10	Applying AWT concepts Design a Registration form with AWT Controls.	Design a registration from using AWT Controls	K6
11	Applying swing concepts Develop a java swing Frame to retrieve the records form the Job Portal database table	Develop a java program using Swing	K6
12	JDBC	Create a java program to manipulate database using JDB.	K6
13	Design a web application for Student details with database operations insert, delete and update	Design a web application to manipulate student details	K6

4. MAPPING (CO, PO, PSO)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	**H**	**M**	**H**	**L**	**H**	**H**	**H**	**H**	**H**	**M**	**M**	**M**	**M**
CO2	**H**	**M**	**M**	**M**	**H**	**H**	**H**	**M**	**H**	**H**	**M**	**H**	**H**
CO3	**H**	**H**	**H**	**M**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**
CO4	**H**	**H**	**H**	**M**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**
CO5	**H**	**H**	**H**	**M**	**H**	**M**	**H**	**H**	**H**	**H**	**H**	**H**	**H**
CO6	**H**	**H**	**H**	**M**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**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, Seminar.
3. Pre/Post Test, Viva, Report for each Exercise.
4. Lab Model Examination & End Semester Practical Examination

INDIRECT:

1. Course end survey (Feedback)

COURSE COORDINATOR — Dr.T.CYNTHIA

HEAD OF THE DEPARTMENT — Dr.R.THAMARAI SELVI

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Core Practical II: INTERNET PROGRAMMING LAB

SEMESTER: I **CODE: P18CA1P2**
CREDITS: 2 **HOURS/WEEKS: 4**

1. COURSE OUTCOMES

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

S.No.	Course Outcomes	Level	Exercise Covered
CO1	Summarize the basic tags to develop web pages design using HTML	K2	1,3,4
CO2	Construct the web page using image mapping and link the pages using hyperlinks	K6	2
CO3	Create the tabular content in web page using tables, form and canvas	K6	5,6,8,13
CO4	Develop a web page with multimedia and display the new articles using semantic elements	K6	7,9
CO5	Design a web page for various event and event handlers	K6	10,11,12
CO6	Design a web site to interact with users AngularJS	K6	14,15

2A. Syllabus

1. Create a sample web site for the college and courses offered using various formatting text tags and hyperlink
2. Create a web page contain world map which link various parts of the map using
   i. To embed an image map concept in web page
   ii. To locate hotspot in an image map
3. Write a program to design a website of your home town with the following
   i. Cascading Style Sheet
   ii. External style Sheet
   iii. Inline Style Sheet
4. Create a web site for a restaurant that links pages using list and hyperlinks
5. Design a web page to display the class time table using tables
6. Create a web page to display various geometric transformations.
7. Write a program to play a video and audio clip of your department activities using multimedia content in a web page
8. Create a web page for a bio-data to enter the personal information using various input elements
9. Design a web page for a news article using semantic elements
10. Write a java script program to validate the screen input
11. Write a program in java script to design calculator using event handler
12. Design a web page to change the background color of a web page using button element.
13. Create a web page for college admission forms
14. Write a program to create a web page using AngularJS expressions
15. Create a validation form in web page using Angular JS framework

B. TOPICS FOR SELF-STUDY

S.No	Topics	Web Link
1	Giphy with a unique API	**https://medium.com/@mattcroak718/beginners-guide-to-the-giphy-api-316f98459d06**
2	AJAX-style login	**https://www.youtube.com/watch?v=U1yQNnG4lyA**
3	JavaScript quiz game	**https://www.youtube.com/watch?v=49pYIMygIcU**
4	Webpack Angular JS	**https://codecraft.tv/courses/angularjs-migration/step-2-typescript-and-webpack/using-webpack/**

C. Text Books:

1. Faithe Wempen, "HTML5 Step by Step", First edition, Microsoft Press, 2011.
2. Robert W. Sebesta, "Programming the World Wide Web", Pearson Education, Seventh Edition, 2014.
3. Felix Alvaro, "ANGULARJS: Easy AngularJS for Beginners", Kindle Edition, 2016.

D. Reference Book:

1. Joel Skylar, "Principles of Web Design: The Web Technologies Series," Fifth Edition, 2011.

E. Web links:

1. **https://www.w3schools.com/js/DEFAULT.asp**
2. **https://www.javascripttutorial.net/**
3. **https://www.codecademy.com/learn/introduction-to-javascript**

3. SPECIFIC LEARNING OUTCOMES (SLO)

Exercise	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
1	Create a sample web site for the college and courses offered using various formatting text tags and hyperlink	Develop a web site using basic html tags with hyperlinks and text formatting	K6
2	Create a web page contain world map which link various parts of the map using hotspot in an image map	Construct a web site to locate a place in a world map and links its corresponding home page	K5
3	Write a program to design a website of your home town with the using CSS	Design a web page for a home town with various style sheets	K6
4	Create a web site for a restaurant that links pages using list and hyperlinks	Develop a web page for a restaurant contains its menu and	K6

		other details with ordered and un ordered list	
5	Design a web page to display the class time table using tables	Construct a class time table using table format	K6
6	Create a web page to display various geometric transformations.	Build web page displaying various geometry shapes using canvas tags	K6
7	Write a program to play a video and audio clip of your department activities using multimedia content in a web page	Adapt the audio and video content on the web page	K6
8	Create a web page for a bio-data to enter the personal information using various input elements	Develop a web page to fill the personal details using forms with various elements	K6
9	Design a web page for a news article using semantic elements	Design a news article about a college using semantic elements	K6
10	Write a java script program to validate the screen input	Design a web page for login details with username and password	K6
11	Write a program in java script to design calculator using event handler	Develop a calculator in a web page	K6
12	Design a web page to change the background color of a web page using button element.	Design a web page to change the background color by clicking a button using event handler	K6
13	Create a web page for college admission forms	Create an admission form for college	K6
14	Create a validation form in web page using Angular JS framework	Create a web page for using expressions in angular JS	K6
15	Create a validation form in web page using Angular JS framework	Create a web page to validate the form	K6

4.

MAPPING (CO, PO, PSO)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**H**	**-**	**M**	**-**	**L**	**L**	**H**	**L**	**M**	**H**	**M**	**H**	**H**
CO2	**H**	**H**	**H**	**L**	**H**	**-**	**L**	**L**	**M**	**M**	**H**	**H**	**H**
CO3	**H**	**-**	**H**	**-**	**H**	**M**	**H**	**L**	**M**	**H**	**H**	**H**	**H**
CO4	**H**	**H**	**M**	**-**	**M**	**M**	**M**	**-**	**H**	**M**	**H**	**H**	**H**
CO5	**H**	**M**	**H**	**-**	**H**	**M**	**H**	**-**	**H**	**H**	**H**	**H**	**H**
CO6	**H**	**-**	**M**	**-**	**H**	**M**	**H**	**-**	**M**	**H**	**H**	**H**	**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, Seminar.
3. Pre/Post Test, Viva, Report for each Exercise.
4. Lab Model Examination & End Semester Practical Examination

INDIRECT:

1. Course end survey (Feedback)

COURSE COORDINATOR **HEAD OF THE DEPARTMENT**

Dr. M. LOVELIN PONN FELCIAH Dr.R.THAMARAI SELVI

****

Core V: PROGRAMMING IN .NET TECHNOLOGY

SEMESTER: II **CODE: P18CA205**
CREDITS:4 **HOURS/WEEKS: 4**

1. COURSE OUTCOMES

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

S.No.	Course Outcomes	Level	Unit
CO1	Create web applications using HTML controls and server controls	K2	I
CO2	Design web applications using MVC pattern and demonstrate CRUD application	K6	II
CO3	Illustrate Partial Views in applications and select the parts of an application that can be constructed with partial views	K2	III
CO4	Demonstrate an application with validations and annotations to design better UI	K2	IV
CO5	Construct Web API and avail the existing Web API's whenever needed	K6	V
CO6	Select libraries for web applications based on the requirements	K1	V

2A. Syllabus

UNIT I - Web Technologies **12 Hours**

The Anatomy of an ASP.NET Application – Introducing Server Controls– Improving the Currency Converter– A Deeper Look at HTML Control Classes– The Page Class– Application Events– Stepping Up to Web Controls– Web Control Classes– List Controls– Table Controls– Web Control Events and AutoPostBack–A Simple Web Page.

UNIT II - Controllers And Views **12 Hours**

Introduction of different Web Technology-Quick introduction to ASP.NET MVC-Role of Model, View, and Controller-How ASP.NET MVC Works-Benefits of using ASP.NET MVC-Installing MVC 5 and Creating Applications**.**

UNIT III - Models **12 Hours**

Controllers– The Controller's Role-A sample Application:The MVC Music Store-Controller Basics. **Views-**The purpose of Views-View Basics-The Razor View Engine-Specifying a partial view.

UNIT IV - AJAX and Nuget **12 Hours**

Models-Modeling the Music store-Scaffolding a store manager-Editing an Album-Model Binding-**Data annotations and Validation-**Annotating orders for validation-Custom validation logic-Display and edit annotations.

UNIT V - ASP.NET -API and single page applications with AngularJS **12 Hours**

AJAX: JQuery-Ajax helpers-Client validation-Beyond helpers-Improving Ajax performance. **Nuget –** Introduction to Nuget-Adding a library as a package. **Asp.Net Web API-**Defining Asp.net web API-Writing an API controller-Configuring web API.

B. TOPICS FOR SELF-STUDY

S.No.	Topics	Web Links
1	External Authentication Services with Web API (C#)	https://docs.microsoft.com/en-us/aspnet/web-api/overview/security/external-authentication-services
2	ASP.NET MVC Integration with GitHub	https://docs.microsoft.com/en-us/dotnet/samples-and-tutorials/
3	ASP.NET WebHooks	https://docs.microsoft.com/en-us/aspnet/webhooks/
4	ASP.NET Core	https://docs.microsoft.com/en-us/aspnet/core/blazor/?view=aspnetcore-5.0

C. Text Books:

1. Mathew MacDonald, "Beginning ASP.NET 4 in C# 2010: From Novice to Professional", Apress Publications, Second Edition, 2012.
2. Jon Galloway, Brad Wilson, K.Scott Allen, David Matson, "Professional ASP.NET MVC 5", John Wiley & sons Inc.

D. Reference Books:

1. 1. Mathew MacDonald, "Beginning ASP.NET 3.5 in C# 2008: From Novice to Professional", Apress Publications, Second Edition, 2008.
2. Mahesh Chand, "Programming C# 5.0, C# Corner Publications, 2014.
3. Freeman, Adam, "ProASP.NET MVC 5", Apress, 2013.

E. Web links:

1. **https://docs.microsoft.com/en-us/aspnet/mvc/overview/getting-started/introduction/getting-started**
2. **https://www.tutorialsteacher.com/mvc/asp.net-mvc-tutorials**

3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning outcomes	Highest Bloom's Taxonomic Level of Transaction
I	**Web Technologies**		
1.1	Introduction of different Web Technology	Define web technologies	K1
1.2	Quick introduction to ASP.NET MVC	Identify the roles of Model, View and Controller	K3
1.3	Role of Model, View, and Controller	Compare MVC with previous technologies	K2
1.4	How ASP.NET MVC Works	Make use of MVC in developing a web application	K3

Unit/ Section	Course Content	Learning outcomes	Highest Bloom's Taxonomic Level of Transaction
1.5	Benefits of using ASP.NET MVC	Utilize MVC design pattern in creating web application	K3
1.6	Installing MVC 5 and Creating Applications.	Build a web application in Visual Studio	K6
II	**Controllers And Views**		
2.1	The Controller's Role	Decide the role of controller in web application	K5
2.2	A sample Application	Develop " Music Store" app using MVC	K6
2.3	Controller Basics	Interpret the basics of controller into an application	K5
2.4	Views-The purpose of Views	Select correct technology to design View	K3
2.5	View Basics	Illustrate the use of view in a sample application	K2
2.6	The Razor View Engine	Design Registration page with Razor View	K6
III	**Models**		
3.1	Modeling the Music store	Compose Models for Music Store application	K6
3.2	Scaffolding a store manager	Improve UI with scaffolding	K6
3.3	Editing an Album	Change the UI by adding/deleting fields	K6
3.4	Model Binding	Combine Models with Views using model binding	K6
3.5	Data annotations and Validation	Test for correct I/P values using validation	K3
3.6	Annotating orders for validation	Determine annotation	K6
3.7	Custom validation logic	Create a custom validation logic for strong password	K6
3.8	Display and edit annotations.	Show annotations in program	K1
IV	**AJAX and Nuget**		
4.1	Jquery	Define the role of Jquery in web application	K1
4.2	Ajax helpers	Combine Ajax helpers in designing a web page	K6
4.3	Client validation	Examine the I/P with validations	K4
4.4	Beyond helpers	Explain helpers	K2
4.5	Improving Ajax performance	Design a web application with improved Ajax controls	K6
4.6	Introduction to Nuget	Make use of Nuget package manager	K3
4.7	Adding a library as a package	Test for package manager by downloading bootstrap	K4

Unit/ Section	Course Content	Learning outcomes	Highest Bloom's Taxonomic Level of Transaction
V	**ASP.NET API and single page applications with AngularJS**		
5.1	Defining Asp.net web API	Improve web application with API	K6
5.2	Getting started with web API	Choose an API for Music store application	K6
5.3	Writing an API controller, Configuring web API	Develop an API for CRUD operations	K6
5.4	Understanding and Setting up AngularJS	Build an application using AngularJS	K6
5.5	Building the web API	Develop an API for CRUD operations	K6
5.6	Building applications and modules	Build a small web application	K6
5.7	Defining Asp.net web API	Improve web application with API	K6

4. MAPPING (CO, PO, PSO)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	**H**	**H**	**H**	**H**	**H**	**M**	**H**	**H**	**H**	**L**	**L**	**H**	**H**
CO2	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**
CO3	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**M**	**H**	**H**	**H**	**H**	**M**
CO4	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**
CO5	**H**	**H**	**L**	**M**	**H**	**H**	**H**	**H**	**H**	**L**	**L**	**H**	**H**
CO6	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**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, Poster Presentation, Seminar, Quiz (written).
4. Pre-Semester & End Semester Theory Examination

INDIRECT:

1. Course end survey (Feedback)

COURSE COORDINATOR — Dr.T.CYNTHIA

HEAD OF THE DEPARTMENT — Dr.R.THAMARAI SELVI

****

SEMESTER : II **HOURS/WEEK : 4**
CODE : P18CA206 **CREDITS : 3**

Core VI : PROBABILITY AND STATISTICS

Course Objectives:

COURSE OUTCOMES

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

S.No.	Course Outcomes	Level	Unit
CO1	Provide students with the foundations of probabilistic and statistical analysis mostly used in varied applications in engineering and science like disease modeling, climate prediction and computer networks etc	K2	I
CO2	Analyze discrete distributions and basics of statistics.	K4	II
CO3	Apply concepts of various probability distributions to find probabilities.	K3	III
CO4	Demonstrate an application with validations and annotations to design better UI	K2	IV
CO5	Test the types of Samplings.	K6	V
CO6	Formulate means and variance for large and small samples	K6	V

UNIT – I **10 Hours**

Probability – Random Events –Sample Spaces – Axiomatic Approach to Probability – Conditional Probability –Addition and Multiplication – Baye's Theorem.

UNIT – II **10 Hours**

Random Variables –Discrete and Continuous Random Variables–Probability Density Functions – Distribution Functions – Marginal and Conditional probability Distribution Functions.

UNIT – III **10 Hours**

Mathematical Expectations –Variance –Moment Generating Functions – Correlation Coefficients –Regression.

UNIT – IV **10 Hours**

Discrete Distributions – Binomial, Poisson Distributions – Continuous Distribution –Normal and Properties of Normal Distribution.

UNIT – V **10 Hours**

Concept of Sampling – Types of Sampling – Sampling Distribution and Standard Error – Testing of Hypothesis – Tests for Means and Variances for Large and Small Samples – Chi–Square Test and its Applications – Tests of Goodness of Fit – Test of Independence of Attributes.

Books for Study

1. Irwin Miller., Marylees Miller., "John E. Freund'sMathematical Statistics with Applications", Seventh Edition, Pearson Education,2004.

Books for Reference

1. Madin A, "Statistical Methods - An Introductory Text", Wiley BasterLtd., New Delhi,2010.
2. Guptha S.V, Kapoor V.K, "Fundamental of Mathematical Statistics", Sultan Chand andSons, 2011.

E. Web links:

1. **https://swayam.gov.in/explorer?searchText=operations%20research**
2. **https://nptel.ac.in/courses/111/107/111107128/**

3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
I	**Probability**		
1.1	Random Events	Explain and discuss about Random Events	K2
1.2	Sample Spaces	Describe Sample Spaces	K2
1.3	Axiomatic Approach to Probability	Estimate Axiomatic Approach to Probability	K2
1.4	Conditional Probability	Determine the solution for Conditional Probability	K2
1.5	Addition and Multiplication	Solve Addition and Multiplication	K6
1.6	Baye's Theorem	Discuss Baye's Theorem	K6
II	**Random Variables**		
2.1	Discrete and Continuous Random Variables	Identify Discrete and Continuous Random Variables	K3
2.2	Probability Density Functions	Make use of Probability Density Functions	K3
2.3	Distribution Functions	Estimates the Initial Basic Feasible Solution	K6
2.4	Marginal and Conditional probability Distribution Functions	Identify the degeneracy in transportation problem	K3
III	**Mathematical Expectations**		
3.1	Variance	Classify Variance	K4
3.2	Moment Generating Functions	Explain the Moment Generating Functions	K5
3.3	Correlation Coefficients	Construct Correlation Coefficients	K5
3.4	Regression	Solve Regression.	K6
IV	**Discrete Distributions**		

4.1	Binomial, Poisson Distributions	Discuss Binomial, Poisson Distributions	K6
4.2	Continuous Distribution	Explain Continuous Distribution	K5
4.3	Normal and Properties of Normal Distribution	Discuss Normal and Properties of Normal Distribution	K6
V	**Concept of Sampling**		
5.1	Types of Sampling	Explain the types of Sampling	K5
5.2	Sampling Distribution and Standard Error	Discuss Sampling Distribution and Standard Error	K6
5.3	Testing of Hypothesis	Test the testing of Hypothesis	K6
5.4	Tests for Means and Variances for Large and Small Samples	Solve Tests for Means and Variances for Large and Small Samples	K6
5.5	Chi–Square Test and its Applications	Discuss Chi–Square Test and its Applications	K6
5.6	Tests of Goodness of Fit	Determine Tests of Goodness of Fit	K5
5.7	Test of Independence of Attributes	Discuss Test of Independence of Attributes	K6

4. MAPPING (CO, PO, PSO)

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

L-Low **M-Moderate** **H- High**

5. COURSE ASSESSMENT METHODS

DIRECT:

1. Continuous Assessment Test: T1, T2 (Theory & Practical Components): Closed Book
2. Open Book Test.

3. Cooperative Learning Report, Assignment, Group Presentation, Group Discussion, Poster Presentation, Seminar, Quiz (written).
4. Pre-Semester & End Semester Theory Examination

INDIRECT:

1. Course end survey (Feedback)

COURSE COORDINATOR **HEAD OF THE DEPARTMENT**

Dr.J.CHRISTY KINGSTON Dr.R.THAMARAI SELVI

****

Core VII: LINUX PROGRAMMING

SEMESTER: II **CODE: P18CA207**
CREDITS: 4 **HOURS/WEEKS: 4**

1. COURSE OUTCOMES

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

S.No.	Course Outcomes	Level	Unit covered
CO1	Create and work with Linux Shell programming techniques and files	K6	I
CO2	Assess the information in the files and terminals	K5	II
CO3	Apply various data management techniques, tools with other debugging functions.	K3	III
CO4	Design and apply various functionalities of process and signals	K6	IV
CO5	Develop GNOME programming using GTK+.	K6	V
CO6	Construct programming with KDE using Qt.	K6	V

2A. Syllabus

UNIT I - Shell Programming and Files **12 Hours**

Getting Started: An Introduction to UNIX, Linux and GNU -Programming Linux:.**Shell Programming:** why program with a shell? a bit of philosophy-what is a shell?-pipes and redirection-the shell as a programming language-shell syntax-going graphical the dialog utility-putting it all together. **Working with Files:** linux file structure-system calls and device drivers-library functions-low-level file access-the standard I/O library-Formatted input and output-file and directory maintenance-scanning directories-errors-the/proc file system-advanced topics.

UNIT II - The Linux Environment and Terminals **12 Hours**

The Linux Environment: program arguments-environment variables-time and date-temporary files-user information-host information-logging-resources and limits **. Terminals:** Reading from and Writing to the terminal-talking to the terminal-the terminal driver and the general terminal interface-the termios structure-terminal output-detecting keystrokes. **Managing Text-Based Screens with curses:** compiling with curses-curses terminology and concepts-the screen-the keyboard-windows-subwindows-the keypad-using color-pads-the CD collection application,

UNIT III - Data Management and Tools with Debugging **12 Hours**

Data Management: managing memory-file locking-databases-the CD application. **Development Tools:** problems of multiple source files-the make command and make files-source code control-writing a manual page-distributing software-RPM packages-other package formats-development environments. **Debugging:** types of errors-general debugging techniques-debugging with gdb-more debugging tools-assertions-memory debugging.

UNIT IV - Process Signals , POSIX .Pipes and Semaphores **12 Hours**

Processes and Signals: what is a process:-process structure-starting new processes-signals, **POSIX Threads:** what is a thread?-advantages and drawbacks of threads-a first threads program-

simultaneous execution-synchronization-thread attributes-cancelling a thread-threads in abundance. **Inter-Process Communication: Pipes:** what is a pipe?-process pipes-sending output to popen-the pipe call-parent and child processes-named pipes: FIFOs-the CD database application. **Semaphores, Shared memory and Message Queues:** semaphores-shared memory-message queues-the CD database application-IPC status commands.

UNIT V -Sockets, Programming with GNOME and KDE using GTK+ and Qt 12Hours

Sockets: what is a socket?-socket connections-network information-multiple clients-datagrams. **Programming GNOME using GTK+:**introducing X-introducing GTK+ -Events, signals and widgets-GTK+ widgets-GNOME widgets- GNOME menus-dialogs-CD database application .**Programming KDE Using Qt :**introducing KDE and Qt-installing Qt-signals and slots-Qt widgets-dialogs-menus and toolbars with KDE-CD database application using KDE/Qt.

B. TOPICS FOR SELF-STUDY

S.No	Topics	Web Link
1	Shell Generalities	**www.math.uh.ed**
2	Interactive Shell Script	**www.tldp.org**
3	The sed stream Editor	**www.tutorialspoint.com**
4	The awk Programming Language	**www.en.wikipedia.org**

C. Text Books:

1. Neil Matthew,Richard Stones,"Beginning Linux Programming", Fourth Edition,Wiley Publishing Inc,2008.

D. Reference Books:

1. Paul Cobbaut,"Linux Fundamentals" version 1.3,published by Free Software Foundation on 24 may 2015.
2. Ellen Siever, Stephen Figgins, Robert Love, Arnold Robbins, "Linux in a Nutshell", 6thEdition, O'Reilly Media, 2009.
3. Neil Matthew, Richard Stones, Alan Cox, "Beginning Linux Programming", 3rd Edition, 2004.
4. Robert Love, "Linux System Programming" ,O'Reilly Media, 2ndEd., 2007.
5. William Shotts,"The Linux Command Line"version 16.07,3rd internet edition, published by No Starch press on July 28,2016.

E. Web Links:

1.**www.guru99.com**
2.**www.learnpick.in**
3.**www.cdac.in**

3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
I	**Getting Started**		

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
1.1	An Introduction for UNIX and Linux	Distinguish between Unix and Linux.	K4
1.2	The GNU Project	Explain the GNU project	K5
1.3	Linux Distributions	Discuss linux distribution.	K6
1.4	Programming Unix - Linux Programs	Create a linux shell program.	K6
1.5	Text Editors	Summarize on various text editors.	K2
1.6	The C Compiler	Explain the C Compiler	K5
1.7	Development System Roadmap	Discuss on the roadmap	K6
1.8	Shell program , A bit of philosophy	Discuss on shell.	K6
1.9	Pipes and Redirection	Explain the different types of redirection.	K5
1.10	The Shell as a Programming Language	Illustrate different types of shell programs	K2
1.11	Shell Syntax	Show the syntax for a shell.	K1
1.12	Variables	Explain variables in detail.	K5
1.13	Condition control structures	Develop programs using condition control structures.	K6
1.14	Shell Syntax – Functions	Explain functions in detail	K5
1.15	Commands	Make use of the different types of shell commands	K3
1.16	Command Execution	Discuss on execution of the programs.	K6
1.17	Shell Syntax -documents, Debugging Scripts, Graphical	What is a document?	K1
1.18	Debugging Scripts	Elaborate on debugging scripts.	K6
1.19	Graphical	Outline on graphical structure.	K2
1.20	Linux File Structure	Summarize on linux file structure.	K2
1.21	System Calls	Explain system calls	K5
1.22	Device Drivers	Illustrate on device drivers	K2
1.23	Library Functions	Elaborate on library functions	K6
1.24	Lowlevel File Access	Discuss on low level file access.	K6
1.25	The Standard I/O Library	Illustrate on the standard i/o library functions	K6
1.26	Formatted Input and Output	Determine the concept formatted input and output functions	K5
1.27	File and Directory Maintenance	Discuss on directory maintenance	K6

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
1.28	Scanning Directories	Explain about scanning directories	K5
1.29	Errors, The /proc File System	Recall on /proc file system	K1
II	**The Linux Environment**		
2.1	Program Arguments	Explain program arguments	K5
2.2	Environment Variables	Outline on environment variables	K1
2.3	Time and Date	Explain Time and Date variables	K5
2.4	Temporary Files	Discuss temporary files in detail	K6
2.5	User Information	Elaborate on user information	K5
2.6	Host Information	Illustrate on host information	K2
2.7	Logging	Recall logging	K1
2.8	Resources and Limits	Outline on resources and limits	K2
	Terminals		
2.9	Reading from and writing to the terminal	Explain reading from and writing to the terminal	K5
2.10	Talking to the terminal	Outline on talking to the terminal	K2
2.11	The terminal driver and the general terminal interface	Discuss on the terminal driver and general terminal interface	K6
2.12	The termios structure	Elaborate on the termios structure	K6
2.13	Terminal output	Summarize on terminal output	K2
2.14	Detecting keystrokes	Recall on detecting keystrokes	K1
	Managing Text-Based Screens with curses		
3.7	Compiling with curses	Explain how to compile with curses	K5
3.8	Curses terminology and concepts	Elaborate on the concept of curses terminology	K6
3.9	The screen-the keyboard-windows-subwindows-the keypad-using color-pads-the	Outline on the concept of screen, keyboard and windows.	K2
III	**Data Management**		
3.1	Managing memory	Explain memory management	K5
3.2	File locking and databases	Discuss file locking	K6
3.3	**Development Tools**		
3.4	Problems of multiple source files	Recall the problem of multiple source files	K1
3.5	The make command and make files	Elaborate make command and make files	K6
3.6	Source code control	Outline on source cod control	K2
3.7	Writing a manual page	Illustrate on writing a manual page	K2

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
3.8	Distributing software	Summarize on distributing a software	K2
3.9	RPM packages	Explain RPM package	K5
3.10	Other package formats and development environments	Discuss the development environments.	K6
	Debugging		
3.11	Types of errors	Explain the types of errors	K5
3.12	General debugging techniques	Outline on the general debugging techniques	K2
3.13	Debugging with gdb	Elaborate debugging with gdb	K6
3.14	More debugging tools	Discuss the debugging tools in detail	K6
3.15	Assertions, and memory debugging	Recall assertion	K1
IV	**Processes and Signals**		
4.1	Process structure	Explain process structure	K5
4.2	Starting new processes	Illustrate on starting a new process	K2
4.3	Signals	Discuss on signals	K6
	POSIX Threads		
4.4	Advantages and drawbacks of threads	List the advantages and disadvantages of threads	K1
4.5	A first threads program	Create a thread program.	K6
4.6	Simultaneous execution	Explain simultaneous execution	K5
4.7	Synchronization	Discuss synchronization	K6
4.8	Thread attributes	Outline thread attributes in detail	K2
4.9	Cancelling a thread	Illustrate cancelling a thread	K2
4.10	Threads in abundance	Elaborate on thread in abundance	K5
	Inter-Process Communication: Pipes		
4.11	Process pipes	Discuss process pipes	K6
4.12	Sending output to popen	Explain sending output to popen	K5
4.13	The pipe call	Summarize on pipe call	K2
4.14	Parent and child processes	Outline on parent and child processes.	K2
4.15	Named pipes: fifos	Elaborate on FIFO.	K6
	Semaphores, Shared memory and Message Queues		
4.16	Semaphores	Explain semaphores	K5
4.17	Shared memory	Discuss shared memory in detail	K6
4.18	Message queue	Recall message queues	K1
V	**Sockets**		
5.1	Socket connections and network information	Explain Connections and network in detail	K5

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
5.2	Multiple clients	Elaborate on multiple clients	K6
5.3	Datagrams	Summarize on datagram	K2
	Programming GNOME using GTK+		
5.4	Introducing X-introducing GTK+	Recall on GTK+	K1
5.5	Events	Summarize on events	K2
5.6	Signals and widgets-GTK+ widgets-GNOME widgets	Discuss on signals and widgets	K6
5.7	GNOME menus and dialogs	Outline on GNOME menus and dialogues	K2
	Programming KDE Using Qt		
5.8	Introducing KDE and Qt	Explain KDE	K5
5.9	Installing Qt	Elaborate on the Installation process of Qt	K6
5.10	Signals and slots	Discuss on signals and slots	K6
5.11	Qt widgets	Outline on Qt widget	K2
5.12	Dialogs and menus	Summarize on dialogues and menus in KDE	K2
5.13	Toolbars with KDE	Recall the toolbars in KDE	K1

4. MAPPING (CO, PO, PSO)

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

L-Low **M-Moderate** **H- High**

5. COURSE ASSESSMENT METHODS

DIRECT:

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

INDIRECT:

1. Course end survey (Feedback)

COURSE COORDINATOR **HEAD OF THE DEPARTMENT**

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Core VIII: DATA STRUCTURES AND ALGORITHMS

SEMESTER: II **CODE: P19CA208**
CREDITS: 3 **HOURS/WEEKS: 4**

1. COURSE OUTCOMES

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

S.No.	Course Outcomes	Level	Unit
CO1	Summarize the basic concepts of Data Structures	K2	I
CO2	Discuss the representation and Operation of Binary Tree	K6	II
CO3	Analyze and apply Graph Structures	K4	III
CO4	Compare the various Algorithms for Merge sort and Quick sort	K5	IV
CO5	Make use of the various Dynamic Programming techniques	K3	V
CO6	Discuss 8-Queens Problem and Graph Coloring.	K6	V

2A. Syllabus

UNIT I - Introduction to Data structure **12 Hours**

Introduction and Overview: Definitions – Concept of Data Structures – Overview of Data Structures – Implementation of Data Structures. **Linked Lists:** Definition – Single Linked List – Circular Linked List – Double Linked List – Circular Double Linked List – Application of Linked Lists. **Stacks:** Introduction – Definition – Representation of Stack – Operations on Stacks – Application of Stacks. **Queues:** Introduction – Definition – Representation of Queues – Various Queue Structures– Application of Queues.

UNIT II - Tree and Binary Tree **12 Hours**

Trees : Basic Terminologies – Definition and Concepts – Representation of Binary Tree – Operations on Binary Tree – Types of Binary Trees – Trees and Forests – B Trees .

UNIT III - Graphs and Algorithm Analysis **12 Hours**

Graphs: Introduction – Graph Terminologies – Representation of Graphs – Operations on Graphs – Applications of Graph Structures – BDD and its Applications. **Introduction:** What is an Algorithm? – Algorithm Specification – Performance Analysis**.**

UNIT IV - Divide–and–Conquer and Greedy Method **12 Hours**

Divide–and–Conquer: General Method – Binary Search – Finding the Maximum and Minimum – Merge Sort – Quick Sort – Selection. **The Greedy Method:** The General Method – Minimum Cost Spanning Trees – Single–Source Shortest Paths.

UNIT V - Dynamic Programming and Backtracking **12 Hours**

Dynamic Programming: The General Method – Multistage Graphs – All Pairs Shortest Paths – Single Source Shortest Paths. **Backtracking:** The General Method – The 8-Queens Problem – Sum of Subsets – Graph Coloring.

B. TOPICS FOR SELF-STUDY

S.No	Topics	Web Link
1	Graph Traversal	**www.tutorialspoint.com**
2	AVL Tree	**www.geeksforgeeks.com**
3	Tree Traversal	**www.geeksforgeeks.com**
4	Heap	**www.tutorialspoint.com**

C. Text Books:

1. Samanta D, "Classic Data Structures", Prentice Hall of India, 2006.
2. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, "Fundamentals of Computer Algorithms", Galgotia Publications, Second Edition, 1998.

D. Reference Books:

1. V. Aho, J. E. Hopcroft, and J. D. Ullman, "Data Structures and Algorithms", Pearson Education, 2008.
2. Anany Levitin, "Introduction to the Design and Analysis of Algorithms", Pearson Education 2003.

E. Web links:

1. **https://swayam.gov.in/nd1_noc19_cs51**
2. **https://nptel.ac.in/courses/106106144**

3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
I	**Basics of Data Structures**		
1.1	Data Structure Basics	Recall the basic concepts of data structures	K1
1.2	Outline the operations on data structure	Outline the operations on data structure	K2
1.3	Single Linked List	Discuss the Single Linked List.	K6
1.4	Doubly Linked List.	Outline use of Doubly Linked List.	K2
	Stacks and Queue		
1.5	Operations on Stack	Explain about the operations on Stack	K2
1.6	Application of Stack	Outline the Application of Stack	K2
1.7	Representation of Queues	Explain Representation of Queues	K2

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
1.8	Application of Queue	Discuss about Application of Queue	K6
II	**Tree and Binary Tree Concepts**		
2.1	Tree Basics	Recall the basic concepts of Tree	K1
2.2	Binary Tree	Define Binary Tree.	K1
2.3	Representation of binary tree	Explain the Representation of binary tree.	K2
2.4	Operation on binary tree	Summarize Operation on binary tree	K2
2.5	Types of binary trees	Compare the types of binary trees	K4
2.6	B Tree	Discuss about B Tree	K6
2.7	Forest	Define Forest	K1
III	**Graphs and Algorithm**		
3.1	Graph Basics	Recall the basic concepts of Graph	K1
3.2	Representation of Graphs	Explain the Representation of Graphs	K2
3.3	Applications of Graphs	Discuss the Applications of Graphs	K6
	Algorithm		
3.4	Algorithm Basics	Define Algorithm	K1
3.5	Performance analysis	Compare the performance analysis on an algorithm	K4
IV	**Divide and Conquer**		
4.1	Divide and Conquer algorithms	Classify the Divide and Conquer algorithms	K5
4.2	Binary search algorithm.	Develop binary search algorithm.	K5
4.3	Merge Sort	Discuss about Merge Sort	K6
4.4	Quick Sort	Illustrate Quick Sort	K2
4.5	Selection Sort	Apply Selection Sort	K3
	Greedy Method		
4.6	Greedy algorithms	Classify the Greedy algorithms	K5
4.7	Shortest path algorithm	Discuss the shortest path algorithm	K6
4.8	Minimum cost spanning tree	Develop Minimum cost spanning Tree algorithm	K5
V	**Dynamic Programming and Backtracking**		
5.1	Dynamic Programming	Recall the basic concepts of Dynamic Programming	K1
5.2	Multistage Graphs	Explain Multistage Graphs	K2

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
5.3	All Pairs Shortest Paths	Discuss All Pairs Shortest Paths problem	K6
5.4	Backtracking	Recall the basic concepts of Backtracking	K1
5.5	The 8-Queens Problem	Apply The 8-Queens Problem	K3
5.6	Graph Coloring	Explain Graph Coloring	K2

4. MAPPING (CO, PO, PSO)

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

L-Low M-Moderate H- High

5. COURSE ASSESSMENT METHODS

DIRECT:

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

INDIRECT:

1. Course end survey (Feedback)

COURSE COORDINATOR Dr.T.CYNTHIA

HEAD OF THE DEPARTMENT Dr.R.THAMARAI SELVI

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Core Practical III: PROGRAMMING IN .NET LAB

SEMESTER: II **CODE: P20CA2P3**
CREDITS: 2 **HOURS/WEEKS: 4**

1. COURSE OUTCOMES

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

S.No.	Course Outcomes	Level	Exercise
CO1	Design web applications using ASP.NET controls	K6	1
CO2	Create application using MVC Bootstrap	K6	2,3
CO3	Develop ASP .NET MVC Dashboard applications	K6	4
CO4	Createan application using model class in ASP .NET MVC framework	K6	5,6
CO5	Designweb applications with database connectivity	K6	7
CO6	Justify Code First methodology	K5	8

2A. Syllabus

Ex.No.	Exercise
1	Design an ASP.NET web form using HTML Server Controls. Use at least 5 different controls.
2	Design a website using web controls to create an interactive website.
3	Create a Movie database application with ASP.NET MVC.
4	Design a MVCand Razor with database connection for CRUD
5	Create an ASP.NET MVC with Bootstrap
6	Design a Web based application for Event management system
7	Write an application for Restaurant table booking application.
8	Create an Online quiz application with Dashboard.

B. TOPICS FOR SELF-STUDY

Topics	Weblinks
Timesheet Project	**https://code.daypilot.org/97360/asp-net-mvc-5-timesheet**
Healthcare Portal	**https://dzone.com/articles/clinic-project-using-aspnet-mvc5**
Template download	**https://themeforest.net/**
Pharm Assistant	**https://www.youtube.com/watch?v=cG5tzgAkRBc**

3. SPECIFIC LEARNING OUTCOMES (SLO)

Ex.No.	Lab Exercises	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
1	HTML Server Controls	Develop a web page using HTML Server Controls	K6
2	Web Controls	Design an interactive website using web controls	K6
3	Movie Database Application	Create an application for movie database using MVC	K6
4	MVC and Razor with Database Connection for CRUD	Develop a web application for CRUD operations with Razor pages	K6
5	MVC with Bootstrap	Design a responsive web application using MVC Bootstap	K6
6	Event Management System	Design a web application for event management system	K6
7	Restaurant Table Booking Application	Build an application for restaurant table booking	K6
8	Online Quiz Application with Dashboard	Design an online quiz application with dashboard	K6

4. MAPPING (CO, PO, PSO)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	H	M	H	M	H	H	H	H	H	M	L	L	M
CO2	H	M	M	M	H	H	H	M	H	L	L	L	M
CO3	H	H	H	M	H	H	H	H	H	H	H	H	H
CO4	H	H	H	M	H	H	H	H	H	H	H	H	H
CO5	H	H	H	M	H	M	H	H	H	H	H	H	H
CO6	H	H	H	M	H	H	H	H	H	H	H	H	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.
3. Pre/Post Test, Viva, Report for each Exercise.
4. Lab Model Examination & End Semester Practical Examination

INDIRECT:

1. Course end survey (Feedback)

COURSE COORDINATOR **HEAD OF THE DEPARTMENT**

Dr.T.CYNTHIA Dr.R.THAMARAI SELVI

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Core Practical IV: PROGRAMMING IN LINUX LAB

SEMESTER: II **CODE: P18CA2P4**
CREDITS: 2 **HOURS/WEEKS: 4**

1. COURSE OBJECTIVES

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

S.No.	Course Outcomes	Level	Exercise Covered
CO1	Create shell programs using basic commands	K6	1,2
CO2	Develop programs with threads and processes	K6	2,3,4
CO3	Design applications using Inter Process Communication using pipes, shared memory and messages	K6	3,4,5 ,6
CO4	Demonstrate various shell programs using editors	K6	7,8
CO5	Apply filter functions for searching the files.	K3	4.5
CO6	Develop various conditional statements and looping statements	K6	9,10,11

2A. Syllabus

Ex. No.	Exercise
1	Basic Commands of Linux cal, pwd, cd, ls, mv, cd, cp, rm, mkdir, rmdir, more, less, touch.
2	Creating and viewing files using cat, file comparisons, disk related commands, checking disk free spaces.
3	Batch commands, kill, ps, who, Printing commands, find, sort, touch, file, file processing commands- wc, cut, paste etc –
4	Mathematical commands - expr, factor etc.
5	Filter commands- pr, head, tail, cut, sort, uniq. tr - Filter using regular expression grep, egrep, sed, awk .
6	Accessing help options, File names and Wild Card, Types of Files, Directory Hierarchy, Operations
7	Commands using vi and Emacs Editor, File Permissions
8	Shell Programming: Basics of Shell Programming, Meta Characters, Predefined Variables, Shell Variables, Storing and Accessing value of variables, Reading files, Expression, Strings Handling.
9	Conditional Statements: if, if-else, nested conditions, Case Statements

10	Positional Parameters, argument Validations, Looping Statements: while loop, until, for, Nested Loops, User Defined Functions.
11	Process Management with Linux, File System management, User Administration, Linux Start up and Shutdown.

B. TOPICS FOR SELF-STUDY

S.No	Topics	Web Link
1	Shell Generalities	**www.math.uh.ed**
2	Interactive Shell Script	**www.tldp.org**
3	The sed stream Editor	**www.tutorialspoint.com**
4	The awk Programming Language	**www.en.wikipedia.org**

3. SPECIFIC LEARNING OUTCOMES (SLO)

Ex.No.	Lab Exercises	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
1	Basic Commands	Demonstrate the basic commands Cal,pwd,ls,mv,cp.rm,less,more and touch	K6
2	Directory Commands	Create Cd,mkdir,rmdir,etc.,	K6
3	File Commands	Create and view the files using cat,file comparisons.	K6
4	File Commands	DemonstrateDisk Related commands,checking disk free spaces	K6
5	Batch commands	Demonstrate Kill,ps,who, Printing Commands,find,sort,file,touch.	K6
6	File Processing Commands	Make use of Wc,cut,paste etc.,	K3
7	Mathematical Commands	Create Expr,factor etc.,	K6
8	Filter Commands	Develop Pr,head,tail,cut,sort,uniq,tr,filter using regular expression grep,egrep,sed,awk	K6
9	Accessing help options	Demonstrate Help options,filenamesand wild card,types of files,director hierarchy operations.	K6
10	Editor Commands	Create Vi,emacseditor,file permission	K6
11	Shell Programming	Demonstrate Basics of shell programming,metacharacters,predefined variables	K6

12	Shell Programming	Design shell variables,storing and accessing value of variables	K6
13	Shell Programming	Develop Reading files, expressions, string handling.	K6
14	Conditional Statements	Create Programs using If and if-else, Nested condition,Case Statement	K6
15	Positional parameters	Design Parameters,argument validation	K6
16	Looping Statements	Develop While loop,until,for, Nested loops,user defined functions	K6
17	Process Managements	Create Process management with linux,file system management	K6
18	Linux Administration	Develop Administration commands,linux startup and shutdown	K6

4. MAPPING (CO, PO, PSO)

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

L-Low M-Moderate H- High

5. COURSE ASSESSMENT METHODS

DIRECT:

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

INDIRECT:

1. Course end survey (Feedback)

COURSE COORDINATOR — Mrs. PEARLY CHARLES

HEAD OF THE DEPARTMENT — Dr.R.THAMARAI SELVI

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Elective I: COMPUTER GRAPHICS

SEMESTER: II **CODE: P19CA2:1**
CREDITS: 3 **HOURS/WEEKS: 4**

1. COURSE OUTCOMES

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

S.No.	Course Outcomes	Level	Unit covered
CO1	Summarize the basic concepts and features and mathematical applications of Computer Graphics.	K2	1
CO2	Analyze the fundamentals of 2D and 3D Computer Graphics.	K3	II
CO3	Apply the various concepts of viewing and interactive techniques.	K4	III
CO4	Examine the three-dimensional techniques in Computer Graphics Application	K3	IV
CO5	Build the knowledge of Visible–Surface Detection Methods.	K5	V
CO6	Develop the application using computer animation.	K6	V

2A. Syllabus

UNIT I - Output Primitives **12 Hours**

Overview of Graphics Systems: Video Display Devices – Input Devices – Hard Copy Devices – Graphics Software – Introduction to OpenGL. **Graphics Output Primitives:** Line–Drawing Algorithms – Line Equations – DDA Algorithm – Bresenham's Algorithm – Circle – Generating Algorithms.

UNIT II - Graphics Primitives and Geometric Transformations **12 Hours**

Attributes of Graphics Primitives: Color and Gray Scale – Line Attributes – Fill–Area Attributes – Character Attributes – Antialiasing. – OpenGL Color Functions. **Geometric Transformations:** Basic Two Dimensional Geometric Transformations – Matrix Representations and Homogeneous Coordinates.

UNIT III - Dimensional Viewing and Graphical User Interfaces **12 Hours**

Two–Dimensional Viewing: The Clipping Window – Clipping Algorithms – Two Dimensional Line Clipping – Polygon Fill – Area Clipping – Curve Clipping – Text Clipping. **Interactive Input Methods and Graphical User Interfaces:** Logical Classification of Input Devices – Interactive Picture Construction Techniques.

UNIT IV - Three Dimensional Viewing **12 Hours**

Three Dimensional Viewing: Three–Dimensional Viewing Pipeline – Three–Dimensional Viewing – Coordinate Parameters Transformation from World to Viewing Coordinates – Projection Transformations – Perspective Projections– OpenGL Three Dimensional Viewing Functions.

UNIT V - Computer Animation **12 Hours**

Visible–Surface Detection Methods: Classification of Visible–Surface Detection Algorithms – Comparison of visibility – Detection Methods – Curved Surfaces – Wire–Frame Visibility Methods. **Computer Animation:** Design of Animation Sequences – Traditional Animation Techniques – General Computer–Animation Functions – Computer Animation Languages – Key-Frame Systems – Motion Specifications.

B. TOPICS FOR SELF-STUDY

S.No	Topics	Web Link
1	Hidden Surface Removal	https://www.javatpoint.com/computer-graphics-hidden-surface-removal
2	Pointing and Positioning Techniques	https://www.javatpoint.com/computer-graphics-pointing-and-positioning-techniques
3	Pointing and Positioning Techniques	https://www.tutorialspoint.com/computer_graphics/computer_graphics_fractals.htm
4	Data Explorer	http://www.phys.ocean.dal.ca/docs/DX_tutorial.html

C. Text Book:

1. Donald Hearn, M. Pauline Baker, "***Computer Graphics with Open GL",*** Pearson Education, Third Edition, 2009.

D. Reference Books

1. Newman William M., Sproull Robert F., "***Principles of Interactive Computer Graphics"***, McGraw Hill, 2010.

E. Web links: (Swayam/nptel/…)

1. **https://swayam.gov.in/**
2. **https://nptel.ac.in/**

3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
I	**Overview of Graphics Systems**		
1.1	Video Display Devices	Recall the basic concepts of Video Display Devices	K1
1.2	Input Devices	Summarize the Input Devices	K2
1.3	Hard Copy Devices	Explain Hard Copy Devices	K2
1.4	Graphics Software	Discuss Graphics Software	K6
1.5	Introduction to OpenGL	Illustrate OpenGL	K2
	Graphics Output Primitives		
1.6	Line Drawing Algorithms	Explain Line Drawing Algorithms	K2
1.7	Line Equations	Define Line Equations	K1
1.8	DDA Algorithm	Outline DDA Algorithm	K2

Unit	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
1.9	Bresenham's Algorithm	Develop Bresenham's Algorithm	K3
1.10	Circle – Generating Algorithms.	Illustrate Circle – Generating Algorithms.	K2
II	**Attributes of Graphics Primitives**		
2.1	Color and Gray Scale	Identify the basic concepts of Color and Gray Scale	K3
2.2	Line Attributes	Explain Line Attributes	K2
2.3	Fill–Area Attributes	Demonstrate Fill–Area Attributes	K2
2.4	Antialiasing	Discuss Antialiasing	K6
2.5	OpenGL Color Functions	Build OpenGL Color Functions	K3
	Geometric Transformations:		
2.6	Basic Two Dimensional Geometric Transformations	Discuss Basic Two Dimensional Geometric Transformations	K6
2.7	Matrix Representations and Homogeneous Coordinates.	Identify Matrix Representations and Homogeneous Coordinates.	K3
III	**Two–Dimensional Viewing**		
3.1	The Clipping Window	Define Clipping Window	K1
3.2	Clipping Algorithms	Discuss Clipping Algorithms	K6
3.3	Two Dimensional Line Clipping	Develop Two Dimensional Line Clipping	K3
3.4	Polygon Fill	Illustrate Polygon Fill	K2
3.5	Area Clipping	Elaborate Area Clipping	K6
3.6	Curve Clipping	Examine Curve Clipping	K4
3.7	Text Clipping	Demonstrate Text Clipping	K2
	Interactive Input Methods and Graphical User Interfaces		
3.8	Logical Classification of Input Devices	Classify Input Devices	K2
3.9	Interactive Picture Construction Techniques	Demonstrate Interactive Picture Construction Techniques	K2
IV	**Three Dimensional Viewing**		
4.1	The Three–Dimensional Viewing Pipeline	Discuss Three–Dimensional Viewing Pipeline	K6
4.2	Three–Dimensional Viewing	Explain Three–Dimensional Viewing	K2

Unit	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
4.3	Coordinate Parameters Transformation from World to Viewing Coordinates	Demonstrate Coordinate Parameters Transformation from World to Viewing Coordinates	K2
4.4	Projection Transformations	Illustrate Projection Transformations	K2
4.5	Perspective Projections	Identify Perspective Projections	K3
4.6	OpenGL Three Dimensional Viewing Functions.	Develop OpenGL Three Dimensional Viewing Functions.	K3
V	**Visible–Surface Detection Methods:**		
5.1	Classification of Visible – Surface Detection Algorithms	Classify Visible–Surface Detection Algorithms	K2
5.2	Comparison of visibility	Explain Comparison of visibility	K2
5.2	Detection Methods	Discuss Detection Methods	K6
5.4	Curved Surfaces	Evaluate Curved Surfaces	K5
5.5	Wire – Frame Visibility Methods.	Formulate Wire–Frame Visibility Methods.	K6
	Computer Animation		
5.6	Design of Animation Sequences	Discuss the Design of Animation Sequences	K6
5.7	Traditional Animation Techniques	Examine Traditional Animation Techniques	K4
5.8	General Computer	Explain General Computer	K2
5.9	Animation Functions	Demonstrate Animation Functions	K2
5.10	Computer Animation Languages	Apply Computer Animation Languages	K3
5.11	Key-Frame Systems	Illustrate Key-Frame Systems	K2
5.12	Motion Specifications	Explain Motion Specifications	K2

4. MAPPING (CO, PO, PSO)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**M**	**-**	**L**	**-**	**-**	**H**	**M**	**M**	**L**	**H**	**M**	**M**	**-**
CO2	**M**	**H**	**M**	**M**	**L**	**L**	**M**	**L**	**M**	**H**	**H**	**M**	**L**
CO3	**H**	**H**	**M**	**M**	**H**	**M**	**H**	**M**	**H**	**H**	**M**	**H**	**M**
CO4	**H**	**M**	**M**	**M**	**M**	**L**	**M**	**M**	**M**	**M**	**M**	**M**	**M**

CO5	**H**	**H**	**M**	**M**	**H**	**M**	**H**	**H**	**H**	**M**	**H**	**M**	**H**
CO6	**H**	**H**	**H**	**H**	**H**	**M**	**M**	**M**	**M**	**H**	**M**	**M**	**H**

L-Low **M-Moderate** **H- High**

5. COURSE ASSESSMENT METHODS

DIRECT:

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

INDIRECT:

1. Course end survey (Feedback)

COURSE COORDINATOR **HEAD OF THE DEPARTMENT**

Dr.A. FLORENCE DEEPA Dr.R.THAMARAI SELVI

****

Elective I - COMPUTER SIMULATION AND MODELING

SEMESTER: II **CODE: P19CA2:2**
CREDITS : 3 **TOTAL HOURS : 60**

1.COURSE OUTCOMES:

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

S.No.	Course Outcomes	Level
CO1	Recall the area of application	K1
CO2	Apply the technologies of different simulation models	K3
CO3	Determine the platforms and web applications in accessing the cloud	K5
CO4	Utilize the various techniques for random number generation	K3
CO5	Develop applications to measure input and output data	K6
CO6	Discuss the concepts of meta modeling	K6

2A. Syllabus

UNIT I - Introduction to Simulation and Modeling **12 Hours**

Introduction – Advantages and Disadvantages of simulation – Areas of application – Components of a systems – Model of a system – Types of Models – Discrete – Event system simulation – Steps in a simulation study – Simulation examples.

UNIT II - Discrete Event Simulation and Programming Languages **14 Hours**

Concepts in Discrete – Event simulation – Event scheduling / Time Advance Algorithm – Manual simulation using event scheduling – List Processing – Programming Languages – Fortran – GPSS – SIMAN V – SIMSCRIPT – SLAM II – MODSIM III

UNIT III - Random Number Generation Techniques **14 Hours**

Random – Number Generation – Properties of random Random numbers – Techniques for generating random numbers – Tests for Random numbers – Random Variate Generation – Inverse transform technique – Direct Transformation - Convolution method – Acceptance – Rejection Technique.

UNIT IV - Analysis of Simulation Data **10 Hours**

Analysis of Simulation Data: Input modeling – Data collection – Identifying the distribution – Parameter estimation – Goodness of fit tests – Multivariate and Time series Input Models.

Verification and validation of simulation models – Verification of Simulation Models – Calibration and Validation of Models.

UNIT V - Output Analysis and Meta-modeling **10 Hours**

Output Analysis for a Single Model – Stochastic nature of output Data – Types of simulations with respect to output Analysis – Measures of performance and their Estimation – Output Analysis for Terminating simulations and steady-s take simulations – Comparison and Evaluation of Alternative system Designs – Comparison of two system Designs and several system Designs. Meta-modeling.

B. TOPICS FOR SELF-STUDY

S.No	Topics	Web Links
1	Features of Pro-model Package and Input Modeling	www.promodel.com
2	Simulation of Manufacturing System	www.flexsim.com/manufacturing-simulation/
3	Simulation of Service Operations	www.edglabs.com/operations-process-simulation.html
4	Modelling a Live Problem	macstandl.com/live-modelling/

C. Text Book:

1. Jerry Banks, John S. Carson and Barry L. Nelson, "Discrete – Event System Simulation" – Prentice Hall of India, 2009.

D. Reference Books:

1. Fishman G.S, "Principles of Discrete Event Simulation", Kindle Edition, Wiley Medical Publications, 2007

E.Web Links:

1. https://nptel.ac.in/
2. https://www.coursera.org/lecture/modeling-simulation-natural-processes/modeling-and-simulation-F7vas
3. https://www.tutorialspoint.com/modelling_and_simulation

3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning outcomes	Blooms Taxonomy Level of Transaction
I	**Introduction**		

1.1	Advantages and Disadvantages of simulation	List out the advantages of simulation	K4
1.2	Areas of application	Illustrate the functionalists of area of intranet	K2
1.3	Components of a systems	Elaborate the components of a systems	K6
	Model of a system		
1.4	Types of Models	Discuss the different types of model	K6
1.5	Steps in a simulation study	Explain the steps in simulation study	K5
1.6	Simulation examples	Identify the limitations of simulation	K3
II	**The Business Case for Going to the Cloud**		
2.1	Concepts in Discrete-Event simulation	Summarize the Concepts in Discrete-Event simulation	K2
2.2	Event scheduling / Time Advance Algorithm	Build the Event scheduling / Time Advance Algorithm	K6
2.3	Manual simulation using event scheduling	Explain the manual simulation using event scheduling	K5
	Programming Languages		
2.4	FORTRAN	Elaborate on FORTRAN	K6
2.5	GPSS	Explain the benefits in GPSS	K5
2.6	SIMAN V	Discuss the different operation of SIMAN V	K6
2.7	SIMSCRIPT	Elaborate on the various operation of SIMSCRIPT	K6
2.8	SLAM II	List out the features of SLAM II	K4
2.9	MODSIM III	Determine the operations of MODSIM III	K5
III	**Random-Number Generation**		
3.1	Properties of random Random numbers	Elaborate the properties of random Random numbers	K6
3.2	Techniques for generating random numbers	Identify the techniques for generating random numbers	K3

3.3	Tests for Random numbers	Explain the Tests for Random numbers	K5
3.4	Random Variate Generation	Assess the different techniques for Random Variate Generation	K5
3.5	Inverse transform technique	Summarize Inverse transform technique in detail	K2
3.6	Direct Transformation	Recall the Direct Transformation	K1
3.7	Convolution method	Identify the advantages in Convolution method	K3
3.8	Acceptance-Rejection Technique	Illustrate the Acceptance-Rejection Technique	K2
IV	**Analysis of Simulation Data**		
4.1	Input modeling	Explain the applications of Input modeling	K5
4.2	Data collection	Illustrate the basis of data collection	K2
43	Identifying the distribution	Discuss the concepts of identifying the distribution	K6
4.4	Parameter estimation	Explain the Parameter estimation	K5
4.5	Goodness of fit tests	Elaborate on Goodness of fit tests	K6
	Verification and validation of simulation models		
4.6	Multivariate and Time series Input Models	Determine the Multivariate and Time series Input Models	K5
4.7	Verification of Simulation Models	Elaborate on the Verification of Simulation Models	K6
4.8	Calibration and Validation of Models	Explain the Calibration and Validation of Models	K5
V	**Output Analysis for a Single Model**		
5.1	Stochastic nature of output Data	Summarize the Stochastic nature of output Data	K2
5.2	Types of simulations with respect to output Analysis	Relate types of simulations with respect to output Analysis	K1
5.3	Measures of performance and their Estimation	Illustrate Measures of performance and their Estimation	K2

5.4	Output Analysis for Terminating simulations and steady-stake simulations	Discuss the Output Analysis for Terminating simulations and steady-stake simulations	K6
5.5	Comparison and Evaluation of Alternative system Designs	Explain the Evaluation of Alternative system Designs	K5
5.6	Comparison of two system Designs and several system Designs	Compare the two system Designs with several system Designs	K4
5.7	Meta-modeling	Elaborate on Meta-modeling	K6

4. MAPPING (CO, PO, PSO)

L-Low **M-Moderate** **H- High**

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

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)

COURSE COORDINATOR **HEAD OF THE DEPARTMENT**

Dr.A. FLORENCE DEEPA Dr.R.THAMARAI SELVI

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Core IX: SOFTWARE ENGINEERING

SEMESTER: III **CODE: P18CA309**
CREDITS: 4 **HOURS/WEEKS:4**

1. COURSE OUTCOMES

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

S.No.	Course Outcomes	Level	Unit covered
CO1	Summarize the basic concepts and the functionalities of Software Engineering.	K2	1
CO2	Identify the various software requirements in designing processes.	K3	II
CO3	Examine the quality of the software.	K4	III
CO4	Apply the various software management techniques to maintain the software.	K3	IV
CO5	Assess the software using metric techniques.	K5	V
CO6	Develop software and apply strategies of project management	K6	V

2A. Syllabus

UNIT I - Software Engineering and Software Process **12 Hours**

Software and Software Engineering: The Nature of Software – The Unique Nature of WebApps – Software Engineering – The Software Process – Software Engineering Practice – Software Myths. **The Software Process: Process Models:** A Generic Process Model – Process Assessment and Improvement – Prescriptive Process Models – Specialized Process Models – The Unified Process.

UNIT II - Modeling Principles **12 Hours**

Modeling: Principles that Guide Practice: Software Engineering Knowledge – Core Principles – Principles That Guide Each Framework Activity. **Understanding Requirements:** Requirements Engineering – Establishing the Groundwork – Eliciting Requirements – Developing Use Cases – Building the Requirements Model – Negotiating Requirements – Validating Requirements. Requirements **Modeling: Scenarios, Information and Analysis Classes:** Requirements Analysis – Scenario–Based Modeling – UML Models That Supplement the Use Case – Data Modeling Concepts – Class–Based Modeling.

UNIT III - Design and Quality Concepts **12 Hours**

Design Concepts: Design within the Context of Software Engineering – The Design Process – Design Concepts– The Design Model. **Architectural Design:** Software Architecture – Architectural Genres – Architectural Styles – Architectural Design. **User Interface Design:** The Golden Rules–Interface Design Steps. **Quality Management: Quality Concepts:** Software Quality – The Software Quality Dilemma – Achieving Software Quality.

UNIT IV - Software Testing **12 Hours**

Software Quality Assurance: Background Issues – Elements of Software Quality Assurance – SQA Tasks, Goals and Metrics – Formal Approaches to SQA – Statistical Software Quality Assurance – Software Reliability – The ISO 9000 Quality Standards – The SQA Plan. **Software Testing Strategies:** A Strategic Approach to Software Testing –Strategic Issues – Test Strategies for Conventional Software – Validation Testing – System Testing – The Art of Debugging. **Testing Conventional Applications:** Software Testing Fundamentals –Internal and External Views of Testing – White Box Testing – Basis Path Testing – Control Structure Testing – Black Box Testing.

UNIT V - Software Project **12 Hours**

Managing Software Projects: Project Management Concepts: The Management Spectrum – People – The Product – The Process – The Project. **Process and Project Metrics:** Metrics in the Process and Project Domains – Software Measurement – Metrics for Software Quality – Integrating Metrics within the Software Process – Metrics for Small Organizations – Establishing a Software Metrics Program. **Estimation For Software Projects:** Software Project Estimation – Decomposition Techniques – Empirical Estimation Models. **Project Scheduling:** Basic Concepts – Project Scheduling – Scheduling**. Risk Management:** Software Risks – Risk Identification – Risk Projection – Risk Refinement – Risk Mitigation, Monitoring and Management.

B. TOPICS FOR SELF STUDY

S.No	Topics	Web Link
1	The Capability Maturity Model Integration (CMMI)	**http://dthomas-software.co.uk/resources/frequently-asked-questions/what-is-cmmi-2**
2	Business process reengineering	**https://www.geeksforgeeks.org/introduction-to-business-process-re-engineering**
3	Reverse engineering	**https://www.youtube.com/watch?v=eB4o0feXw7Q**
4	Component Based Software Engineering	**https://www.geeksforgeeks.org/component-based-software-engineering/**

C. Text Book

1. Roger S. Pressman, "Software Engineering - A Practitioner's Approach", McGraw Hill, seventh Edition, 2010.

D. Reference Books

1. Ian Sommerville, "Software Engineering", Pearson Education Asia, Sixth edition, 2000.
2. James F Peters and WitoldPedryez, "Software Engineering – An Engineering Approach", John Wiley and Sons, New Delhi, 2000.

E. Web links:

1. **https://swayam.gov.in/**
2. **https://nptel.ac.in/**

3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's

			Taxonomic Level of Transaction
I	**Software and Software Engineering**		
1.1	The Nature of Software	Recall the basic concepts of software engineering	K1
1.2	The Unique Nature of Web Apps	Identify the nature of web apps	K3
1.3	Software Engineering	Define software engineering	K1
1.4	The Software Process	Illustrate software process	K2
1.5	Software Engineering Practice	Discuss the practices in software engineering	K6
1.6	Software Myths	Outline software myths	K2
	The Software Process: Process Models		
1.7	A Generic Process Model	Illustrate generic process model	K2
1.8	Process Assessment and Improvement	Assess a process and improve it	K5
1.9	Prescriptive Process Models	Build prescriptive process models	K6
1.10	Specialized Process Models	Construct specialized process models	K6
1.11	The Unified Process.	Identify unified process	K3
II	**Modeling: Principles That Guide Practice**		
2.1	Software Engineering Knowledge	Discuss about software engineering	K6
2.2	Core Principles	Explain the core principles in software engineering	K2
2.3	Principles That Guide Each Framework Activity	Illustrate the framework activity	K2
	Understanding Requirements		
2.4	Requirements Engineering	Discuss requirements engineering	K6
2.5	Establishing the Groundwork	Illustrate groundwork activities	K2
2.6	Eliciting Requirements	Explain the requirements	K2
2.7	Developing Use Cases	Apply use case model in software process	K3
2.8	Building the Requirements Model	Identify the concepts for building the requirement model	K3
2.9	Negotiating Requirements	Illustrate negotiating requirements	K2
2.10	Validating Requirements	Discuss the requirements for validation	K6
	Requirements Modeling Scenarios, Information and Analysis Classes		
2.11	Requirements Analysis	Recall requirements analysis	K1
2.12	Scenario–Based Modeling	Explain scenario–based modeling	K2
2.13	UML Models That Supplement the Use Case	Discuss UML models	K6
2.14	Data Modeling Concepts	Explain the concepts of data modeling	K2
2.15	Class–Based Modeling	Illustrate class based modeling	K2
III	**Design Concepts**		

3.1	Design within the Context of Software Engineering	Summarize the design concepts	K2
3.2	The Design Process	Explain the design Process	K2
3.3	Design Concepts	Apply the concepts in designing	K3
3.4	The Design Model	Construct a model	K6
	Architectural Design		
3.5	Software Architecture	Develop software	K6
3.6	Architectural Genres	Illustrate architectural genres	K2
3.7	Architectural Styles	List out the styles in architecture	K4
3.8	Architectural Design	Discuss the architectural design	K6
	User Interface Design		
3.9	The Golden Rules	Illustrate the golden rules	K2
3.10	Interface Design Steps	List out the steps involved in designing an interface	K4
	Quality Management: Quality Concepts		
3.11	Software Quality	Define software quality	K1
3.12	The Software Quality Dilemma	Distinguish software quality dilemma	K4
3.12	Achieving Software Quality	Assess the quality of software	K5
IV	**Software Quality Assurance**		
4.1	Background Issues	Recall background issues	K1
4.2	Elements of Software Quality Assurance	Classify the various elements in software quality assurance	K2
4.3	SQA Tasks, Goals and Metrics	Illustrate SQA tasks, goals and metrics	K2
4.4	Formal Approaches to SQA	Discuss formal approaches to SQA	K6
4.5	Statistical Software Quality Assurance	Elaborate statistical software quality assurance	K6
4.6	Software Reliability	Define software reliability	K1
4.7	The ISO 9000 Quality Standards	Explain the ISO 9000 quality standards	K2
4.8	The SQA Plan	Develop SQA plan	K6
	Software Testing Strategies		
4.9	Strategic Approach to Software Testing	Design strategic approach to software testing	K6
4.10	Strategic Issues	Formulate strategic issues	K6
4.11	Test Strategies for Conventional Software	Apply test strategies for conventional software	K3

4. MAPPING (CO, PO, PSO)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**M**	**-**	**L**	**-**	**-**	**M**	**M**	**M**	**L**	**H**	**M**	**M**	**-**
CO2	**M**	**H**	**M**	**M**	**L**	**L**	**M**	**L**	**M**	**H**	**H**	**M**	**L**
CO3	**H**	**H**	**M**	**M**	**H**	**M**	**H**	**M**	**H**	**H**	**M**	**H**	**M**
CO4	**H**	**M**	**M**	**M**	**M**	**M**	**M**	**M**	**M**	**M**	**M**	**M**	**M**

CO5	**H**	**H**	**M**	**M**	**H**	**L**	**H**	**H**	**H**	**M**	**H**	**M**	**H**
CO6	**H**	**H**	**H**	**H**	**H**	**M**	**M**	**M**	**M**	**H**	**M**	**M**	**H**

L-Low **M-Moderate** **H- High**

5. COURSE ASSESSMENT METHODS

DIRECT:

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

INDIRECT:

1. Course end survey (Feedback)

COURSE COORDINATOR **HEAD OF THE DEPARTMENT**

Dr. L. JAYASIMMAN Dr.R.THAMARAI SELVI

****

Core X : RESOURCE MANAGEMENT TECHNIQUES

SEMESTER: III **CODE: P18CA310**
CREDITS:4 **HOURS/WEEKS: 4**

1. COURSE OUTCOMES

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

S.No.	Course Outcomes	Level	Unit
CO1	Explain linear programming problems	K2	I
CO2	Solve the Transportation problem and assignment problem	K3	II
CO3	Construct Queuing models for real life problems	K3	III
CO4	Analyze the various queuing models	K4	III
CO5	Analyze the various Inventory models and solve Inventory control problems.	K4	IV
CO6	Develop network scheduling by PERT and CPM	K6	V

2A. Syllabus

UNIT I - The Linear Programming Problem **12 Hours**

The Linear Programming Problem – Mathematical Formulation of the Problem –Graphical Solution Method – **The Simplex Method – Artificial Variable Techniques – Dual Simplex method**.

UNIT II - The Transportation Problem **12 Hours**

The Transportation Problem – Matrix Form – The Transportation Table – The Initial Basic Feasible Solution – Degeneracy in Transportation Problems – Optimum Solution – The Assignment and Routing Problems.

UNIT III - Queueing Theory **12 Hours**

Queueing Theory – Queueing System – Characteristics of Queueing System – Poisson Process and Exponential Distribution – Classification of Queues – Transient and Steady States – Poisson Queues – Non – Poisson Queueing Systems – Non – Markovian Queues – Probabilistic models.

UNIT IV - Inventory Control **12 Hours**

Inventory Control – ABC Analysis – Economic Lot Size Problems – EOQ with Shortage – Multi–Item Deterministic Problem – Uncertain Demand – Inventory Control with Price Breaks. Replacement Problem – Replacement of Items that Deteriorate with time – Replacement of Items that Fail Completely – other Replacement Problems.

UNIT V - Network Scheduling by PERT/CPM **12 Hours**

Network Scheduling by PERT/CPM – Basic Concepts – Constraints in Network – Construction of the Network – Time Calculations in Networks – Critical Path Method (CPM) – PERT – PERT Calculations.

B. TOPICS FOR SELF-STUDY

S.No	Topics	Web Link
1	Methods of solving a Linear Programming Problem	**1.https://courses.lumenlearning.com/sanjacinto-finitemath1/chapter/reading-meeting-demands-with-linear-programming/ 2.https://courses.lumenlearning.com/sanjacinto-finitemath1/chapter/reading-solving-standard-maximization-problems-using-the-simplex-method/ 3.https://courses.lumenlearning.com/sanjacinto-finitemath1/chapter/reading-standard-minimization-with-the-dual/**
2	The Transportation Problem	**https://www.geeksforgeeks.org/transportation-problem-set-1-introduction/**
3	Queueing Theory	**https://www.geeksforgeeks.org/packet-queuing-and-dropping-in-routers/**
4	Inventory Control	**1. https://www.wisdomjobs.com/e-university/production-and-operations-management-tutorial-295/inventory-control-or-management-9599.html 2. https://www.unleashedsoftware.com/inventory-management-guide**

C. Text Book

1. Kanti Swarup, P.K. Gupta and Man Mohan,"Operations Research", Sultan Chand and Sons, 1992.

D. Reference Books

1. Hamdy A Taha, "Operations Research – An Introduction", Macmillan Publishing Company, 1982.
2. Don.T. Phillips, A.Ravindran, James.J.Solberg, "Operations Research – Principles and Practice",John Wiley & Sons, 1976.

E. Web links:

1. **https://swayam.gov.in/explorer?searchText=operations%20research**
2. **https://nptel.ac.in/courses/111/107/111107128/**

3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
I	**The Linear Programming Problem**		
1.1	The Linear Programming Problem	Explain and discuss about aLinear Programming Problem	K2

1.2	Mathematical Formulation of the Problem	Describe the mathematical formulation of aLinear Programming Problem	K2
1.3	Graphical Solution Method	Estimate the solution of aLinear Programming Problem by Graphical solution method	K2
1.4	The Simplex Method	Determine the solution of a Linear Programming Problem by using Simplex method	K2
1.5	Artificial Variable Techniques	Apply Artificial Variables to find a solution for a Linear Programming Problem	K3
1.6	Dual Simplex method	Examine the solution of a Linear Programming Problem by using Simplex method	K3
II	**The Transportation Problem**		
2.1	The Transportation Problem	Describe Transportation Problem	K1
2.2	Matrix form of Transportation Table	Describe matrix form of transportation problem	K1
2.3	The Initial Basic Feasible Solution	Estimates the Initial Basic Feasible Solution	K2
2.4	Degeneracy in Transportation Problems	Identify the degeneracy in transportation problem	K4
2.5	Optimum Solution	Computes optimum solution of a transportation problem	K3
2.6	The Assignment	Describe the assignment problem and computes the optimum solution	K3
2.7	Routing Problems	Solve the routing problems	K3
III	**Queueing Theory**		
3.1	Queueing Theory	Illustrate Queueing theory	K3
3.2	Queueing System	Explain the Queueing system.	K4
3.3	3.3 Characteristics of Queueing System	Construct the queueing system.	K5
3.4	Poisson Process and Exponential Distribution	Solve the queueing problem.	K3
3.5	Classification of Queues	Compare the properties of Queueing models.	K4
3.6	Transient and Steady States	Distinguish the state of a queueing system.	K4
3.7	Poisson Queues	Identify the Poisson queue.	K4

3.8	Non – Poisson Queueing Systems	Examine the solution of Non-Poisson Queueing system.	K4
3.9	Non – Markovian Queues	Describe a Non-Markovian Queue.	K1
IV	**Inventory control**		
4.1	Inventory control	Discuss in details about inventories and their types	K6
4.2	ABC Analysis	Explain about ABC analysis	K6
4.3	Economic Lot Size problems	Discuss in detailabout Economic Lot size	K6
		Solve corresponding problems	K4
4.4	EOQ with shortage	Discuss in detail about EOQ with shortage	K6
		Solving problems	K4
4.5	Multi-Item deterministic Problem	Solving Multi-Item deterministic Problems	K4
4.6	Uncertain Demand	Discuss in detailabout Uncertain Demand	K6
		Solving corresponding problems	K4
4.7	Inventory Control with Price Breaks	Recalling price breaks	K1
		Solving corresponding problems	K4
4.8	Replacement Problems	Discuss in detail about Replacement problems	K6
		Apply it on a solving problems	K3
4.9	Replacement of Items that Deteriorate with time	Discuss in detail about Replacement of Items that Deteriorate with time	K6
4.10	Replacement of Items that Fail Completely	Discuss in detail Replacement of Items that Fail Completely	K6
4.11	Other Replacement Problems	Evaluate other replacement problems	K4
V	**Network Scheduling by PERT/CPM**		
5.1	Introduction	Use network scheduling and utilize network pre-determined schedule PERT and CPM	K3
5.2	Network and basic components	Discuss basic components of networks Activity and Event .	K6
5.3	Logical Sequencing	Illustrate Looping and Dangling.	K3
5.4	Rules of network Construction	Identify rules for drawing network.	K4

5.5	Concurrent activities	Discuss activity in discrete nature	K6
5.6	Critical Path Analysis	Determine Forward and backward pass calculation.	K6
		Discuss different kinds of floats namely total float and free float and independent float.	K6
		Determine total float and free float and independent float.	K6
5.7	Probability considerations in PERT	Discuss optimistic time and pessimistic time and most likely time.	K6
		Determine optimistic time and pessimistic time and most likely time.	K6
		Determine Probability of meeting the schedule time.	K6

4. MAPPING (CO, PO, PSO)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**M**	**H**	**M**	**M**	**L**	**L**	**-**	**-**	**-**	**M**	**M**	**H**	**--**
CO2	**M**	**H**	**M**	**L**	**L**	**-**	**-**	**-**	**-**	**L**	**M**	**H**	**--**
CO3	**L**	**H**	**H**	**M**	**-**	**M**	**H**	**H**	**M**	**-**	**M**	**H**	**M**
CO4	**-**	**H**	**H**	**-**	**M**	**M**	**M**	**H**	**H**	**-**	**H**	**H**	**M**
CO5	**H**	**H**	**M**	**-**	**-**	**L**	**M**	**L**	**M**	**L**	**H**	**M**	**M**
CO6	**H**	**-**	**H**	**H**	**H**	**L**	**-**	**H**	**M**	**H**	**H**	**H**	**-**

L-Low **M-Moderate** **H- High**

5. COURSE ASSESSMENT METHODS

DIRECT:

5. Continuous Assessment Test: T1, T2 (Theory & Practical Components): Closed Book
6. Open Book Test.
7. Cooperative Learning Report, Assignment, Group Presentation, Group Discussion, Poster Presentation, Seminar, Quiz (written).
8. Pre-Semester & End Semester Theory Examination

INDIRECT:

1. Course end survey (Feedback)

COURSE COORDINATOR **HEAD OF THE DEPARTMENT**

Dr.J.RAMEEZABANU Dr.R.THAMARAI SELVI

****

Core XI: DATABASE SYSTEMS

SEMESTER: III **CODE: P18CA311**
CREDITS: 4 **HOURS/WEEKS: 4**

1. COURSE OUTCOMES

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

S.No.	Course Outcomes	Level	Unit covered
CO1	Explain Database Systems using data models	K5	I
CO2	Construct various tables using integrity constraints and keys	K6	II
CO3	Apply different normal forms in database design	K3	II
CO4	Examine the various hashing techniques	K4	III
CO5	Analyze the concept of transaction management and concurrency control	K4	IV
CO6	Build SQL and PL/SQL statements	K6	V

2A. Syllabus

UNIT I - Introduction to Database **12 Hours**

Introduction: Database System Applications – Database Systems vs File Systems – View of data – Data Models – Database Languages – Database Users and Administrators – Transaction Management – Database System Structure – Application Architectures. **Entity – Relationship model**: Basic Concepts – Constraints – Keys – Entity – Relationship Diagram – Weak entity Sets – Extended E–R Features. **Relational Model:** Structure of Relational Database – Relational Algebra– Extended Relational Algebra Operations.

UNIT II - Relational Database Design and Integrity **12 Hours**

Integrity and security: Domain Constraints Referential Integrity – Assertions – 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 .

UNIT III - File Structure and Indexing **12 Hours**

Storage and File Structure: RAID – File Organization – Organization of Records in Files – Dictionary Storage. **Indexing and Hashing**: Basic Concepts – Ordered Indices – B+ – Tree Index Files – Static Hashing – Dynamic Hashing.

UNIT IV - Transaction Management and Currency control **12 Hours**

Transaction Management: Transactions Concept – Transaction state – Implementation of Atomicity and Durability – Concurrent Executions– Serializability –**Concurrency control:** Lock Based Protocols – Timestamp Based Protocols – Validation Based Protocols – **Recovery system:** Failure classification – Storage Structure – Recovery and Atomicity – Log Based Recovery–Shadow Paging.

UNIT V - Oracle and PL/SQL **12 Hours**

Introduction to Oracle: Classification of SQL Commands – Data Types – Operators – Built in functions – Sorting – Joins – Special Operators: Set Operators. **Indexing:** Removing Index – Creating Index on Multiple Columns. **Views:** Creating and Accessing – Classification of Views. **PL/SQL:** Introduction – Advantages of PL/SQL – Structure of PL/SQL Block – Conditional Statement – Stored Functions: Structure of Function – Compiling a Function – Calling a Function. **Stored Procedures:** Advantages of Procedures – Why Called "Stored Procedures"? – Differences between Procedures and Functions – Compiling a Procedure – Executing a Procedure. **Cursors:** What is Cursor? – Purpose of Cursors – Classification of Cursors.**Database Triggers:** Components of Trigger–Types of Triggers.

B. TOPICS FOR SELF STUDY

S.No	Topics	Web Link
1	Object Oriented Database	**www.tutorialspoint.com**
2	Client-Server Architecture	**www.geeksforgeeks.org**
3	Data Warehouse	**www.talend.com**
4	Distributed database	**www.geeksforgeeks.org**

C. Text Books

1. Abraham Silberchatz, Henry F. Korth and S. Sudharshan, "Data Base System concepts" Mc Graw Hill, Fifth Edition, 2006.
2. Satish Asnani, "Oracle Database 11g –Hands–on SQL and PL/SQL", PHI Learning, 2010.

D. Reference Books

1. C.J. Date, A. Kannan, S.Swamynathan, "Introduction to Database Systems", Pearson Education, Eighth Edition 2006.
2. RamezElmasri, "Fundamentals of Database Systems", Pearson Education, 2008.

E. Web links:

1. **https://swayam.gov.in/nd1_noc19_cs51/**
2. **https://nptel.ac.in/courses/106106144/**

3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
I	**Database Systems Overview**		
1.1	Database Systems	Recall the basic concepts of database systems	K1
1.2	Database System Applications	Summarize the applications of database system	K2
1.3	Data Models	Classify Data Models	K4

1.4	Database Languages	Categorize database languages	K4
1.5	Database System Structure	Discuss the structure of a database system	K6
	Design of E-R Diagram		
1.6	Transaction Management	Explain Transaction Management	K2
1.7	E- R model	Identify the purpose of E-R Model	K3
1.8	Constraints and keys	Illustrate constraints & Keys	K2
1.9	E- R Diagram	Build an E- R Diagram	K6
1.10	Relational Algebra	Elaborate on relational algebra.	K6
II	**Integrity and security**		
2.1	Domain Constraints	Illustrate Domain Constraints	K3
2.2	Referential integrity	Apply referential integrity in tables	K2
2.3	Security and Authorization	Explain security and authorization	K5
2.4	Encryption and Authentication.	Discuss encryption and authentication	K6
	Types of Normal Form		
2.5	First Normal Form	Discuss First Normal Form	K6
2.6	Functionaldependencies	Explain Functional dependencies	K2
2.7	Decomposition	Discuss Decomposition	K6
2.8	BCNF	Compare BCNF and 4NF	K4
2.9	Third Normal Form	Explain Third Normal Form	K2
2.10	Fourth Normal Form	Illustrate Fourth Normal Form	K2
III	**Storage and File Structure**		
3.1	File Organization	Explain File Organization	K2
3.2	RAID	Elaborate on RAID	K6
3.3	Organization of Records	Improve the Organization of Records	K6
3.4	Dictionary Storage	Identify the use of DictionaryStorage	K3
	Indexing and Hashing		
3.5	Basic Concepts	Recall the basic concepts of Indexing	K1
3.6	Ordered Indices	Explain Ordered Indices	K2
3.7	B+ Tree Index Files	Construct B+ tree index files	K6
IV	**Transaction Management**		
4.1	Transactions Concept	Explain Transactions Concept	K2
4.2	Transaction state	Discuss the states of transaction	K6
4.3	Concurrent Executions	List the advantages of concurrent execution	K1
4.4	Serializability	Illustrate serializability	K2
	Concurrency control and recovery		
4.5	Lock based protocols	Discuss Lock based protocols	K6

4.6	Timestamp Based Protocols	Illustrate Timestamp Based Protocols	K2
4.7	Failure classification	Classify the types of failures	K4
4.8	Recovery and Atomicity	Recall the definition of recovery and atomicity	K1
4.9	Log Based Recovery	Apply log Based Recovery	K3
V	**Introduction to Oracle**		
5.1	Classification of SQL commands	Categorize SQL Commands	K4
5.2	Data Types and Operators	Summarize Data Types and Operators	K2
5.3	Built-in functions	List out the Built-in functions	K1
5.4	Sorting and Joins	Make use of sorting methods	K3
5.5	Set operators	Explain set operations	K2
	Indexing and Views		
5.6	Create Index	Create Indices	K6
5.7	Remove Index	Utilize Index removal	K3
5.8	Create Views	Create views in a Table	K6
5.9	Classification of Views	Classify the different types of views	K4
	PL/SQL and Stored Procedure		
5.10	Structure of PL/SQL Block	Illustrate the structure of PL/SQL Block	K2
5.11	Conditional Statement	Construct conditional statement	K6
5.12	Structure of Function	Explain the structure of function	K2
5.13	Advantages of Procedures	List the advantages of procedures	K1
5.14	Executing a Procedure	Explain the execution of a procedure	K2
	Cursor and Trigger		
5.15	Purpose of Cursors	Summarize the uses of cursors.	K2
5.16	Classification of Cursors	Classify Cursors.	K4
5.17	Components of Trigger	Utilize the components of triggers	K3
5.18	Types of Triggers.	Compare the types of triggers	K4

4. MAPPING (CO, PO, PSO)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**M**	**M**	**L**	**L**	**-**	**H**	**L**	**-**	**M**	**H**	**-**	**M**	**M**
CO2	**M**	**H**	**L**	**H**	**L**	**H**	**M**	**L**	**M**	**M**	**H**	**-**	**L**
CO3	**H**	**M**	**H**	**M**	**M**	**M**	**H**	**M**	**M**	**M**	**L**	**L**	**M**
CO4	**M**	**L**	**H**	**M**	**L**	**M**	**M**	**M**	**H**	**H**	**H**	**M**	**M**

CO5	**H**	**M**	**L**	**H**	**M**	**H**	**H**	**H**	**H**	**M**	**M**	**H**	**L**
CO6	**H**	**H**	**M**	**H**	**H**	**M**	**-**	**H**	**M**	**H**	**H**	**H**	**H**

L-Low **M-Moderate** **H- High**

5. COURSE ASSESSMENT METHODS

DIRECT:

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

INDIRECT:

1. Course end survey (Feedback)

COURSE COORDINATOR **HEAD OF THE DEPARTMENT**

Dr.K.MOHAMED AMANULLAH Dr.R.THAMARAI SELVI

****

Core XII: OPERATING SYSTEMS

SEMESTER: III **CODE: P18CA312**
CREDITS: 4 **HOURS/WEEKS: 4**

1. COURSE OUTCOMES

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

S.No.	Course Outcomes	Level	Unit
CO1	Summarize the basic concepts and functionalities of operating systems	K2	I
CO2	Determine the situations that lead to deadlock and starvation by recognizing the state of the process	K5	II
CO3	Analyze and apply effective memory management techniques	K4	III
CO4	Compare the various scheduling algorithms for uniprocessors and multiprocessors	K5	IV
CO5	Make use of the various I/O management and disk scheduling techniques	K3	V
CO6	Discuss secondary storage and file management techniques	K6	V

2A. Syllabus

UNIT I - Operating System Overview **12 Hours**

Operating System Objectives and Functions – The Evolution of Operating Systems – Major Achievements – Developments Leading to Modern Operating Systems – Virtual Machines – OS Design Considerations for Multiprocessor and Multicore – Microsoft Windows Overview – Traditional UNIX Systems – Modern UNIX Systems.

UNIT II - Process & Threads **12 Hours**

Process Descriptions & Control: What is a Process? Process States – Process Description – Process Control – Execution of the Operating System. **Threads:** Processes and Threads – Types of Threads – Multicore and Multithreading. **Concurrency: Mutual Exclusion and Synchronization** – **Concurrency: Deadlock and Starvation.**

UNIT III - Memory Management **12 Hours**

Memory: Memory Management: Memory Management Requirements – Memory Partitioning – Paging – Segmentation – Security Issues. **Virtual Memory:** Hardware and Control Structures – Operating System Software.

UNIT IV - Uniprocessor, Multiprocessor and Real Time Scheduling **12 Hours**

Scheduling: Uniprocessor Scheduling: Types of Scheduling – Scheduling Algorithms. **Multiprocessor and Real Time Scheduling:** Multiprocessor Scheduling – Real time scheduling – Linux Scheduling – UNIX FreeBSD Scheduling Windows 7 Scheduling.

UNIT V - Input/ Output and File Management **12 Hours**

Input/Output and Files: I/O Management and Disk Scheduling: I/O Devices – Organization of the I/O Function – Operating System Design Issues – I/O Buffering – Disk scheduling – RAID – Disk Cache – UNIX FreeBSD I/O – Windows 7 I/O. **File Management**: Overview – File Organization and Access – File Directories – File Sharing – Record Blocking – Secondary Storage Management – File System Security – UNIX File Management – Linux File Management – Windows 7 File System.

B. TOPICS FOR SELF-STUDY

S.No	Topics	Web Link
1	Virtualization	**https://opensource.com/resources/virtualization#:~:text=Virtualization%20is%20the%20process%20of,on%20a%20computer%20system%20simultaneously**
2	The design and implementation of a Log – Structured File System	**ftp://ftp.cs.berkeley.edu/ucb/sprite/papers/lfsSOSP91.ps**
3	The HP Auto RAID Hierarchical Storage System	**ftp://ftp.hpl.hp.com/wilkes/AutoRAID.TOCS.ps.Z**
4	Serverless Network File System	**ftp://ftp.cs.berkeley.edu/ucb/sprite/papers/lfsSOSP91.ps**

C. Text Book:

1. Willam Stallings, Operating Systems, Pearson Education, Seventh Edition, 2003.

D. Reference Books:

1. Deital H.M, An Introduction to Operating Systems, Addison Wesley Publishing Co., 1984.
2. Silberschartz A, Peterson J.L., Galvin P, Operating System Concepts, Addison Wesley publishing co., 1998.

E. Web links:

1.**https://swayam.gov.in/nd1_noc19_cs51**
2.**https://nptel.ac.in/courses/106106144**

3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
I	**Operating System Overview**		
1.1	Objectives and Functions	Recall the basic concepts of Operating Systems.	K1
1.2	Evolution of OS	Summarize the evolution of OS	K2
1.3	Major Achievements	Discuss the major achievements of Operating Systems.	K6

1.4	Developments Leading to Modern Operating Systems	Outline the developments in the modern Operating Systems	K2
	Design Considerations for Multiprocessor and Multicore		
1.5	Windows Overview	Explain about Windows	K2
1.6	Traditional UNIX Systems	Illustrate traditional UNIX Systems	K2
1.7	Modern UNIX Systems	Elaborate on modern UNIX Systems	K6
II	**Process Description and Control**		
2.1	Process States	Identify the state of a process	K3
2.2	Process Description	Explain process description	K2
2.3	Process Control	Build a Process Control block	K6
	Threads		
2.4	Processes and Threads	Discuss processes and threads	K6
2.5	Types of Threads	List the types of threads	K1
2.6	Multicore and multithreading	Discuss multicore and multithreading.	K6
2.7	Parallel algorithm models	Compare the parallel models	K4
	Concurrency: Mutual Exclusion and Synchronization		
2.8	Principles of Concurrency	Explain the principles of concurrency	K2
2.9	Deadlock and Starvation	Deduct the conditions that lead to deadlock and starvation.	K5
III	**Memory Management**		
3.1	Memory Management Requirements	List out the requirements for memory management	K1
3.2	Partitioning	Construct memory partitioning	K6
3.3	Paging	Develop paging	K6
3.4	Segmentation	Construct segmentation	K6
	Virtual Memory		
3.5	Hardware and control structures	Inspect hardware and control structures	K4
3.6	Operating System Software	Develop Operating System software	K3
IV	**Uniprocessor Scheduling**		
4.1	Types of Processor Scheduling	Choose the type of scheduling algorithm.	K5
4.2	Scheduling Algorithms	Compare the scheduling algorithms.	K5
	Multiprocessor and Real Time Scheduling		
4.3	Multiprocessor Scheduling	Design multiprocessor scheduling	K6
4.4	Real time Scheduling	Formulate Real time scheduling	K6
4.5	Linux Scheduling	Apply Linux scheduling	K3
4.6	UNIX SVR4 Scheduling	Define UNIX	K1

4.7	Windows Scheduling	Design Windows scheduling	K6
V	**I/O Management and Disk Scheduling**		
5.1	I/O Devices	Categorize I/O devices	K4
5.2	Organization of the I/O Function	Summarize I/O functions	K2
5.3	Operating System Design Issues	List out the design issues in Operating Systems	K1
5.4	I/O Buffering	Discuss the approaches of I/O buffering	K6
5.5	Disk Scheduling	Compare disk scheduling	K4
5.6	RAID	Categorize RAID	K4
5.7	Disk Cache	Summarize cache memory	K2
	File Management		
5.8	File Organization and Access	Choose the organization of file	K5
5.9	File Directories	Explain file directories	K5
5.10	File Sharing	Importance of secondary storage management	K5
5.11	Record Blocking	Classify blocking techniques	K4
5.12	Secondary Storage Management	Choose the appropriate file management technique	K5
5.13	UNIX File Management	Distinguish UNIX File Management	K4
5.14	Linux Virtual File System	Design Linux File Management	K6
5.15	Windows File System	Propose the features of the file system	K6

4. MAPPING (CO, PO, PSO)

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

L-Low **M-Moderate** **H- High**

5. COURSE ASSESSMENT METHODS

DIRECT:

1. Continuous Assessment Test: T1, T2 (Theory & Practical Components): Closed Book
2. Open Book Test.

3. Cooperative Learning Report, Assignment, Group Presentation, Group Discussion, Poster Presentation, Seminar, Quiz (written).
4. Pre-Semester & End Semester Theory Examination

INDIRECT:

1. Course end survey (Feedback)

COURSE COORDINATOR **HEAD OF THE DEPARTMENT**

Mrs.J.JASMINE CHRISTINA MAGDALENE Dr.R.THAMARAI SELVI

****

Core Practical V: MULTIMEDIA LAB

SEMESTER: III **CODE: P18CA3P5**
CREDITS: 2 **HOURS/WEEKS: 4**

1. COURSE OUTCOMES:

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

S. No.	Course Outcomes	Level	Exercise Covered
CO1	Summarize the various skills in multimedia	K2	1, 2, 3
CO2	Apply the color manipulation techniques for enhancing the images	K3	4, 5
CO3	Design images using masking concepts	K6	6
CO4	Create animations with special visual effects using filters	K6	7
CO5	Design posters for advertisements using Adobe Photoshop	K6	8, 9
CO6	Improve the practical knowledge on multimedia tools	K6	10, 11, 12

2A. Syllabus

Ex.No	Excercise
1	Draw an image using various basic tools (paintbrush tool, eye dropper & color picker, crop tool, lasso tool, paint bucket tool etc).
2	Use the following options to edit the image: i. Scale. ii. Rotate. iii. Distort. iv. Transformation. v. Fill & stroke. vi. Sharpen.
3	Re–touch the photo with the following options: i. Black & white photo re–touching. ii. Converting color to black & white. iii. Picture Restoration. iv. Dodging. v. Burning with photo.
4	Select different portions from two (or) three images and merge them into a single image.
5	Apply the following color manipulation techniques: i. Invert. ii. Equalize. iii. Threshold. iv. Replace color options.
6	Implement the image masking concepts.

7	Apply special visual effects to an image using filters.
8	Make a poster for an advertisement of a product using Adobe Photoshop.
9	Create an animation with special effects.
10	Create a new RGB Color file that is 5 inches wide, 7 ½ inches high with 200 pixels per inch and change the background through the File/New pull–down menu.
11	Create an e–Invitation for sport's day.
12	Create a 30 second multi–media profile about Bishop Heber College.

B. TOPICS FOR SELF-STUDY:

S.No	Topics	Web Link
1	Dreamweaver	www.youtube.com/watch?v=08CshKXqzoA
2	Virtual Reality	www.youtube.com/watch?v=i4Zt3JZejbg
3	Augmented Reality	www.youtube.com/watch?v=HAgSTxjsduo
4	Movie making using OBS	www.youtube.com/watch?v=DTk99mHDX_I

C. Text Books:

1. Mastering Photoshop, WebTech Solutions Inc., Khanna Publishers, 2015.
2. Animating with Flash 8 Creative Animation Techniques by Alex Michael, Focal Press, 2016.

D. Reference Books:

1. Photoshop 6 For Dummies by Barbara Obermeier Deke Mcclelland, Published by For Dummies.
2. Focal Easy Guide to Macromedia Flash 8: For New Users and Professionals (The Focal Easy Guide), by Birgitta Hosea Published by Focal Press.

E. Web links:

1. **www.w3schools.in/category/photoshop**
2. **www.helpx.adobe.com/in/photoshop**
3. **www.dummies.com/software/adobe/flash**

3. SPECIFIC LEARNING OUTCOMES (SLO)

Exercise	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
1	Draw an image using various basic tools (paintbrush tool, eye dropper & color picker, crop tool, lasso tool, paint bucket tool etc).	Design images using multimedia elements and label the options for editing the images.	K6
2	Use the following options to edit the image: (i) Scale, (ii) Rotate, (iii) Distort, (iv) Transformation, (v) Fill & stroke and (vi) Sharpen.	Select a brush tool, to repair scratches and dust on images and analyze the different edit options of images	K5

3	Re–touch the photo with the following options: (i) Black & white photo re–touching, (ii) Converting color to black & white, (iii) Picture Restoration, (iv) Dodging and (v) Burning with photo.	Originate the picture restoration and apply retouch to black & white photo	K6
4	Select different portions from two (or) three images and merge them into a single image.	Combine the different portions of images into a single image	K6
5	Apply the following color manipulation techniques: (i) Invert, (ii) Equalize, (iii) Threshold and (iv) Replace color options.	Choose the replace color options and apply color manipulation techniques	K5
6	Implement the image masking concepts.	Select the image masking technique to define a small 'image piece' and use it to modify a larger image	K5
7	Apply special visual effects to an image using filters.	Compose video using the elements in multimedia	K6
8	Make a poster for an advertisement of a product using Adobe Photoshop.	Create advertisements in Adobe Photoshop	K6
9	Create an animation with special effects.	Build simple animations by inferring to its principles and design visual effects sequences with multimedia presentations	K6
10	Create a new RGB Color file that is 5 inches wide, 7 ½ inches high with 200 pixels per inch and change the background through the File/New pull–down menu.	Create a new RGB Color file using File/New pull-down menu by changing the size of an image without altering the resolution	K6
11	Create an e–Invitation for sport's day.	Create simple animations for e-Invitation by choosing the library of graphic design elements	K6
12	Create a 30 second multi–media profile about Bishop Heber College.	Create simple animations for web sites	K6

4. MAPPING (CO, PO, PSO)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**H**	**H**	**H**	**H**	**H**	**L**	**M**	**H**	**H**	**H**	**H**	**H**	**L**
CO2	**H**	**L**	**L**	**L**	**H**	**-**	**M**	**H**	**H**	**H**	**L**	**L**	**-**
CO3	**H**	**H**	**H**	**M**	**H**	**-**	**M**	**H**	**H**	**H**	**L**	**L**	**-**
CO4	**H**	**M**	**M**	**M**	**H**	**-**	**M**	**H**	**H**	**H**	**L**	**L**	**-**

CO5	**H**	**M**	**M**	**M**	**H**	**-**	**M**	**H**	**H**	**H**	**L**	**L**	**-**
CO6	**H**	**M**	**M**	**M**	**H**	**-**	**M**	**H**	**H**	**H**	**L**	**L**	**-**

L-Low **M-Moderate** **H- High**

5. COURSE ASSESSMENT METHODS

DIRECT:

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

INDIRECT:

1. Course end survey (Feedback)

COURSE COORDINATOR **HEAD OF THE DEPARTMENT**

Dr.A. FLORENCE DEEPA Dr.R.THAMARAI SELVI

****

Core Practical VI : DATABASE SYSTEMS LAB

SEMESTER: III **CODE: P18C34P6**
CREDITS: 2 **HOURS/WEEKS: 4**

1. COURSE OUTCOMES

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

S.No.	Course Outcomes	Level	Exercise
CO1	Create tables and insert values.	K6	1,2
CO2	Construct queries for table manipulation using where clause.	K6	3
CO3	Construct queries using SET operations union ,Difference	K3	4
CO4	Construct query using Inner and Outer Join	K6	5
CO5	Develop PL/SQL programs using function and procedures	K6	6,7,11
CO6	Develop PL/SQL programs using triggers, functions, cursors and exception.	K6	8,9,10

2A. Syllabus

Ex.No.	Exercise
1	Create an Employee table using the details employee name, Designation, Department date of joining, salary etc..
2	Create an student table using the details like student name, roll no, mark1, mark2, mark3, total, average, result.
3	Find out name of students those who are getting result as “Pass” using Where clause. Find out List of students, whose name start with “B” using LIKE operator Find out list of Employee those who getting salary between 20000 and 40000
4	Find out list of Employee those who are working in Finance and HR department using Logical operator. Sort the records in employee table in ascending order using name Find out the number are staff working in each department using grouping Apply Set operations like Union, Intersection, Difference in employee table.
5	Find out name of student who score maximum marks using sub query Apply Inner and Outer Join in employee table.
6	Develop a PL/SQL program using function to find out factorial of given number
7	Develop a PL/SQL program using Procedure to calculate result of student.
8	Develop a PL/SQL program using Cursors to process records in employee table

9	Develop a PL/SQL program using Triggers to process records in student table
10	Develop a PL/SQL program using Exception.
11	Develop a PL/SQL program using function to Prepare pay bill for employee

B. TOPICS FOR SELF STUDY

S.No	Topics	Web Link
1	Oracle PL/SQL Exception Handling	**https://www.guru99.com/exception-handling-pl-sql.html**
2	Develop application using Oracle Forms	**https://docs.oracle.com/cd/E21764_01/web.1111/e10240/intro.htm#FSDEP108**
3	Create trigger	**https://docs.oracle.com/cd/B19306_01/server.102/b14200/statements_7004.htm**
4	Access Control List	**http://www.brainkart.com/article/DBMS---Advanced-Topics_11388**

3. SPECIFIC LEARNING OUTCOMES (SLO)

Exercise	Course Content	Learning outcomes	Highest Bloom's Taxonomic Level of Transaction
1	Creating an Employee Table	Create an employee table using SQL commands	K6
2	Inserting values into an Employee Table	Construct a table with values	K6
3	Using Where Clause	Make use of Where Clause to retrieve the required information	K3
4	Using Logical Operators and Set Operations	Apply logical and set operators	K3
5	Using Sub Queries and Apply Join Operations in a Table	Apply the sub queries for retrieving data	K3
6	Using Aggregate, String and Date Functions	Construct queries using aggregate, string and date functions	K6
7	Create Views	Create views on tables	K6
8	PL/SQL Program Using Function	Develop a PL/SQL program using function	K6
9	PL/SQL Program Using Procedure	Build a PL/SQL program using procedure	K6
10	PL/SQL Program Using Cursors	Create a PL/SQL program using cursors	K6
11	PL/SQL Program Using Triggers	Develop a PL/SQL program using triggers	K6

12	PL/SQL Program Using Exception	Build a PL/SQL program using exception	K6
13	PL/SQL Program for Preparing Playbill	Create a PL/SQL program for preparing the playbill	K6

4. MAPPING (CO, PO, PSO)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**H**	**H**	**H**	**H**	**H**	**M**	**H**	**H**	**H**	**H**	**H**	**H**	**L**
CO2	**H**	**H**	**H**	**H**	**H**	**M**	**M**	**H**	**M**	**H**	**L**	**L**	**L**
CO3	**H**	**H**	**M**	**M**	**H**	**H**	**M**	**M**	**H**	**M**	**L**	**L**	**L**
CO4	**H**	**M**	**H**	**M**	**H**	**M**	**M**	**H**	**H**	**H**	**L**	**L**	**L**
CO5	**H**	**M**	**M**	**H**	**H**	**M**	**M**	**H**	**H**	**H**	**L**	**L**	**L**
CO6	**H**	**M**	**M**	**M**	**H**	**H**	**M**	**H**	**H**	**H**	**L**	**L**	**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, Seminar.
3. Pre/Post Test, Viva, Report for each Exercise.
4. Lab Model Examination & End Semester Practical Examination

INDIRECT:

1. Course end survey (Feedback)

COURSE COORDINATOR **HEAD OF THE DEPARTMENT**

Dr.K.MOHAMED AMANULLAH Dr.R.THAMARAI SELVI

****

Elective II: ACOUNTING AND FINANCIAL MANAGEMENT

SEMESTER: III **CODE: P19CA3:1**
CREDITS: 4 **HOURS/WEEKS:4**

1. COURSE OUTCOMES

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

S.No	Course Outcomes	Level	Unit
CO1	Examine the basic concepts of accounting and its principles	K4	I
CO2	Construct the financial statements with suitable standards	K5	I
CO3	Identify the major elements of long-term and short-term ratio analysis	K3	II
CO4	Estimate cost per unit on various technique	K5	III
CO5	Distinguish shares and debentures of a company	K4	IV
CO6	Predict the marketing strategies to understand the consumer behavior and buying motives	K6	V

2A. Syllabus

UNIT I - Basic Accounting Concepts and Methods **12 Hours**

Financial Statements: Accounting Concepts and Conventions - System of Book Keeping – Journal - Ledger - Trail Balance - Preparation of Trading A/c, Profit and Loss A/c and Balance Sheet without Adjustments.

UNIT II - Ratio Analysis **12 Hours**

Ratio analysis ratios Introduction - Significance - Limitations - Classification According to Statement: Short-Term Solvency - Current Ratio - Liquidity Ratio - Classification According to Function: Long-Term Solvency - Debt-Equity Ratio - Proprietary Ratio - Profitability Ratio - Gross-Profit Ratio - Net-Profit Ratio - Operating Ratio.

UNIT III - Cost Management **12Hours**

Cost Concepts and cost classifications: Cost concepts and various types of cost classifications -Determination of costs -Marginal costing -Break Even Analysis - Contribution approach - Direct costing

UNIT IV - Company Accounts –Shares Capital **12Hours**

Company Accounts - Introduction to company accounts - Types of shares - Issue of shares at par, at premium, at discount

UNIT V - Marketing **12 Hours**

Introduction to Marketing: Meaning – Objectives - Classification of markets -Recent trends in marketing - Customer relationship Marketing - E-Marketing - Online Marketing - Tele Marketing

B. TOPICS FOR SELF-STUDY

S.No	Topics	Web Link
1	Depreciation Accounting	**https://www.tutorialspoint.com/accounting_basics/financial_accounting_depreciation.htm**
2	Subsidiary Books	**https://www.wisdomjobs.com/e-university/accounting-basics-tutorial-2266/financial-accounting-subsidiary-books-25196.html**
3	Budgeting and Planning Control	**https://i.investopedia.com/inv/pdf/tutorials/budgeting-basics.pdf**
4	Advance Digital Marketing	**https://www.edureka.co/blog/digital-marketing-tutorial/**

C. Text Books:

1. T.S. Reddy and A. Murthy, "Financial Accounting", 6th revised edition, Margam Publications, 2016.
2. M.Sheik Mohamed, E.Mubarak Ali and M.AbdulHakkem, "Management Accounting", Raja Publications, 2012.
3. R.Ramachandran, R.Srinivasan, "Financial Management", 12th Edition, Sriram Publications, 2012.
4. R.S.N Pillai, Bagavathi and S.Kala, "Marketing Management", S.Chand& Co Publications, 1st Edition, 2010.

D. Reference Books:

1. R.L. Gupta and V.K. Gupta, "Principles and practice of Accountancy", Eleventh Edition, 2005, Sultan Chand Sons, New Delhi.
2. N. Vinayagam& B. Charumathi, "Financial Accounting", Second Revised Edition, 2008, S.Chand& Company Ltd, New Delhi

E. Web links:

1. **https://www.tutorialspoint.com/accounting_basics/index.htm**
2. **https://www.guru99.com/accounting.html**

3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
I	**Accounting Concepts and Conventions**		
1.1	Definition and Objective of Accounting	Illustrate the concepts and principles of accounting rules	K2
1.2	Advantages of Book Keeping	Outline the uses of Book-Keeping	K2
1.3	Basic terms used in Accountancy	List out the terms in Accountancy	K1

1.4	Methods and Types of Accounts	Classify accounting strategies	K4
	Journal &Ledger		
1.5	Double Entry Book Keeping	Explain the method of double entry system	K2
1.6	Journal-Meaning-Rules	Make use of the Golden rules for journal	K3
1.7	Posting into Ledger	Examine the journal to post into ledger	K4
	Final Accounts-Trading and Profit and Loss Account		
1.8	Preparing Trading andP&LA/c and Balance sheet	Estimate the financial position of a concern	K6
II	**Ratio Analysis**		
2.1	Significance of ratio analysis	Identify the efficiency of firm's management	K3
2.2	Limitations of ratio analysis	Interpret the challenges in ratio analysis	K2
2.3	Classification According to statement/Function	Distinguish between function and statement	K4
	Short-term Solvency		
2.4	Current Ratio	Asses the current ratio of a firm	K5
2.5	Liquidity Ratio	Evaluate the Liquidity ratio of a firm	K5
	Long-term Solvency		
2.6	Debt Equity Ratio	Estimate the Equity ratio of share holders	K5
2.7	Proprietary Ratio/Profitability Ratio	Determine the profitability ratio	K5
2.8	Gross profit and Net Profit Ratio	Compare the gross and net profit ratio	K5
2.9	Operating Ratio	Evaluate the operatingratio	K5
III	**Cost Accountancy**		
3.1	Definition	Explain the cost account	K1
3.2	Various types of cost classification	Identify the specifics of different costing methods	K6
3.3	Illustration-Calculate Direct, Indirect and Variable cost	Analyze cost-volume-profit techniques to determine optimal managerial decisions.	K4
3.4	Determination of Marginal cost	Estimate of schedule costs per unit of production	K5
	Break Even Analysis		
3.5	Determination of Marginal cost	Explain the breakeven sales and cost-volume analysis	K2
3.6	Contribution approach-Problems	Interpret the impact of the selected costs method	K5
IV	**Company Accounts**		
4.1	Introduction to Company Accounts	Explain about the meaning of companies and working style of companies.	K2

4.2	Types of Shares	Explain the relationship between company and debenture holders	K2
	Issues of Shares-Journal Entries		
4.3	Shares issued at Par	Apply journal for issue of share at par	K3
4.4	Shares issued at premium	Apply journal for issue of share at premium	K3
4.5	Shares issued at discount	Apply journal for issue of share at discount	K3
V	**Marketing**		
5.1	Meaning and Objectives	Explain the fundamental of marketing	K2
5.2	Classification of markets	Classify different methods of sales promotion	K2
5.3	Recent Trends in marketing	Identify the trends in marketing	K3
5.4	Customer relationship marketing	Build effective relationship with customers	K3
5.5	E-Business	Demonstrate legal issues and privacy in E-Commerce	K2
5.6	Tele marketing/Online marketing	Assess the effect of changing technology on traditional business models and strategy	K5

4. MAPPING (CO, PO, PSO)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	-	M	M	-	M	H	L	L	M	-	-	M	H
CO2	M	H	L	-	L	H	-	M	M	-	-	-	H
CO3	M	M	H	-	H	M	-	-	L	-	-	-	M
CO4	M	H	M	-	M	L	-	L	L	-	M	H	H
CO5	-	L	-	-	L	M	-	L	-	-	L	-	M
CO6	H	M	M	L	M	H	-	H	M	M	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. Open Book Test.
3. 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)

COURSE COORDINATOR **HEAD OF THE DEPARTMENT**

Dr. M. LOVELIN PONN FELCIAH Dr.R.THAMARAI SELVI

****

Elective II: ENTERPRISE RESOURCE PLANNING

SEMESTER : III **CODE: P19CA3:2**
CREDITS: 4 **HOURS/WEEK: 4**

1. COURSE OUTCOMES

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

S. No.	Course Outcomes	Level	Unit covered
CO1	Summarize the basic concepts of ERP systems	K2	I
CO2	Distinguish between MRP, MRP II and ERP systems	K4	II
CO3	Analyze the technologies related to ERP systems and major components	K4	III
CO4	Discover the knowledge of typical ERP systems	K4	III
CO5	Assess the advantages and limitations of implementing ERP systems	K5	IV
CO6	Relate the various processes in business using ERP concepts and techniques	K2	V

2A. Syllabus

UNIT I - Introduction to ERP **12 Hours**

Introduction to ERP: Enterprise - ERP concepts - Justification for ERP investment – Risk involved in ERP implementation - Benefits of ERP - Important ERP Products (Software)

UNIT II - ERP and related Technologies **12 Hours**

ERP and related Technologies: Business Intelligence - E-Commerce & E-Business – Business Process Re-engineering - Data Warehousing and Data Mining - Online Analytical Process (OLAP) - Supply Chain Management - Customer Relationship Management

UNIT III - Business Modules in ERP **12 Hours**

Business Modules in ERP: Marketing – Finance - Material Management – Production - Quality Management - Sales Distribution – Plant Maintenance - Human Resource Management

UNIT IV - ERP Implementation **14 Hours**

ERP Implementation: ERP Implementation Life Cycle - Requirement definition - Implementation methodologies - Process definition Vendors and Consultants - ERP Project Teams - Dealing with Employee Resistance - Training and Education Data Migration

UNIT V - ERP Operation, Maintenance and Future Trends **10 Hours**

ERP Operation, Maintenance and Future Trends: Post implementation Activities - Operation and maintenance of ERP Systems - Performance Measurement of ERP Systems - Internet enabled ERP - Future trends in ERP

B. TOPICS FOR SELF-STUDY:

S.No	Topics	Web Link
1	The Future of ERP Market	www.deskera.com
2	ERP vs. ERP II vs. ERP III	www.iitrun.com
3	Open-Source ERP Technologies	www.thebalancesmb.com
4	Deploying ERP Applications	www.networkworld.com

C. Text Book:

1. Alexis Leon, "ERP Demystified", Tata McGraw-Hill Publications, 2008.

D. Reference Book:

1. Dr. Ashim Raj Singla, "Enterprise Resource Planning", 2nd Edition, Cengage Learning India Pvt., Ltd., 2016

E. Web links:

1. **www.ebooks.lpude.in/management**
2. **www.akwl.org/wp-content/uploads**

3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
I	**Introduction to ERP**		
1.1	ERP concepts	Recall the concepts of Enterprise Resource Planning	K1
1.2	Justification for ERP investment	List out the growth reasons of ERP	K1
1.3	Risk involved in ERP Implementation	Analyze the risks factors in ERP implementation	K4
1.4	Benefits of ERP	Explain the benefits of ERP	K2
1.5	Important ERP Products (Software)	Discuss integrated data model and business modeling	K6
II	**ERP and related Technologies**		
2.1	Business Intelligence	Apply the concepts of MIS, DSS and EIS in Business Intelligence	K3
.2.2	E-Commerce & E-Business	Outline the characteristics of BPR	K2
2.3	Business Process Re-engineering	Compare the various needs for business process re-engineering	K4
2.4	Data Warehousing and Data Mining	Discuss the concepts of data warehousing and data mining	K6
2.5	Online Analytical Process (OLAP)	Summarize the concepts of OLAP	K2

2.6	Supply Chain Management	Elaborate on supply chain business process integration	K6
2.7	Customer Relationship Management	Explain the concept of Customer Relationship Management	K2
III	**Business Modules in ERP**		
3.1	Marketing	Discuss the business modules of ERP	K6
3.2	Finance	Summarize the finance module	K2
3.3	Material Management	Organize material management module of ERP	K3
.3.4	Production and Quality Management	Recall the need for quality management	K1
3.5	Sales Distribution	Compare sales distribution between delivery and creation of quality certificates	K5
3.6	Plant Maintenance	Explain the plant maintenance module	K2
3.7	Human Resource Management	Solve HRM problems by applying system approach	K6
IV	**ERP Implementation**		
4.1	ERP Implementation Life Cycle	Discuss the ERP implementation cycle	K6
4.2	Requirement definition	Elaborate on gap analysis technique	K6
4.3	Implementation methodologies	Design ERP packages using implementation methodologies	K6
4.4	Process definition Vendors and Consultants	Outline the role of Vendors	K2
4.5	ERP Project Teams	Categorize the pros and cons of In-house Implementation	K4
4.6	Dealing with Employee Resistance	Explain the phases in project planning	K2
4.7	Training and Education Data Migration	Identify the need for end user training	K3
V	**ERP Operation, Maintenance and Future Trends**		
5.1	Post implementation Activities	Discuss the faster implementation methodology	K6
5.2	Operation and maintenance of ERP Systems	Distinguish between new markets and new channels	K4
5.3	Performance Measurement of ERP Systems	Outline the challenges of ERP Systems	K2
5.4	Internet enabled ERP	Summarize the concept of Internet enabling	K2
5.5	Future trends in ERP	Predict new business segments	K6

4. MAPPING (CO, PO, PSO)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**H**	**H**	**M**	**L**	**M**	**H**	**L**	**L**	**M**	**H**	**M**	**M**	**H**
CO2	**H**	**H**	**M**	**L**	**M**	**H**	**M**	**L**	**M**	**H**	**M**	**L**	**H**
CO3	**H**	**H**	**M**	**L**	**L**	**H**	**L**	**M**	**M**	**M**	**H**	**L**	**H**
CO4	**H**	**H**	**M**	**L**	**L**	**H**	**M**	**L**	**M**	**M**	**H**	**L**	**H**
CO5	**H**	**H**	**M**	**L**	**L**	**H**	**L**	**M**	**M**	**H**	**M**	**L**	**H**
CO6	**H**	**H**	**M**	**L**	**L**	**H**	**M**	**L**	**M**	**H**	**M**	**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. Open Book Test.
3. 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)

COURSE COORDINATOR **HEAD OF THE DEPARTMENT**

Dr.A. FLORENCE DEEPA Dr.R.THAMARAI SELVI

****

Elective II: MANAGEMENT INFORMATION SYSTEMS

SEMESTER: III **CODE : P19CA3:3**
CREDITS : 4 **HOURS/WEEKS: 4**

1. COURSE OUTCOMES

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

S.No.	Course Outcomes	Level	Unit
CO1	Recall the role of information technology and information system in business	K1	I
CO2	Evaluate the role of information systems in supporting various levels of business strategy	K2	II
CO3	Analyze and synthesize business information and systems to facilitate evaluation of strategic alternatives	K3	III
CO4	Describe the role of information technology and decision support systems in business and record the current issues with those of the firm to solve business problems	K3	IV
CO5	Build a business case for IT, addressing key IT acquisition decisions such as make/buy; outsource/in source; project management	K5	V
CO6	Create the theoretical models used in database management systems to answer business questions	K6	V

2A. Syllabus

UNIT I - Introduction to Information Systems **12 Hours**

Introduction to Information Systems: Why study Information System? – Why Business need Information Technology? – Fundamentals of Information Systems – Overview of Information Systems.

UNIT II - Solving Business Problems with Information Systems **12 Hours**

Solving Business Problems with Information Systems: System Approach to Problem Solving – Developing Information System Solution. **Database Management:** Managing Data Resources – Technical Foundation of Database Management.

UNIT III - Information Systems for Strategic Advantage **12 Hours**

Information Systems for Strategic Advantage: Fundamentals – Strategic Advantage – Strategic Applications and Issues in IT. **Managing:** Enterprise and Global Management.

UNIT IV - Business Applications of Information Technology **12 Hours**

Business Applications of Information Technology: The Internet Electronic Commerce – Fundamentals of Electronic Commerce – Information System for Business Operations – Business Information System – Transaction Processing Systems.

UNIT V - Information Systems for Managerial Decision Support **12 Hours**

Information Systems for Managerial Decision Support: Decision Support Systems – Artificial Intelligence Technology in Business – Management IT – Planning for Business Change with IT –

Implementing Business Changes with IT – Security and Control Issues in I/S – Ethical and Societal Challenge of Information Technology.

B. TOPICS FOR SELF-STUDY

S.No	Topics	Web Link
1	Functional Information Systems	**https://ecomputernotes.com/mis/structure-and-classification/explain-briefly-the-different-functional-information-systems**
2	Enterprise Resource Planning	**https://solutionsreview.com/enterprise-resource-planning/understand-erp-by-watching-these-5-youtube-videos/**
3	Trends in MIS	**https://moonwelfarefoundation.blogspot.com/2018/11/trends-in-management-information-systems.html**
4	Enterprise Software Systems	**https://www.floridatechonline.com/blog/information-technology/types-of-enterprise-systems-and-their-applications/**

C. Text Book

1. James A. O'Brien, "Management Information Systems", Fourth Edition, Galgotia Publications, 1999.

B. Reference Book

1. Gordon B. Davis, Margrethe H. Olson, "Management Information Systems", McGraw Hill, 2000.

D. Web links

1.**https://nptel.ac.in/courses/122/105/122105022/**
2.**https://www.youtube.com/watch?v=N8F7eOqgH8Q**

3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
I	**Introduction to MIS**		
1.1	Introduction to MIS	Recall the definition of MIS.	K1
1.2	Fundamentals of Information Systems	Explain some of the essential features of the modern organisation	K2
1.3	Overview of information system	Show the pyramid of information system in organization	K2
II	**Solving Business Problems with Information Systems**		
2.1	Definition of Information Systems	Define business problems using business solutions	K1

2.2	System Approach to Problem Solving	Summarize the main purposes of information systems in organizations	K2
2.3	Developing Information System Solution	Develop solutions for information system problems	K5
	Database Management		
2.4	Managing Data Resources	Identify the stages of transaction from a manual system to automated systems	K3
2.5	Technical Foundation of Database Management	Summarize the need for database systems.	K2
III	**Information Systems for Strategic Advantage**		
3.1	Fundamentals	Outline the strategic roles of information systems	K2
3.2	Strategic Advantage	Identify the stages in IT infrastructure evolution.	K3
3.3	Strategic Applications and Issues in IT	Assess the strategic information system	K5
	Managing IT Infrastructure		
3.4	Enterprise and global management	Identify the challenges of managing IT infrastructure and management solutions	K3
IV	**Business Applications of IT**		
4.1	Definition of IT	Define IT infrastructure	K1
4.2	The Internet Electronic Commerce	Classify e-commerce transactions	K4
4.3	Fundamentals of Electronic Commerce	Construct the e-commerce support service diagram	K3
	Information System for Business Operations		
4.4	Business Information System	Compare E-enterprise business model with traditional business organization model	K5
4.5	Transaction Processing System.	Summarize the characteristics of Transaction Processing System	K2
V	**I/O Management and Disk Scheduling**		
5.1	Decision Support Systems	Discuss the functionality of Decision Support System.	K6
5.2	Artificial Intelligence Technology in Business	Evaluate how artificial intelligence can gain business intelligence through the implementation of a communication information system.	K5
	Management of IT		
5.3	Planning for Business Change with IT	Discuss the challenges faced by the CIO.	K4
5.4	Implementing Business Changes with IT	Develop new concepts of management in technological companies using IT	K5

5.5	Security and Control Issues in Information system.	Examine the various ethical & security issues in information system	K6

4. MAPPING (CO, PO, PSO)

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

COURSE COORDINATOR **HEAD OF THE DEPARTMENT**

Dr. H.B.VINCENTRAJ Dr.R.THAMARAI SELVI

****

SBC I*- COMMUNICATION AND LIFE SKILLS

SEMESTER: III & IV **CODE: P18CAPS1**
CREDITS: 2 **HOURS/WEEKS: 2**

1. COURSE OUTCOMES

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

S.No.	Course Outcomes	Level	Unit covered
CO1	Utilize the basic grammar for written and oral communication	K3	I
CO2	Elaborate on the importance of reading skills	K6	II
CO3	Develop contents for various topics for writing essays	k6	III
CO4	Improve leadership and problem-solving skills	K6	IV
CO5	Demonstrate good interaction skills and participate in group discussions and interviews	K6	IV
CO6	Construct a good Resume	K6	V

2A. Syllabus

UNIT I - Basic Grammar **12 Hours**

Basic Grammar – Reading Comprehension: Purpose and Strategies of Reading – Skimming for Details– Identifying Main Ideas.

UNIT II - Reading and Writing Skills **12 Hours**

Reading Comprehension: Scanning for Information – Drawing Inferences – Vocabulary. **Writing Paragraphs:** Features of Good Writing – Gathering Ideas – Purposes of Writing – Writing for a Specific Audience– Organizing Ideas.

UNIT III - Proof Reading **12 Hours**

WritingEssays: Writing an Introduction – Developing Supporting Ideas – Writing a Conclusion – using Linkers – Choosing the Right Words – Common Errors in Writing – Editing and Proof Reading.

UNIT IV - Group Discussion **12 Hours**

Group Discussion: Group Discussion as a Tool for Selection – Skills for Group Discussion – Leadership and Problem–Solving Skills – Types of Group Discussions – Group Dynamics – Roles and Functions.

UNIT V - Interview Skills **12 Hours**

Interview Skills: Purpose of Interviews – Preparing a Resume – Writing Cover Letter – Before and at the Interview – Etiquette, Body Language and Time Management.

B. TOPICS FOR SELF STUDY

S. No	Topics	Web Link
1	Critical Thinking	**www.skillsyouneed.com**
2	Social Skills	**www.lifehack.org**

3	Emotional Intelligence	**www.en.wikipedia.org**
4	Leadership Skills	**www.in.indeed.com**

C. Text Book:

1.Lina, B Sai Lakshmi et.al., "Polyskills", Cambridge University Press India Pvt. Ltd., 2012.

D. Reference Books:

1. John Seely, "The Oxford Guide to Writing and Speaking", Oxford University Press, New Delhi, 2004.
2. Thorpe E, and Thorpe S, "Objective English", Pearson Education, Second Edition, New Delhi, 2007.
3. Turton N.D and Heaton J.B, "Dictionary of Common Errors", Addison Wesley Longman Ltd., Indian reprint 1998.

E. Web links:

1. **www.thebalancecareers.com**
2. **www.mindtools.com**
3. **www.skillsyouneed.com**

3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
I	**Basic Grammar-Reading Comprehension**		
1.1	Purpose and strategies of reading	Develop reading practices	K6
1.2	Skimming for Details	Plan for reading	K6
1.3	Identifying Main Ideas	Identifying the ideas for reading	K3
II	**Reading Comprehension**		
2.1	Scanning for Information	Recall the information	K1
2.2	Drawing Inferences	Make use of inference	K3
2.3	Vocabulary	Build vocabulary	K6
	Writing Paragraphs		
2.4	Features of Good Writing	Develop good writing skills	K6
2.5	Gathering Ideas	Summarize the ideas of writing	K2
2.6	Purpose of Writing	Improve writing skills	K6
2.7	Writing for Specific Audience	Recommend for specific audience	K5
2.8	Organizing Ideas	Organize ideas	K3
III	**Writing Essays**		
3.1	Writing an Introduction	Outline on writing an introduction	K2
3.2	Developing Supporting Ideas	Develop supporting ideas	K6
3.3	Writing Conclusion	Conclude writing	K5
3.4	Using Linkers	Make use of linkers	K3
3.5	Choosing the Right Words	Choose right words	K3

3.6	Common errors in writing	Show common errors in writing	K1
3.7	Editing and Proof Reading	Evaluate writing skills	K5
IV	**Group Discussion**		
4.1	Group Discussion as a Tool for Selection	Discuss on a particular topic	K6
4.2	Skills for Group Discussion	Develop skills forgroupdiscussion	K6
4.3	Leadership and Problem-solving skills	Build leadership skills	K6
4.4	Types of Group Discussion	Explain the types of group discussion	K5
4.5	Group Dynamics	Design group dynamics	K6
4.6	Roles and Functions	Illustrate the roles and functions	K2
V	**Interview Skills**		
5.1	Purpose of Interviews	Improve interview skills	K6
5.2	Preparing a Resume	Design a resume	K6
5.3	Writing a Cover Letter	Outline a cover letter	K2
5.4	Before and at the Interview	Elaborate on interview techniques	K6
5.5	Etiquette	Exhibit etiquette	K4
5.6	Body Language	Importance of body language	K5
5.7	Time Management	Examine time management	K4

4. MAPPING (CO, PO, PSO)

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

L-Low M-Moderate H- High

5. COURSE ASSESSMENT METHODS

DIRECT:

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

INDIRECT:

1. Course end survey (Feedback)

COURSE COORDINATOR
Mrs. PEARLY CHARLES

HEAD OF THE DEPARTMENT
Dr.R.THAMARAI SELVI

****

Core XIII: PROGRAMMING IN PHP WITH MYSQL

SEMESTER: IV **CODE: P18CA413**
CREDITS: 3 **HOURS/WEEKS: 4**

1. COURSE OUTCOMES

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

S.No.	Course Outcomes	Level	Unit covered
CO1	Develop a PHP program using variables and basic statements.	K6	I
CO2	Utilize the different types of arrays.	K3	I
CO3	Create custom functions using PHP built-in functions	K6	II
CO4	Distinguish POST and GET in form submission.	K4	III
CO5	Create sessions and cookies.	K6	IV
CO6	Design Dynamic web site using server-side PHP and MYSQL Database	K6	V

2A. Syllabus

UNIT I - Introduction to PHP **12 Hours**

PHP BASICS : Introduction - PHP Getting Started - Syntax - PHP Variables, Predefined Variables: super globals, server variables - Constants - Echo and Print - Data Types - String Functions - Operators - Control Structures: - Arrays - Sorting Arrays - Loops

UNIT II - PHP Functions and File System **12 Hours**

PHP Functions - Math Operations - Date and Time -Classes and Objects - Forms : GET and POST -Include Files - File system- Parsing Directories- File Upload- File Download

UNIT III - Cookies and Session **12 Hours**

State Management : Cookies - Sessions - Form Handling - Form Validation - Filters - Error Handling - Send Email - PHP Magic Constants - JSON Parsing - Regular Expressions - Exception Handling

UNIT IV - MYSQL Database **12 Hours**

PHP & MySQL DATABASE : MySQL Introduction:MySQLi (object-oriented, MySQLiprocedural,PDO) - MySQL Connect - MySQL Create Database - MySQL Create Table - MySQL Insert - MySQL Prepared - MySQL Last Inserted ID - MySQL Select - MySQL Where - MySQL Limit - MySQL Order By - MySQL Update - MySQL Delete.

UNIT V - Ajax and MVC **12 Hours**

MySQL CRUD Application - MySQL Ajax Search - MySQL Login System – MVC - Simple PHP MVC Example

B. TOPICS FOR SELF STUDY

S.No	Topics	Web Link
1	PHP XML parser	**www .w3schools.com**
2	Directory in PHP	**www .w3schools.com**
3	PHP Calendar	**www .w3schools.com**
4	PHP with Backup Database	**www.tutorialspoint.com**

C. Text Books

1.Antonio Lopez, "Learning PHP 7", PACKT Open Source Publication, 2016
2.Dennis Popel, "Learning PHP Data Objects: A Beginner's Guide to PHP Data Objects, Database Connection Abstraction Library for PHP 5", Packt Publishing, 2009. (UNIT V)

D. Reference Books

1.Adrian W. West, "Practical PHP and MySQL Website Databases", Apress, 2016
2.Leon Atkinson, "Core PHP Programming", Pearson Education, 2004.
3. www.jkmaterials.yolasite.com/resources/labmanuals/BTech/WT-PHP-Record.pdf
4. MySQL® Notes for Professionals, GoalKicker.com
5. PHP Notes for Professionals, GoalKicker.com

E. Web links:

1. **www.tutorialspoint.com**
2. **www.w3school.com**
3. **www.javatpoint.com**

3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning outcomes	Highest Bloom's Taxonomic Level of Transaction
I	**Introduction to PHP**		
1.1	Basics of PHP	Recall the basic concepts of PHP	K1
1.2	PHP Variables	List out thePHP Variables	K2
1.3	super global, server variables	Explain about super global, server variables	K2
1.4	Echo and Print	Compare Echo and Print	K4
1.5	Data Types	Classify Data types	K4
	Control Structures and Arrays		
1.6	Operators	Explain about Operators	K2
1.7	String Functions	Apply String functions	K3
1.8	Control Structures	Explain Control Structures	K2
1.9	Arrays	Illustrate Arrays	K2
II	**Functions and Classes**		
2.1	PHP Functions	Create functions in PHP	K6

2.2	Math Operations	Apply Math operations in program	K3
2.3	Date and Time	Explain Date and Time	K3
2.4	Classes and Objects	Discuss Classes and Objects	K6
	Forms and File systems		
2.5	2.3 Forms	Utilize Forms to get data	K3
2.6	2.4 GET and POST	Make use of GET and POST methods	K3
2.7	2.5 File system	Discuss the File System	K6
2.8	2.6 Parsing Directories	Explain Parsing Directories	K2
2.9	2.7 File Upload	Utilize File Upload Controls	K3
2.10	2.8 File Download	Make use of File Download operations	K3
III	**Cookies and Sessions**		
3.1	Cookies and Sessions	Explain Cookies and Sessions	K2
3.2	Form Handling	Create and handle forms	K6
3.3	Filters	Illustrate the use of Filters	K2
3.4	Send Email	Discuss about Email	K6
	Constants and Regular Expressions		
3.5	PHP Magic Constants	Recall the basic concepts of Magic constant	K1
3.6	Regular Expressions	Explain Regular expressions	K2
3.7	Exception Handling	Apply Exception Handling	K3
IV	**PHP & MySQL Database**		
4.1	MySQL Connect	Construct database connectivity	K6
4.2	MySQL Create Database	Create tables, views and index	K6
4.3	MySQL Insert	Apply Insert statementin table	K3
4.4	MySQL Prepared	CreateMySQL Prepared statement	K6
	MYSQL Operations		
4.5	MySQL Select	Make use of select statement	K3
4.6	MySQL Where	Apply Where Clause in SQL statement	K3
4.7	MySQL Order By	Categorize Order Byclause	K4
4.8	MySQL Update	Utilize Update statement	K3
4.9	MySQL Delete	Apply Delete Statement	K3
V	**Ajax and MVC**		
5.1	5.1MySQL CRUD Application	Summarize CRUD Application	K2
5.2	5.2 MySQL Ajax Search	Explain Ajax Search	K2
5.3	5.3 MySQL Login System	List out the Built-in functions	K1
5.4	5.4 MVC	Discuss Model View Controller	K6
5.5	5.5 Simple PHP MVC Example	Design simple Model View Controller	K6

4. MAPPING (CO, PO, PSO)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	M	M	M	L	-	H	H	-	M	M	M	-	M
CO2	M	H	M	H	M	H	H	L	M	M	H	M	L
CO3	H	M	H	M	H	H	H	M	M	M	L	L	M
CO4	M	L	H	H	H	H	H	M	H	L	H	H	M
CO5	H	H	L	H	M	L	M	H	H	M	H	M	L
CO6	H	M	M	M	H	H	H	M	M	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, Poster Presentation, Seminar, Quiz (written).
4. Pre-Semester & End Semester Theory Examination

INDIRECT:

1. Course end survey (Feedback)

COURSE COORDINATOR Dr.R.THAMARAI SELVI

HEAD OF THE DEPARTMENT Dr.R.THAMARAI SELVI

****

Core XIV: COMPUTER COMMUNICATION NETWORKS

SEMESTER: IV **CODE: P18CA414**
CREDITS: 4 **HOURS/WEEKS: 4**

1. COURSE OUTCOMES

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

S.No.	Course Outcomes	Level	Unit
CO1	Compare OSI and TCP/IP Reference Models	K4	I
CO2	Apply the framing methods and data-link layer issues in error detection, corrections and flow control	K3	II
CO3	Choose the appropriate routing algorithms for transmission of data	K5	III
CO4	Conclude the functions of TCP and UDP protocols	K4	IV
CO5	Discuss the features and operations of various application layer protocols such as HTTP, DNS and SMTP	K6	IV
CO6	Elaborate the cryptography and network security algorithms	K6	V

2A. Syllabus

UNIT I - Introduction to Computer Networsk and Physical Layer 12 hours

Introduction – **Uses of Computer Networks:** Business Application – Home Application – Mobiles users – Social Issues – Network Hardware – Network Software. **Reference Models:** OSI Reference model – TCP\IP Reference model. **The Physical Layer:** The Theoretical Basis for Data Communication – Guided Transmission Media – Wireless Transmission.

UNIT II - The Data Link Layer 12 Hours

The Data Link Layer: Design Issues – Error Detection and Correction – Elementary Data Link Protocols – Sliding Window Protocols – The Medium Access Sublayer. **Ethernet:** Ethernet Cabling – Manchester Encoding – Ethernet MAC Sublayer Protocol. **Bluetooth:** Bluetooth Architecture – Bluetooth Applications – The Bluetooth Protocol Stack – Bluetooth Frame Structure.

UNIT III - The Network Layer 12 Hours

The Network Layer: Design Issues – Routing Algorithms. **Congestion Control:** General Principles of Congestion Control – Congestion Control Prevention Policies – Congestion Control in Virtual Circuit Subnets – Congestion Control in Datagram Subnets. Quality of Service – Internetworking – The Network Layer in the Internet: The IP Protocol – IP Address.

UNIT IV - The Transport Layer and Application Layer 12 hours

The Transport Layer: The Transport Service – The Internet Transport Protocol (UDP) .**The Internet Transport Protocol (TCP):** Introduction to TCP – TCP Service Model – The TCP Protocol – The TCP Segment Header – TCP Connection Establishment – TCP Connection Release .**The Application Layer:** Domain Name System – Electronic Mail.

UNIT V - Network Security **12 Hours**

Cryptography: Introduction to Cryptography – Substitution Ciphers – Transposition Ciphers – One Time pads – Two Fundamental Cryptographic Principles. **Symmetric Key Algorithms:** Data Encryption Standard. **Public Key algorithms:** RSA – Other Public Key Cryptography. Email Security – Web Security.

B. TOPICS FOR SELF-STUDY:

S.No.	Topics	Web Links
1	Universal Mobile Telecommunication system	https://www.tutorialspoint.com/universal-mobile-telecommunications-system
2	IEEE 802.11	https://www.tutorialspoint.com/wi-fi/wifi_ieee_standards.htm
3	SIP and H.323	https://www.geeksforgeeks.org/difference-between-h-323-and-sip/
4	Stegnography	https://www.geeksforgeeks.org/image-steganography-in-cryptography/

C. Text Book:

1. Andrew S. Tannenbaum, "Computer Networks", Prentice Hall of India, Fourth Edition, 2005

D. Reference Books:

1. Behrouz A Forouzan, "Data Communications and Networking", McGraw Hill, Fourth Edition, 2006.
2. William Stallings, "Data and Computer Communications", PrenticeHall of India, Sixth Edition, 2000.

E. Web links:

1. https://nptel.ac.in/courses/106/105/106105183/
2. https://www.tutorialspoint.com/data_communication_computer_network/index.htm

3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
1	**Introduction**		
1.1	Uses of Computer Networks	Outline the uses of computer networks	K2
1.2	Network Hardware	Explain the network hardware	K2

1.3	Network Software	Summarize the network software.	K2
1.4	Reference Models: OSI Reference model	Importance of the layers of the OSI reference model.	K5
1.5	TCP\IP Reference model	Illustrate the TCP /IP reference model.	K2
	The physical Layer		
1.6	The Theoretical Basis for Data Communication	Define: Bandwidth	K2
1.7	Guided Transmission Media.	Choose the guided transmission media.	K6
1.8	Wireless Transmission.	Elaborate on wireless transmission.	K6
II	**The Data Link Layer**		
2.1	Design Issues	Discuss the design issues of data-link layer.	K6
2.2	Error Detection and Correction	Test the error detection and correction techniques.	K6
2.3	Elementary Data Link Protocols	Elaborate on the protocols of data link layer	K6
2.4	Sliding Window Protocols	Make use of the sliding window protocol.	K3
2.5	Medium Access Sublayer	Discuss the medium access sublayer.	K6
	Ethernet		
2.6	Ethernet Cabling	Make use of Ethernet cabling.	K3
2.7	Manchester Encoding	Apply the Manchester encoding in data link layer.	K6
2.8	Ethernet MAC Sublayer Protocol	Discuss Ethernet MAC sublayer protocol	K6
	Bluetooth		
2.9	Bluetooth Architecture	Illustrate on the architecture of Bluetooth	K2
2.10	Bluetooth Applications	Outline the various applications of Bluetooth	K2
2.11	The Bluetooth Protocol Stack	Explain the Bluetooth protocol stack.	K2
2.12	Bluetooth Frame Structure	Illustratethe frame structure of Bluetooth	K2
III	**The Network Layer**		
3.1	Design Issues	Analyze the design issues in network layer	K4
3.2	Routing Algorithms	Test thevarious routing algorithms.	K6
	Congestion Control		
3.3	Congestion Control Prevention Policies	Discuss the policies in the control and prevention of congestion.	K6

3.4	Congestion Control in Virtual Circuit Subnets	Choose the control algorithms in virtual circuit subnets.	K6
3.5	Congestion Control in Datagram Subnets	Assess congestion control in datagram subnets.	K5
3.6	Quality of Service	Improve the quality of service.	K6
	The Network Layer in the Internet		
3.7	The IP Protocol	Illustrate on the IP protocol.	K2
3.8	IP Address	Classify IP addresses.	K2
IV	**The Transport Layer**		
4.1	The Transport Service	Identify the services provided to the upper layers	K2
4.2	The Internet Transport Protocol (UDP)	Discuss the Internet transport protocol.	K6
4.3	TCP Service Model	Elaborate on the TCP service model.	K6
4.4	The TCP Protocol	Explain the TCP protocol.	K5
4.5	The TCP Segment Header	Illustrate the TCP segment header.	K2
4.6	TCP Connection Establishment	Explain the TCP connection establishment.	K5
4.7	TCP Connection Release	Make use of the TCP connection release.	K3
	The Application Layer		
4.8	Domain Name System	Elaborate the domain name system.	K6
4.9	Electronic Mail	Illustrate the architecture of E-mail system.	K2
V	**Network Security**		
5.1	Cryptography: Introduction to Cryptography	Define Cryptography	K2
5.2	Substitution Ciphers, Transposition Ciphers, One Time pads	Choose the ty3pe of ciphers	K5
5.3	Two Fundamental Cryptographic Principles	Analyze the fundamental cryptographic principles	K4
5.4	Symmetric Key Algorithms: Data Encryption Standard	Compare the symmetric key algorithms	K5
5.5	Public Key algorithms: RSA, Other Public Key Cryptography.	Choose the public key algorithm	K5
5.6	Email Security	Elaborate on E-Mail security	K6
5.7	Web Security	Elaborate on web security	K6

4. MAPPING (CO, PO, PSO)

	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO	PSO	PSO	PSO

	1	2	3	4	5	6	7	8	9	1	2	3	4
CO1	**H**	**-**	**L**	**H**	**-**	**H**	**M**	**H**	**L**	**L**	**M**	**M**	**-**
CO2	**M**	**H**	**M**	**H**	**M**	**-**	**M**	**L**	**M**	**L**	**H**	**M**	**L**
CO3	**H**	**H**	**H**	**M**	**H**	**M**	**M**	**M**	**H**	**L**	**L**	**M**	**M**
CO4	**M**	**L**	**H**	**H**	**M**	**L**	**M**	**M**	**M**	**L**	**L**	**M**	**M**
CO5	**H**	**L**	**H**	**H**	**H**	**H**	**M**	**M**	**M**	**H**	**H**	**H**	**H**
CO6	**H**	**H**	**H**	**H**	**H**	**M**	**H**	**M**	**M**	**L**	**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. 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)

COURSE COORDINATOR **HEAD OF THE DEPARTMENT**

Dr.P.THANGARAJU Dr.R.THAMARAI SELVI

****

Core XV: SMART DEVICES PROGRAMMING

SEMESTER: IV **CODE: P18CA415**
CREDITS: 4 **HOURS/WEEK: 4**

1. COURSE OUTCOMES

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

S.No.	Course Outcomes	Level	Unit
CO1	Illustrate the various mobile application developing environments and IDEs	K2	I
CO2	Create mobile applications using intents, activities and components	K6	II
CO3	Design mobile applications for android OS with all the UI controls	K6	III
CO4	Create mobile application with SQLite as backend	K6	IV
CO5	Recommend the launching of mobile application in Play Store	K5	V
CO6	Build applications using JavaScript, HTML5, CSS3 and with the help of PhoneGap	K6	V

2A. Syllabus

UNIT I - Introduction to Various Mobile Technologies **12 Hours**

Introduction to Android and Development Environments Various mobile technologies- Apple IOS – Android operating system- install and configure Eclipse, Android Studio andn Android sdk - android virtual device- creation of android virtual device- sample programs – features of Eclipse and Android studio.

UNIT II - Android Components **12 Hours**

Simple Android Application Development Sample programs- Operation of Android Virtual device - activity in android –Life cycle of an activity intent – linking activities using intent- data passing between activities using intent - android components: activities, services, broadcast receivers, content providers**.**

UNIT III - UI Design and Data Storage **12 Hours**

UI Design and Data storage UI components: -Layout: Linear, Absolute, Table, Frame. - Views: Text, Edit, Button, ImageButton, CheckBox, ToggleButton, RadioButton, RadioGroup, List, Image, Grid . Menus – Options, Context- Action bar, Notifications.

UNIT IV - Data Storage in Android **12 Hours**

Data storage in Android- various storage technologies- operations for data storage and retrieval to/from internal and external memory - SQLite database- - content Providers and their relative advantages and disadvantages - SMS service in Android - publish application in Google Play Store.

UNIT V - Apply Styles in Android Application **12 Hours**

Mobile Application development using HTML 5.0 and JavaScript HTML components for mobile applications-HTML 5 tags and attributes for mobile development- Styling Mobile Pages with

CSS3 - Simple applications using HTML5 and JavaScript- Building a mobile web application - Introduction to PhoneGap.

B. TOPICS FOR SELF-STUDY

S.No	Topics	Web Link
1	Animations and Transitions	**https://developer.android.com/training/animation**
2	Sending SMS	**https://www.tutorialspoint.com/android/android_advanced_tutorial.pdf**
3	Working with Sensor data	**https://google-developer-training.github.io/android-developer-advanced-course-practicals/unit-1-expand-the-user-experience/lesson-3-sensors/3-1-p-working-with-sensor-data/3-1-p-working-with-sensor-data.html#tolearn**
4	Google Play's billing system	**https://developer.android.com/google/play/billing**

C. Text Books:

1. Wei-Meng Lee, "Beginning Android Application Development", Wrox, First Edition.
2. Jennifer Kyrnin, "HTML 5 Mobile Application Development", SAMS publications, First Edition

D. Reference Book:

1. Thomas Myer, "Beginning PhoneGap", 2011.

E. Web links:

1. **https://developer.android.com/**
2. **https://www.tutorialspoint.com/android/index.htm**
3. **https://www.javatpoint.com/android-tutorial**
4. **https://www.vogella.com/tutorials/android.html**

3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
I	**Introduction to Various Mobile Technologies**		
1.1	Mobile technologies	Utilize the various mobile technologies	K3
1.2	Android Development Environment	Design a sample Android application	K6
1.3	Apple IOS – Android operating system-	Compare Apple IOS and Android OS	K5
1.4	Integrated Development Environments	Build Android application in Android studio	K6

1.5	Android Virtual Device	Choose the AVD for Android application	K6
1.6	Features of Android Studio and Eclipse	Assess the features of IDEs for Android application	K5
1.7	Sample Programs	Create Android applications	K6
II	**Android Components**		
2.1	Activity	Create Activities in Android application	K6
2.2	Lifecycle of an Activity	Experiment with lifecycle of an Activity	K3
2.3	Intent	Modify an application by passing Intents	K6
2.4	Linking activities using intent	Develop Android application by linking Activities	K6
2.5	Data passing between activities using intent	Improve application by passing data between Activities	K6
2.6	Services	Build Services with Android application	K6
2.7	Broadcast receivers	Combine broadcast receiver with Android application	K6
2.8	Content Providers	Test the Content providers in application	K6
III	**UI Design and Data Storage**		
3.1	Layout	Design a sample Android application with Linear layout and Absolute layout	K6
3.2	Table	Modify application by including a table in UI	K6
3.3	Frame	Combine frame with existing application's UI	K6
3.4	Views	Develop an application by including Text, Button, Image Button, Toggle Button, Radio Button, List, Radio Group and Grid in UI	K6
3.5	Menu	Create application with menu and submenu	K6
3.6	Action bar	Improve application by embedding Action bars	K6
3.7	Notification	Build Android application that sends notifications to users	K6
IV	**Data Storage in Android**		
4.1	Storage Technologies	Apply data storage	K6
4.2	Operations for data storage	Create Android applications with database	K6
4.3	Retrieval to/from internal and external memory	Design application by interacting with internal and external memory	K6

4.4	SQLite Database	Develop Android applications with SQLite as backend	K6
4.5	Content Providers	Build applications with content providers	K6
4.6	SMS services	Improve application by integrating with SMS services	K6
4.7	Publishing application in Play store	Test application's success by publishing it in Play store	K6
V	**Apply Styles in Android Application**		
5.1	Styling Mobile Pages	Design application by applying CSS# for common style	K6
5.2	Mobile applications with HTML5 and JavaScript	Create application with the help of HTML5 and JavaScript	K6
5.3	Mobile Web application	Build mobile web application	K6
5.4	PhoneGap	Develop application in PhoneGap that suits for all the mobile OS	K6

4. MAPPING (CO, PO, PSO)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**H**	**-**	**L**	**H**	**-**	**H**	**M**	**H**	**L**	**L**	**M**	**M**	**-**
CO2	**M**	**H**	**M**	**H**	**M**	**-**	**M**	**L**	**M**	**L**	**H**	**M**	**L**
CO3	**H**	**H**	**H**	**M**	**H**	**M**	**M**	**M**	**H**	**L**	**L**	**M**	**M**
CO4	**M**	**L**	**H**	**H**	**M**	**L**	**M**	**M**	**M**	**L**	**L**	**M**	**M**
CO5	**H**	**L**	**H**	**H**	**H**	**H**	**M**	**M**	**M**	**H**	**H**	**H**	**H**
CO6	**H**	**H**	**H**	**H**	**H**	**M**	**H**	**M**	**M**	**L**	**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. Open Book Test.
3. Cooperative Learning Report, Assignment, Group Presentation, Group Discussion, Project Report, Seminar, Quiz (written).
4. Pre-Semester & End Semester Theory Examination

INDIRECT:

1. Course end survey (Feedback)

COURSE COORDINATOR **HEAD OF THE DEPARTMENT**

Dr.A. FLORENCE DEEPA Dr.R.THAMARAI SELVI

****

Core XVI: DATAWAREHOUSING AND DATA MINING

SEMESTER: IV **CODE: P18CA416**
CREDITS: 4 **HOURS/WEEKS: 4**

1. COURSE OUTCOMES

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

S.No.	Course Outcomes	Level	Unit covered
1	Summarize the basic concepts in data mining and the techniques in knowledge mining.	K2	I
2	Analyze the fundamentals of Data Preprocessing.	K4	II
3	Apply the various concepts of Data Warehousing and Online Analytical Processing for forecasting	K3	II
4	Elaborate the techniques in classification.	K6	III
5	Analyze the cluster algorithms.	K4	IV
6	Estimate the knowledge of Outlier Detection, Data Mining Trends and Research Frontiers.	K6	V

2A. Syllabus

UNIT I - Data Mining Introduction and Preprocessing **12 Hours**

Introduction: Why Data Mining? – What is Data Mining? – What Kinds of Patterns can be Mined? – Which Technologies Are Used? – Which Kinds of Applications Are Targeted? – Major issues in Data Mining. **Data Preprocessing**: **Data Preprocessing:** An Overview – Data Clearing – Data Integration – Data Reduction – Data Transformation and Data Discretization.

UNIT II - Data Warehousing Concepts **12 Hours**

Data Warehousing and Online Analytical Processing: Data Warehouse: Basic Concepts – Data Warehouse Modeling: Data Cube and OLAP – Data Warehouse Design and Usage – Data Warehouse Implementation – Data Generalization by Attribute – Oriented Induction.

UNIT III - Patterns and Classification Techniques **12 Hours**

Mining Frequent Patterns, Associations, and Correlations: Basics Concepts and Methods: Basic Concepts – Frequent Itemset Mining Methods. **Classification: Basic Concepts:** Basic Concepts – Decision Tree Induction – Rule Based Classification – Lazy Learners.

UNIT IV - Cluster Analysis Concepts and Techniques **12 Hours**

Cluster Analysis: Basic Concepts and Methods: Cluster Analysis – Partitioning Methods – Hierarchical Methods – Density Based Methods – Grid Based Methods.

UNIT V - Outlier Detection Techniques **12 Hours**

Outlier Detection: Outliers and Outlier Analysis–Outlier Detection Methods – Statistical Approaches – Proximity based Approaches – Clustering based Approaches – Classification based Approaches. **Data Mining Trends and Research Frontiers:** Data Mining Applications.

B. TOPICS FOR SELF STUDY

S.No	Topics	Web Link
1	Baye's Theorem	**https://www.tutorialspoint.com/data_mining/dm_bayesian_classification.htm**
2	Backpropagation	**https://towardsdatascience.com/understanding-backpropagation-algorithm**
3	Rule-based classification	**https://www.tutorialspoint.com/data_mining/dm_rbc.htm**
4	Clustering Evaluation Measuring Clustering Quality	**https://www.coursera.org/lecture/cluster-analysis/6-2-clustering-evaluation-measuring-clustering-quality-RJJfM**

C. Text Book

1. Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques", Third Edition, rgan Kaufmann, 2012.

D. Reference Books

1. Margaret H.Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education, 2003.
2. Arun K.Pujari, "Data Mining Techniques", University Press, 2001.

E. Web links:

1. **https://swayam.gov.in/**
2. **https://nptel.ac.in/**

3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
I	**Introduction**		
1.1	Why Data Mining?	Recall the basic concepts of Data Mining.	K1
1.2	What is Data Mining?	Illustrate the applications of Data Mining.	K2
1.3	What Kinds of Patterns can be Mined?	Discuss about the kinds of patterns.	K6
1.4	Which Technologies Are Used?	Identify the technologies used in data mining	K2
1.5	Which Kinds of Applications Are Targeted?	Discuss about kinds of mining applications.	K6
1.6	Major issues in Data Mining	List out themajor issues in data mining	K4

	Data Preprocessing: Data Preprocessing		
1.7	An Overview	Discuss about preprocessing techniques	K6
1.8	Data Clearing	Illustrate data cleaning	K2
1.9	Data Integration	Elaborate data integration	K6
1.10	Data Reduction	Explain data reduction	K2
1.11	Data Transformation and Data Discretization	Compare data transformation and data discretization	K5
II	**Data Warehousing and Online Analytical Processing**		
2.1	Data Warehouse	Discuss data warehouse	K6
2.2	Basic Concepts	Explain basic concept of data warehousing	K2
2.3	Data Warehouse Modeling	Build a data warehouse model	K6
2.4	Data Cube and OLAP	Compare Cube and OLAP	K5
2.5	Data Warehouse Design and Usage	Discuss data warehouse design and usage	K6
2.6	Data Warehouse Implementation	Explain data warehouse implementation	K2
2.7	Data Generalization by Attribute	List data generalization by attribute	K1
2.8	Oriented Induction	Illustrate oriented induction	K2
III	**Mining Frequent Patterns, Associations, and Correlations: Basics Concepts and Methods**		
3.1	Basic Concepts	Illustrate the basic concepts of mining	K2
3.2	Frequent Itemset Mining Methods	Discuss frequent itemset mining methods	K6
	Classification: Basic Concepts:		
3.3	Basic Concepts	Explain basic concepts the classification	K2
3.4	Decision Tree Induction	Builddecision tree induction	K3
3.5	Rule Based Classification	Discuss rule-based classification	K6
3.6	Lazy Learners	Develop lazy learners	K3
IV	**Cluster Analysis: Basic Concepts and Methods**		
4.1	Cluster Analysis	Explain cluster analysis	K2
4.2	Partitioning Methods	Illustrate partitioning methods	K2
4.3	Hierarchical Methods	Discuss hierarchical methods	K6
4.4	Density Based Methods	Analyze density-based methods	K4
4.5	Grid Based Methods	Outline grid-based methods	K2
V	**Outlier Detection**		
5.1	Outliers and Outlier Analysis	Compare outliers and outlier analysis	K4
5.2	Outlier Detection Methods	Explain outlier detection methods	K2
5.3	Statistical Approaches	List statistical approaches	K1
5.4	Proximity based Approaches	Discuss the proximity-based approaches	K6
5.5	Clustering based Approaches	Analyze clustering-based approaches	K4

5.6	Classification based Approaches	Construct classification-basedapproaches	K3
	Data Mining Trends and Research Frontiers		
5.7	Data Mining Applications	Build data mining applications	K6

4. MAPPING (CO, PO, PSO)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**H**	**M**	**L**	**M**	**M**	**L**	**M**	**M**	**L**	**H**	**M**	**M**	**M**
CO2	**M**	**H**	**M**	**L**	**M**	**L**	**M**	**M**	**M**	**H**	**M**	**M**	**L**
CO3	**M**	**M**	**M**	**L**	**M**	**M**	**L**	**M**	**L**	**H**	**M**	**H**	**M**
CO4	**M**	**M**	**L**	**M**	**M**	**M**	**M**	**L**	**M**	**M**	**M**	**M**	**H**
CO5	**H**	**M**	**H**	**M**	**H**	**M**	**H**	**H**	**H**	**M**	**H**	**M**	**H**
CO6	**H**	**H**	**H**	**H**	**H**	**M**	**M**	**M**	**L**	**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, Poster Presentation, Seminar, Quiz (written).
4. Pre-Semester & End Semester Theory Examination

INDIRECT:

1. Course end survey (Feedback)

COURSE COORDINATOR — Dr. L. JAYASIMMAN

HEAD OF THE DEPARTMENT — Dr.R.THAMARAI SELVI

****

Core Practical VII : PROGRAMMING IN PHP WITH MYSQL LAB

SEMESTER: IV **CODE: P18CA4P7**
CREDITS: 2 **HOURS/WEEKS: 4**

1. COURSE OUTCOMES

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

S.No.	Course Outcomes	Level	Exercise covered
CO1	Develop PHP programs using Control structures	K6	1,2
CO2	Apply various functions on arrays, Math, String.	K3	3,4
CO3	Design PHP programs using Class and Object	K2	5
CO4	Design PHP programs using Form Handling and Files	K6	6,7
CO5	Apply cookies, sessions in PHP program Sending Mail	K3	8,9,10
CO6	Develop web application PHP programing and Database using MySQL	K6	11,12,13

2A. Syllabus

Ex. No.	Exercise
1	Write a PHP program using Control structures
2	Write a PHP program to read an integer Array and sorting the array in Ascending order
3	Write a PHP program using functions
4	(a) Write a PHP program using date and time objects (b) Write a PHP program using string objects
5	Write a PHP program using class and objects
6	Write a PHP program to design form to get student information using POST and GET
7	Write a PHP program to upload and down load a file
8	Write a PHP program to create cookies and sessions
9	Write a PHP program to create cookies and sessions
10	Write a PHP program to Handle runtime Exception

11.	Write a PHP program to send Email
12.	Write a PHP program to Create Database and tables using MySQLi
13.	Write a PHP program to create simple CRUD Application

B. TOPICS FOR SELF STUDY

S.No	Topics	Web Link
1	Use XML parser in PHP	**www .w3schools.com**
2	Develop PHP Program using Directory	**www .w3schools.com**
3	Develop PHP Program using Calendar	**www .w3schools.com**
4	Develop PHP Program to Backup database	**www.tutorialspoint.com**

3. SPECIFIC LEARNING OUTCOMES (SLO)

Ex.No	Lab Exercises	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
1	Control structures	Develop PHP Program using control structures	K6
2	Arrays and strings	Develop PHP Program using arrays and strings	K6
3	PHP Functions	Apply Functions in PHP program	K6
4	Math, String and Date and Time objects	Apply Math, Date and Time functions in PHP Program	K6
5	PHP programs using Objects and classes	Create a PHP program using Class and Object	K6
6	Form Handling (POST & GET)	Create A Form using GET and POST	K6
7	File upload and download	Apply File upload and download in a program	K6
8	Statemanagement using cookies, sessions	Create cookies, sessions in a program	K6
9	Error Handling	Build simple Program using Error Handling	K6
10	Sending Email	Develop PHP programto send Email	K6
11	Data base Connectivity using MySQLi	Create Database and tables using MySQLi	K6
12	Create CRUD Application	Create simple CRUD Application	K6

4. MAPPING (CO, PO, PSO)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**H**	**H**	**H**	**L**	**M**	**M**	**H**	**H**	**H**	**H**	**M**	**H**	**M**

CO2	**H**	**H**	**M**	**H**	**H**	**M**	**M**	**M**	**H**	**H**	**L**	**H**	**M**
CO3	**H**	**H**	**M**	**H**	**M**	**M**	**M**	**M**	**H**	**L**	**H**	**H**	**H**
CO4	**H**	**M**	**H**	**H**	**M**	**M**	**H**	**M**	**L**	**L**	**L**	**H**	**M**
CO5	**H**	**H**	**M**	**H**	**M**	**M**	**H**	**L**	**L**	**M**	**L**	**H**	**M**
CO6	**H**	**M**	**H**	**M**	**M**	**H**	**H**	**L**	**H**	**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, Seminar.
3. Pre/Post Test, Viva, Report for each exercise.
4. Lab Model Examination & End Semester Practical Examination

INDIRECT:

1. Course end survey (Feedback)

COURSE COORDINATOR **HEAD OF THE DEPARTMENT**

Dr.R.THAMARAI SELVI Dr.R.THAMARAI SELVI

****

Core Practical VIII: SMART DEVICES PROGRAMMING LAB

SEMESTER: IV **CODE: P18CA4P8**
CREDITS: 2 **HOURS/WEEK: 4**

1. COURSE OUTCOMES

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

S.No.	Course Outcomes	Level	Exercise
CO1	Develop mobile applications using various layouts	K6	1,2,3
CO2	Create simulators such as AVD or test with mobile phone to execute the application	K6	4,5,6
CO3	Develop mobile application that integrates SMS and Call services	K6	7
CO4	Develop a mobile application by integrating an application with SQLite	K6	9, 10, 11
CO5	Build mobile web applications	K6	12,13,14
CO6	Maximize the use of HTML5, CSS3 and JavaScript to develop mobile web applications	K6	15

2A. Syllabus

Ex.No.	Exercise
1	Create Hello World application
2	Create activity based applications
3	Create three pages using layout system - Liner layout, Relative layout and Table layout respectively.
4	Write android web applications
5	Create custom Android Virtual Device(AVD)
6	Emulate device with different screen size
7	Make SMS and phone call
8	Write applications utilising data base and SQLite commands
9	To Create a SQLite database and perform query operations.
10	To Insert data in database table and retrieve ,display details in screen

11	Transfer files between emulator and PC
12	Create an android application with login page and a home page
13	Compile and debug the application.
14	Install application in both emulator and device.
`4	Design and Develop mobile application using HTML 5.0 and JavaScript.

B. TOPICS FOR SELF STUDY

S.No	Topics	Web Link
1	Animations and Transitions	**https://developer.android.com/training/animation**
2	Sending SMS	**https://www.tutorialspoint.com/android/android_advanced_tutorial.pdf**
3	Working with Sensor data	**https://google-developer-training.github.io/android-developer-advanced-course-practicals/unit-1-expand-the-user-experience/lesson-3-sensors/3-1-p-working-with-sensor-data/3-1-p-working-with-sensor-data.html#tolearn**
4	Google Play's billing system	**https://google-developer-training.github.io/android-developer-advanced-course-practicals/unit-1-expand-the-user-experience/lesson-3-sensors/3-1-p-working-with-sensor-data/3-1-p-working-with-sensor-data.html#tolearn**

3. SPECIFIC LEARNING OUTCOMES (SLO)

Ex.No.	Lab Exercises	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
1	Hello World application	Create Android application to display "Hello World" text	K6
2	Activity based application	Design Android application with Activities	K6
3	Layout system - Liner layout, Relative layout and Table layout	Construct Android application with layouts	K6
4	Android web application	Build Android web application	K6
5	Android Virtual Device(AVD)	Choose custom simulator for running Android application	K5

6	Emulate device with different screen size	Improve Android application for different screen sizes	K6
7	SMS and phone call	Create Android application that avails SMS and call facility	K6
8	Data base and SQLite commands	Construct Android application by integrating with SQLite	K6
9	Query operations	Construct Android application for inserting, deleting and updating with SQLite	K6
10	Retrieve,display details in screen	Create Android application with UI to display records	K6
	Transfer files between emulator and PC	Design Android application for integration with PC	K6
	Login page and a home page	Apply query manipulation to input and retrieve data	K3
	Compile and debug the application.	Examine Android application for debugging	K4
	Install application in both emulator and device.	Assess the working of an Android application	K4
	HTML 5.0 and JavaScript	Create Android web application using HTML5	K6

4. MAPPING (CO, PO, PSO)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**H**	**M**	**H**	**L**	**H**	**H**	**H**	**H**	**H**	**L**	**L**	**L**	**-**
CO2	**H**	**M**	**M**	**M**	**H**	**H**	**H**	**M**	**H**	**L**	**L**	**L**	**-**
CO3	**H**	**H**	**H**	**M**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**
CO4	**H**	**H**	**H**	**M**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**
CO5	**H**	**H**	**H**	**M**	**H**	**M**	**H**	**H**	**H**	**H**	**H**	**H**	**H**
CO6	**H**	**H**	**H**	**M**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**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, Seminar.
3. Pre/Post Test, Viva, Report for each Exercise.
4. Lab Model Examination & End Semester Practical Examination

INDIRECT:

1. Course end survey (Feedback)

COURSE COORDINATOR
Dr.T.CYNTHIA

HEAD OF THE DEPARTMENT
Dr.R.THAMARAI SELVI

****

ELECTIVE III: ARTIFICIAL INTELLIGENCE

SEMESTER: IV **CODE: P19CA4:1**
CREDITS: 4 **HOURS/WEEKS: 4**

1. COURSE OUTCOMES

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

S.No.	Course Outcomes	Level	Unit covered
CO1	Apply the fundamentals of Artificial Intelligence (AI) and its foundations for solving AI problems	K3	I
CO2	Solve real life problems using AI techniques like searching and game playing in a state space representation	K6	II
CO3	Propose solutions using knowledge representation, logic and heuristic search for AI problems	K6	III
CO4	Compare the different types of intelligent agents, ExpertSystems,Artificial Neural Networks and other Machine Learning Models	K5	IV
CO5	Develop applications using Artificial Intelligence techniques and Data Mining Tools	K6	IV
CO6	Discuss the concepts of Expert Systems and Machine Learning	K6	V

2A. Syllabus

UNIT I - Introduction to Artificial Intelligence **12 Hours**

What is Artificial Intelligence? The AI problems – What is an AI technique? - Criteria for success. Problems, Problem Spaces and Search: Defining the Problem as a State Space Search – Production Systems – Problem Characteristics.

UNIT II - Searching Techniques **12 Hours**

Heuristic Search Techniques: Generate and Test – Hill Climbing: Simple Hill Climbing, Steepest Ascent Hill Climbing – Best First Search: OR Graphs, The A* Algorithm – Problem Reduction: AND-OR Graphs, The AO* Algorithm – Constraint Satisfaction – Means Ends Analysis.

UNIT III - Knowledge Representation **12Hours**

Knowledge Representation Issues: Representation and Mappings – Approaches to Knowledge Representation – Issues in Knowledge Representation: Important Attributes, Relationship among Attributes. Using Predicate Logic: Representing Simple Facts in Logic – Representing Instance and Isa Relationships – Computable Functions and Predicates – Resolution.

UNIT IV - Representing Knowledge using Rules **12 Hours**

Representing Knowledge Using Rules: Procedural versus Declarative Knowledge – Logic Programming – Forward versus Backward Reasoning – Matching – Control Knowledge.

UNIT V - Expert Systems **12 Hours**

Expert Systems: Representing and Using Domain Knowledge – Expert System Shells Explanation – Knowledge Acquisition. Perception and Action: Real-Time Search – Perception: Speech Recognition – Action – Robot Architectures.

B. TOPICS FOR SELF STUDY

S.No	Topics	Web Link
1	Robotics	**www.tutorialspoint.com**
2	Natural Language Processing	**www.en.wikipedia.org**
3	Artificial Neural Network	**www.searchenterpriseai.techtarget.com**
4	Reinforcement Learning	**www.geeksforgeeks.org**

C. Text Book:

1. Elaine Rich, Kevin Knight, "Artificial Intelligence", Second Edition, Tata McGraw Hill publications, 2008.

D. Reference Books

1. Dan W. Patterson, "Introduction to Artificial Intelligence and Expert Systems", Second Edition, Prentice Hall of India Publications, 2006.
2. Nils J. Nilsson, "Artificial Intelligence: A New Synthesis", Second Edition, Harcourt Asia Publications, 2000.
3. V.S. Janakiraman, K. Sarukesi, P. Gopalakrishnan, "Foundations of Artificial Intelligence and Expert Systems", McMillan India Publications, 2005.

E. Web links:

1. **www.tutorialspoint.com**
2. **www.geeksforgeeks.org**
3. **www.javatpoint.com**

3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
I	**Problems and Search-What is Artificial Intelligence**		
1.1	The AI Problems	Explain the task domains of Artificial Intelligence	K5
1.2	What is an AI Technique?	Construct problems using AI techniques	K3
1.3	Criteria for Success	Summarize the goals for success	K2
	Problems, Problem Spaces and Search		
1.4	Defining the Problem as a State Space Search	Elaborate the production rules for the water jug problem	K6
1.5	Production Systems	Develop algorithms using Breadth-First Search	K6

1.6	Problem Characteristics	Explain the problem characteristics in detail	K5
II	**Heuristic Search Techniques**		
2.1	Generate and Test	Utilize the generate and test algorithm	K3
2.2	Hill Climbing	Solve the problems using various Hill Climbing algorithms	K6
2.3	Best-First Search	Discuss on the Best-First Search algorithms.	K6
2.4	Problem Reduction	Elaborate the operations of problem reduction	K6
2.5	Constraint Satisfaction	Solve Cryptarithmetic problems	K6
2.6	Means Ends Analysis	Summarize the techniques of Means Ends Analysis	K2
III	**Knowledge Representation- Knowledge Representation Issues**		
3.1	Representation and Mappings	Classify facts and representations	K4
3.2	Approaches to Knowledge Representation	Elaborate on the approaches of knowledge representation	K6
3.3	Issues in Knowledge Representation	Discuss the issues in knowledge representation	K6
	Using Predicate Logic		
3.4	Representing Simple Facts in Logic	Determine the use of propositional logic	K5
3.5	Representing Instance and Isa Relationships	Identify the three ways of representing class membership	K3
3.6	Computable Functions and Predicates	Prove the computable functions and predicates using the set of facts	K5
3.7	Resolution	Propose algorithm to convert a clause form	K6
IV	**Representing Knowledge Using Rules**		
4.1	Procedural versus Declarative Knowledge	Compare procedural and declarative knowledge	K4
4.2	Logic Programming	Explain logic programming	K5
4.3	Forward versus Backward Reasoning	Compare forward and backward reasoning	K5
4.4	Matching	Develop matching between current state and preconditions of the rules	K6
4.5	Control Knowledge	Outline control knowledge	K2
V	**Expert Systems**		
5.1	Representing and Using Domain Knowledge	Outline the usage of domain knowledge	K2
5.2	Expert System Shells	Summarize on expert system shells	K2
5.3	Explanation on Domain Knowledge	Explain domain knowledge	K1

5.4	Knowledge Acquisition	Elaborate on knowledge acquisition	K6
	Perception and Action		
5.5	Real-Time Search	Propose algorithms using Real Time Search	K6
5.6	Perception	Design systems for speech recognition	K6
5.7	Action	Construct visibility graph	K6
5.8	Robot Architectures	Summarize the architecture of robot	K6

4. MAPPING (CO, PO, PSO)

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

L-Low **M-Moderate** **H- High**

5. COURSE ASSESSMENT METHODS

DIRECT:

1. Continuous Assessment Test: T1, T2 (Theory & Practical Components): Closed Book
2. Open Book Test.
3. 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)

COURSE COORDINATOR **HEAD OF THE DEPARTMENT**

Mrs. PEARLY CHARLES Dr.R.THAMARAI SELVI

****

Elective III : SOFT COMPUTING

SEMESTER: IV **CODE: P19CA4:2**
CREDITS:4 **HOURS/WEEKS: 4**

1. COURSE OUTCOMES

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

S.No.	Course Outcomes	Level	Unit Covered
CO1	Summarize the Soft Computing techniques, their development and features	K2	I
CO2	Analyze the basic concept of Artificial Neural Network and its models	K4	II
CO3	Explain the importance of various supervised learning techniques	K5	III
CO4	Discuss the various types of defuzzification methods.	K6	IV
CO5	Formulate the formation of Fuzzy rules and reasoning based on Fuzzy rules.	K5	IV
CO6	Make use of the knowledge in Genetic algorithms to solve optimization problem.	K3	V

2A. Syllabus

UNIT I - Introduction to Soft Computing **12 Hours**

Introduction: Artificial Neural Network– Advantages of Neural Networks– Fuzzy Logic– Genetic Algorithms–Hybrid Systems– Neuro Fuzzy Hybrid Systems – Neuro Genetic Hybrid Systems– Fuzzy Genetic Hybrid Systems.

UNIT II - Artificial Neural Networks **12 Hours**

Artificial Neural Networks– Fundamental Concept– Evolution of Neural Networks– Basic Models of Artificial Neural Network– Terminologies of ANNs– McCulloch-Pitts Neuron– Linear Separability – Hebb Network.

UNIT III - Supervised Learning Network **12 Hours**

Supervised Learning Network– Perceptron Networks–Adaptive Linear Neuron (Adaline) – Multiple Adaptive Linear Neurons–Back Propagation Network–Radial Basis Function Network.

UNIT IV - Introduction to Fuzzy Logic **12 Hours**

Introduction to Fuzzy Logic – Classical Sets–Operations on Classical Sets – Fuzzy Sets, –Fuzzy Relations–Membership Functions–Defuzzification–Fuzzy Arithmetic and Fuzzy Measures– Fuzzy Rule base and Approximate Reasoning– Fuzzy Decision Making– Fuzzy Logic Control System.

UNIT V - Genetic Algorithms **12 Hours**

Genetic Algorithms – Introduction– Traditional Optimization and Search Techniques – Genetic Algorithm and Search Space– Genetic Algorithms vs. Traditional Algorithms– Basic Terminologies in Genetic Algorithm– Simple GA– General Genetic Algorithm– The Schema

Theorem–Classification of Genetic Algorithm–Holland Classifier System–Genetic Programming– Applications of GA.

B. TOPICS FOR SELF-STUDY

S.No	Topics	Web Link
1	Fuzzy Graph Theory	**https://www.mdpi.com/2227-7390/7/1/63/html**
2	Artificial Intelligent Methods for Handling Spatial Data	**https://www.bokus.com/bok/9783030002374/artificial-intelligent-methods-for-handling-spatial-data/**
3	Fuzzy Measures and Integrals	**https://hal.archives-ouvertes.fr/hal-01477514/document**
4	Hybrid Soft Computing Models to Graph Theory	**https://www.knygos.lt/lt/elektronines-knygos/hybrid-soft-computing-models-applied-to-graph-theory-19pso/**

C. Text Book:

1.Dr.S.N. Sivananda, Dr.S.N. Deepa, Principles of Soft Computing, Wiley India Edition, 2011.

D. Reference Books:

1. F.O. Karray& C.D. Silva Soft Computing and Intelligent Systems Design – theory, tools and applications, Pearson Education, 2009
2. J.S.R. Jang, C.T. Sun & E. Mizutani Neuro-Fuzzy and Soft Computing – A computational approach to learning and machine intelligence, Pearson Education, 2004.

E. Web links:

1. **www.tutorialspoint.com**
2. **www.geeksforgeeks.org**
3. **www.javatpoint.com**

3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
I	**Introduction**		
1.1	Artificial Neural Network:Definition	Define Artificial Neural Network	K1
1.2	Advantages of Neural Networks	Summarize the advantages of Neural Networks	K2
1.3	Fuzzy Logic	Outline Fuzzy Logic	K2
1.4	Genetic Algorithms	Explain Genetic Algorithm	K2
	Hybrid Systems		
1.5	Neuro Fuzzy Hybrid Systems	Combine Fuzzy and Neural Networks	K6

1.6	Neuro Genetic Hybrid Systems	Apply Genetic algorithm and Neural Networks for problem solving	K3
1.7	Fuzzy Genetic Hybrid Systems	Make use of Fuzzyand Genetic algorithms	K3
II	**Artificial Neural Networks**		
2.1	Fundamental Concepts of ANN	Explain the Fundamentals of Artificial Neural Network	K2
2.2	Evolution of Neural Networks	Outline the development of Neural Networks	K1
2.3	Basic Models of Artificial Neural Network	Construct the models of ANN	K3
2.4	Terminologies of ANNs	Make use of the terminologies of ANN	K3
2.5	McCulloch-Pitts Neuron	Design the McCulloch-Pitts Neuron model	K4
2.6	Linear Separability	Discuss the concept of linear separability	K6
2.7	Hebb Network	Analyze Hebb network	K2
III	**Supervised Learning Network**		
3.1	Perceptron Networks	Discuss the Perceptron Networks.	K6
3.2	Adaptive Linear Neuron (Adaline)	Build the Adaline model	K6
3.3	Multiple Adaptive Linear Neurons	Design the multiple adaptive linear neurons	K6
3.4	Back Propagation Network	Propose the various learning factors	K6
3.5	Radial Basis Function Network.	Create radial basis function network	K3
IV	**Introduction to Fuzzy Logic**		
4.1	Classical Sets	Define the classical sets	K1
4.2	Operations on Classical Sets	List various operations on classical sets	K1
4.3	Fuzzy Sets	Examine the properties of Fuzzy Sets	K4
4.4	Fuzzy Relations	Importance of Fuzzy Relations	K5
4.5	Membership Functions	Discuss the Membership Function	K6
4.6	Defuzzification	Make use of Defuzzification	K3
4.7	Fuzzy Arithmetic and Fuzzy Measures	Summarize the concepts involved in Fuzzy Arithmetic	K2
4.8	Fuzzy Rule base and Approximate Reasoning	Apply Fuzzy Rule for reasoning	K3
4.9	Fuzzy Decision Making	Discuss the types of Fuzzy Decision Making	K6
4.10	Fuzzy Logic Control System.	Design a general Fuzzy Logic Control System	K6
V	**Genetic Algorithms**		

5.1	Introduction to Genetic Algorithms	Explain the natural evolution	K2
5.2	Traditional Optimization and Search Techniques	Discuss the different types of optimization method	K2
5.3	Genetic Algorithm and Search Space	Solve problems using search space	K6
5.4	Genetic Algorithms vs. Traditional Algorithms	Compare traditional algorithm and GA	K4
5.5	Basic Terminologies in Genetic Algorithm	List out the terminologies in Genetic Algorithm	K1
5.6	Simple GA	Explain the operational flow of simple GA	K2
5.7	General Genetic Algorithm	Make use of the General Genetic Algorithm	K3
5.8	The Schema Theorem	Prove the result on the behavior of GA	K5
5.9	Classification of Genetic Algorithm	Classify Genetic Algorithms	K2
5.10	Holland Classifier System	Adapt the concepts involved in Holland Classifier System	K6
5.11	Genetic Programming	Examine the features properties of Genetic Program	K4
5.12	Applications of GA	Discuss the applications of GA	K6

4. MAPPING (CO, PO, PSO)

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

L-Low **M-Moderate** **H- High**

5. COURSE ASSESSMENT METHODS

DIRECT:

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

INDIRECT:

1. Course end survey (Feedback)

COURSE COORDINATOR **HEAD OF THE DEPARTMENT**

Dr.M.S.MYTHILI Dr.R.THAMARAI SELVI

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Elective III : GENETIC ALGORITHMS

SSEMESTER: IV **CODE: P19CA4:3**
CREDITS: 4 **HOURS/WEEKS: 4**

1. COURSE OUTCOMES

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

S.No.	Course Outcomes	Level	Unit
CO1	Apply mathematical models to develop Genetic Algorithms	K3	I
CO2	Examine the data analysis and prediction	K3	I
CO3	Apply the Fitness function in Genetic Algorithms.	K4	II
CO	Design the Applications in Genetic Algorithms.	K6	III
CO5	Analyze the operators in Genetic search.	K4	IV
CO6	Assess the knowledge-based techniques	K5	V

2A. Syllabus

UNIT I - Genetic Algorithms in Scientific Models **12 Hours**

Introduction:A Brief History of Evolutionary Computation – Elements of Genetic Algorithms – A simple Genetic Algorithm – Applications of Genetic Algorithms. Genetic Algorithms in Scientific Models: Evolving Computer Programs – Data Analysis and Prediction – Evolving Neural Networks – Modeling Interaction between Learning and Evolution – Modeling Sexual Selection – Measuring Evolutionary Activity.

UNIT II - Foundation of Genetic Algorithm **12 Hours**

Schemas and Two_Armed and k.Armed Problem – Royal Roads – Exact Mathematical models of simple Genetic Algorithms – Statistical Mechanics Approaches.

UNIT III - Computer Implementation of Genetic Algorithm **12 Hours**

Data structures – Reproduction– Crossover and Mutation – Mapping objective functions to fitness form – Fitness Scaling – Coding – A multi parameter – Mapped – Fixed Point Coding – Discretization and Constraints.

UNIT IV - Some applications of Genetic Algorithms **12 Hours**

The Risk of Genetic Algorithms – De Jong and Function Optimization – Improvement in Basic Techniques – Current Applications of Genetic Algorithms.

UNIT V - Advanced Operators and Techniques in Genetic Search **12 hours**

Dominance – Duplicity and Abeyance – Inversion and other Reordering Operators. Micro operators – Niche and Speciation – Multi-Objective optimization – Knowledge based Techniques – Genetic Algorithms and Parallel Processors.

B. TOPICS FOR SELF-STUDY

S. No	Topics	Web Link
1	Constrained Optimization Problems	https://www.tutorialspoint.com/genetic_algorithms/genetic_algorithms_advanced_topics.htm
2	Multi-objective genetic algorithms	https://www.youtube.com/watch?v=RU5PPXrGNNE
3	Memetic algorithms	https://sci2s.ugr.es/sites/default/files/files/Teaching/GraduatesCourses/Metaheuristicas/Bibliography/MemeticAlgorithms.pdf
4	Multimodal Optimization	https://arxiv.org/pdf/1508.05342

C. Text Book:

1. David E. Goldberg, "Genetic Algorithms in Search, Optimization & Machine Learning",Pearson Education, 2006.

D. Reference Book:

1. Melane Mitchell, "An Introduction to Genetic Algorithms", Prentice Hall of India, 2002

E. Web links:

1. https://www.tutorialspoint.com/genetic_algorithms/index.htm
2. https://www.iitg.ac.in/rkbc/CE602/CE602/Genetic%20Algorithms.pdf

3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
I	**Introduction**		
1.1	A Brief History of Evolutionary Computation	Summarize the history of evolutionary computation.	K2
1.2	Elements of Genetic Algorithms	Demonstrate the elements of Genetic Algorithm	K6
1.3	A simple Genetic Algorithm	Develop a simple Genetic Algorithm	K6
1.4	Applications of Genetic Algorithms	Summarize the applications of Genetic Algorithms	K2
Genetic Algorithms in Scientific Models			

1.5	Evolving Computer Programs	Outline the evolution of computer program	K2
1.6	Data Analysis and Prediction	Elaborate data analysis and prediction	K6
1.7	Evolving Neural Networks	Apply the neural networks for classification.	K6
1.8	Modeling Interaction between Learning and Evolution	Illustrate modeling interaction between learning and evolution.	K2
1.9	Modeling Sexual Selection	Elaborate the modeling of sexual selection	K6
1.10	Measuring Evolutionary Activity	Experiment with measuring evolutionary activity	K4
II	**Theoretical Foundation of Genetic Algorithm**		
2.1	Schemas and Two Armed and k-Armed Problem	Apply Two Armed and k-Armed Problem	K6
2.2	Royal Roads	Illustrate the concept of Royal Roads	K2
2.3	Exact Mathematical models of simple Genetic Algorithms	Elaborate the mathematical models of simple Genetic Algorithms	K6
2.4	Statistical Mechanics Approaches	Apply Statistical mechanics approaches to genetic problems	K6
III	**Computer Implementation of Genetic Algorithm**		
3.1	Data structures	Elaborate the Data structures used in Genetics Algorithm	K6
3.2	Reproduction	Illustrate the reproduction in genetic algorithm	K2
3.3	Crossover and Mutation	Demonstrate the crossover and mutation operation	K2
3.4	Mapping objective functions to fitness form	Formulate fitness transformation in to equations	K6
3.5	Fitness Scaling	Compare fitness scaling functions.	K2
3.6	Coding	Develop coding for genetic algorithm.	K6
3.7	Fixed Point Coding	Apply fixed point coding in genetic problems	K2
3.8	Discretization and Constraints	Discuss the discretization and constraints.	K6
IV	**Some Applications of Genetic Algorithms**		
4.1	The Risk of Genetic Algorithms	Summarize the risk of Genetic Algorithms.	K2
4.2	De Jong and Function Optimization	Apply De Jong and function optimization to genetic applications	K6
4.3	Improvement in Basic Techniques	Discuss the improvements in basic techniques.	K6

4.4	Current Applications of Genetic Algorithms.	Summarize the current applications of Genetic Algorithms.	K2
V	**Advanced Operators and Techniques in Genetic Search**		
5.1	Dominance	Discuss dominance in genetic algorithm.	K6
5.2	Duplicity and Abeyance	Demonstrate Duplicity and Abeyance	K6
5.3	Inversion and other Reordering Operators	Apply inversion and other reordering operators	K6
5.4	Micro operators	Apply micro operators in genetic problems	K6
5.5	Niche and Speciation	Discuss the concept of Niche and speciation	K6
5.6	Multi-Objective optimization	Elaborate multi-objective optimization	K6
5.7	Knowledge based Techniques	Summarize the knowledge-based techniques	K2
5.8	Genetic Algorithms and Parallel Processors	Discuss genetic algorithms and parallel processors	K6

4. MAPPING (CO, PO, PSO)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**H**	**M**	**L**	**L**	**M**	**M**	**M**	**L**	**L**	**M**	**M**	**L**	**-**
CO2	**H**	**H**	**H**	**H**	**M**	**M**	**L**	**L**	**M**	**L**	**L**	**M**	**-**
CO3	**M**	**M**	**M**	**L**	**M**	**L**	**L**	**L**	**L**	**L**	**L**	**M**	**-**
CO4	**M**	**M**	**M**	**H**	**M**	**L**	**L**	**L**	**L**	**L**	**M**	**L**	**-**
CO5	**H**	**M**	**M**	**H**	**M**	**L**	**L**	**L**	**L**	**M**	**M**	**L**	**-**
CO6	**H**	**M**	**M**	**M**	**H**	**M**	**L**	**L**	**L**	**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, Seminar, Quiz (written).
4. Pre-Semester & End Semester Theory Examination

INDIRECT:

1. Course end survey (Feedback)

COURSE COORDINATOR **HEAD OF THE DEPARTMENT**

Dr.P.THANGARAJU Dr.R.THAMARAI SELVI

****

Core XVII: PROGRAMMING IN PYTHON

SEMESTER: V **CODE: P18CA517**
CREDITS: 4 **HOURS/WEEKS: 5**

1. COURSE OUTCOMES

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

S.No.	Course Outcomes	Level	Unit covered
CO1	Recall the basics of Python and Develop Python programs with conditional controls and loops	K1	I
CO2	Apply Python data structures –lists, tuples and dictionaries for programming	K6	II
CO3	Define Python functions and call them and also construct programs using classes and objects	K6	III
CO4	Construct programs using classes and objects	K6	III
CO5	Adapt files, modules and packages and perform Database operations on them	K6	IV
CO6	Construct programs using GUI and Django Framework	K6	V

2A. Syllabus

UNIT I - Introduction to Python, Data, Expressions and Statements **12 Hours**

Introduction to Python : Overview – History of Python – Python features – Environment: Environment setup – Getting Python – Install Python – Setting up Path – Running Python – Basic Syntax – Hello World – Interactive mode programming – Script mode Programming – A simple Python example-**Data, Expressions, Statements, Control Flow:** Python interpreter and interactive mode - Values and types: int, float, boolean, strings-variables – expressions – statements - tuple assignment - precedence of operators – comments

UNIT II - Python Data Structures **12 Hours**

Sequence : Lists:List operations - list slices, list methods - list loop, mutability – aliasing - cloning lists - list parameters – **Tuples**: Tuple assignment - tuple as return value**– Dictionary**: Operations and methods – **Sets– Date &Time - F**low of execution - parameters and arguments - Conditionals: Boolean values and operators - conditional (if) - alternative (if-else) - chained conditional (if-elif-else) - Iteration: state – while – for – break – continue –pass. Fruitful functions: return values – parameters - local and global scope-

UNIT III - Functions, Classes and Objects **12 Hours**

Functions: Function composition – recursion. Strings: string slices – Immutability - string functions and methods - string module - Lists as arrays. Object Oriented Programming: Classes and Objects: Creating a Class – Using a Class – A simple Inheritance – Multiple Inheritance.

UNIT IV - Files, Modules, Packages, Database **12 Hours**

Files, Modules, Packages, Database: Files and exception: text files - reading and writing files - format operator - command line arguments. Errors and exceptions: handling exceptions – modules – packages. - Illustrative programs: word count, copy file. **Database and SQL:** Database – Transactions – What is SQLDB? – Database connection Parameters – Insert, Update, Delete.

UNIT V - GUI and Web Programming **12 Hours**

GUI Programming: Working with widgets: Label – Button – Canvas – ComboBox – RadioButton – Entry – Frame – Message – Scale – Scrollbar – SpinBox – Text – Menu – Standard Attributes – Controlling Layout with Geometry Managers – Events and Event Handlers – Building GUI simple Calculator – **Web Framework:** Django Basics – Django Forms and Form fields – Render forms

B. TOPICS FOR SELF-STUDY

S.No	Topics	Web Link
1	Python MongoDB	**https://www.w3schools.com/python/python_mongodb_getstarted.asp**
2	Python Random Module	**https://www.w3schools.com/python/module_random.asp**
3	cMath Module	**https://www.w3schools.com/python/module_cmath.asp**
4	PostgreSQL	**https://www.tutorialspoint.com/postgresql/postgresql_python.htm**

C. Text Books:

1. Allen B. Downey, “Think Python: How to Think Like a Computer Scientist”, O’Reilly Publishers, Second Edition, 2016.
2. Guido van Rossum and Fred L. Drake Jr, “An Introduction to Python, Network Theory Ltd., 2011.

D. Reference Books:

1. Charles Dierbach, “Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2013.
2. John V Guttag, “Introduction to Computation and Programming Using Python”, Revised and expanded Edition, MIT Press , 2013.
3. Kenneth A. Lambert, “Fundamentals of Python: First Programs”, CENGAGE Learning, 2012.
4. Timothy A. Budd, “Exploring Python”, Mc-Graw Hill Education (India) Private Ltd.,, 2015.

E. Web links:

1. **https://nptel.ac.in/courses/106/106/106106182**
2. **https://www.w3schools.com/python**

3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
I	**Introduction to Python**		
1.1	Introduction	Recall the basics of Python programming	K1
1.2	Environmental Setup	Install Python software and run Python programs	K6
1.3	Basic Syntax	Explain the basic syntax of python program with examples	K6
1.4	Interactive and Script mode Programming	Illustrate the interactive and script mode in Python programming	K2
1.5	Simple Python Programs	Construct simple programs	K6
	Data, Statements, Control Flow		
1.6	Python Values, Data types	Illustrate the standard data types in Python.	K2
	Expressions		
1.7	Expressions and Control Statements	Evaluate expressions and statements in Python	K4
	Data Structures		
1.8	Lists and Tuples	Construct list and tuples and perform operations on it	K6
	Operators		
1.9	Operators and its precedence	Discuss about the operators and its precedence.	K6
II	**Sequences: Lists**		
2.1	Lists and its Operations	Create list and do various operations on list	K6
	Tuples		
2.2	Tuples and its Operations	Illustrate the operations on tuples	K2
	Dictionaries		
2.3	Dictionaries in Python	Create dictionary and perform key value pair searching	K6
	Sets		
2.4	Set Operations	Illustrate the set operations with suitable program.	K2
	Modules		
2.5	Date and Time	Create programs by using Date and Time modules.	K6
	Control Flow		
2.6	Conditional Statements	Evaluate the conditional statements	K5

2.7	Iterative Statements	Develop programs using while and for loop with break, continue and pass	K6
III	**Functions**		
3.1	Function composition – recursion	Construct programs using functions and do recursion	K6
3.2	Strings and its functions	Apply string handling functions	K3
3.3	Lists as arrays	Compare Lists and Arrays	K5
	Object Oriented Programming (OOPs)		
3.4	Object Oriented Programming	Create Class and invoke class members	K6
3.5	Classes and Objects	Create a Class and access the members of the class using objects	K6
3.6	Inheritance	Compare the types of inheritance	K5
IV	**Files and Exceptions**		
4.1	Files and exception	Illustrate reading and writing operations on files	K2
4.2	Errors and exceptions	Apply exception handling mechanisms	K3
	Modules and Packages		
4.3	Modules and packages	Apply modules and Python packages	K3
4.4	Illustrative programs	Illustrate various programs for word count and copy file	K2
	Database		
4.5	SQL Database	Apply SQL database and do insert, delete and update operations	K3
4.6	Database Operations	Create a Python program to insert, delete and update into a database.	K3
V	**GUI Programming**		
5.1	Working with widgets	Compare the working procedure of input widget classes.	K4
5.2	Controlling Layout with Geometry Managers	Examine the Layouts in Python with different Geometry managers.	K4
5.3	Events and Event Handlers	Discuss in detail about the Event and Event Handlers in Python.	K6
5.4	Building GUI simple Calculator	Design a simple calculator using GUI in python.	K5
	Web Frame Work		
5.5	Django Basics	Discuss on Django framework for web programming in Python.	K6
5.6	Django Forms	Elaborate the working principles of form creation and rendering of forms with Django Framework.	K6

4. MAPPING (CO, PO, PSO)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**H**	**H**	**H**	**M**	**M**	**H**	**M**	**M**	**M**	**H**	**H**	**M**	**L**
CO2	**H**	**H**	**H**	**M**	**M**	**L**	**L**	**L**	**M**	**H**	**M**	**L**	**H**
CO3	**H**	**M**	**H**	**M**	**M**	**L**	**L**	**L**	**M**	**H**	**M**	**L**	**L**
CO4	**H**	**M**	**H**	**M**	**M**	**L**	**L**	**L**	**M**	**H**	**M**	**L**	**L**
CO5	**H**	**H**	**H**	**H**	**L**	**L**	**L**	**L**	**L**	**H**	**L**	**L**	**L**
CO6	**H**	**H**	**H**	**H**	**H**	**M**	**M**	**M**	**M**	**H**	**M**	**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, Group Presentation, Group Discussion, Project Report, Poster Presentation, Seminar, Quiz (written).
4. Pre-Semester & End Semester Theory Examination

INDIRECT:

1. Course end survey (Feedback)

COURSE COORDINATOR **HEAD OF THE DEPARTMENT**

Mrs.J.JASMINE CHRISTINA MAGDALENE Dr.R.THAMARAI SELVI

****

Core XVIII: COMPILER DESIGN

SSSEMESTER: V **CODE: P18CA518**
C CREDITS: 4 **HOURS/WEEK: 5**

1. COURSE OUTCOMES

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

S.No.	Course Outcomes	Level	Unit covered
CO1	Explain the different phases of compiler	K5	I
CO2	Develop appropriate parser to produce parse tree	K6	II
CO3	Compare the storage allocation strategies	K5	III
CO4	Choose the intermediate codes to get the target code	K6	IV
CO5	Improve the target code by using language processing system	K6	V
CO6	Construct basic block and flow graph	K6	V

2A. Syllabus

UNIT I - Introduction to Compiler & Lexical Analysis **18 Hours**

Introduction to Compiler – Compilers – Analysis of the Source Program – The Phases of a Compiler – Cousins of the Compiler – Grouping of Phases – Compiler Constructions Tools – Lexical Analysis:Role of the Lexical Analyzer – Input Buffering – Specifications of Tokens – Recognitions of Tokens – Language for Specifying Lexical Analyzers – Finite Automata – Regular Expression to NFA – Design of a Lexical Analyzer Generator.

UNIT II - Syntax Analyzer **18 Hours**

Syntax Analyzer – Role of The Parser – Context – Free Grammars – Top-Down Parsing – Bottom-Up Parsing – Operator – Precedence Parsing – LR Parsers – Using Ambiguous Grammars – Parser Generators

UNIT III - Runtime Environments **12 Hours**

Runtime Environments – Source Language Issues – Storage Organization – Storage Allocations – Strategies – Access to Non-Local Names – Parameter Parsing – Symbol Tables – Language Facilities for Dynamic Storage Allocation – Dynamic Storage Allocation Techniques.

UNIT IV - Intermediate Code Generation **15 Hours**

Intermediate Code Generation – Intermediate Languages – Declarations Assignment Statements – Boolean Expressions – Case Statements – Back Patching – Procedure Calls.

UNIT V - Code Generation and Code Optimization **12 Hours**

Code Generation – Issues in the Design of a Code Generator – The Target Machine – Runtime Storage Management – Basic Blocks and Flow Graphs – Next Use Information – A Simple Code Generation – Code Optimization – Principal Sources of Optimization – Optimization of Basic Blocks – Loops in Flow Graphs.

B. TOPICS FOR SELF-STUDY:

S.No	Topics	Web Link
1	C program to detect tokens	**www.geeksforgeeks.org**
2	Formal Grammar	**www.xahlee.info**
3	Syntax Directed Translation	**www.geeksforgeeks.org**
4	Semantic Analysis	**www.tutorialspoint.com**

C. Text Book

1. Alfred V. Aho, Ravi Sethi and Jeffrey D. Ullman, "Compilers, Principles, Techniques and Tools", Pearson Education, Second Edition, 2007.

D. Reference Books

1. Reinhard Wilhelm, Helmut Seidl, "Compiler Design Virtual Machines", Springer Verlag Berlin Heidelberg, 2010.
2. Charles N. Fischer, Richard. J. LeBlanc, "Crafting a Compiler with C", 2008**.**

E. Web links:

1. **www.tutorialspoint.com**
2. **www.geeksforgeeks.org**
3. **www.javatpoint.com**

3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
I	**Introduction to Compiler**		
1.1	Compiler	Define Compiler	K1
1.2	Analysis of the Source Program	Analyze the contents of the source program	K2
1.3	The Phases of a Compiler	Explain the phases of a compiler	K5
1.4	Cousins of the Compiler	List out the cousins of compiler	K1
1.5	Grouping of Phases	Explain the grouping of phases	K5
1.6	Compiler Constructions Tools	Make use of the compiler construction tools	K3
	Lexical Analysis		
1.7	Role of the Lexical Analyzer	Summarize the role of a lexical analyzer	K2
1.8	Input Buffering	Importance of input buffering	K5

1.9	Specifications of Tokens	Outline specification of tokens	K2
1.10	Recognitions of Tokens	Apply regular expression for identifier and white space	K3
1.11	Language for Specifying Lexical Analyzers	Explain an algorithm for Lex that recognizes the tokens	K5
1.12	Finite Automata	Compare NFA and DFA	K5
1.13	Regular Expression to NFA	Solve regular expression to NFA	K6
1.14	Design of a Lexical Analyzer Generator.	Design the construction of lexical analyzer using lex	K6
II	**Syntax Analyzer**		
2.1	Role of The Parser	Summarize the role of parser	K2
2.2	Context – Free Grammars	Define context-free grammar	K1
2.3	Top-Down Parsing	Construct the rule to eliminate left recursion	K6
2.4	Bottom-Up Parsing	Construct the steps of a shift reduce parser	K6
2.5	Operator-Precedence Parsing	Construct the operator-precedence parser for the grammar	K6
2.6	LR Parsers	Explain the advantages and disadvantages of LR parsing	K5
2.7	Using Ambiguous Grammars	Make use of ambiguous grammar.	K3
2.8	Parser Generators	Define YACC parser generator	K1
III	**Runtime Environments**		
3.1	Source Language Issues	Utilize the source language issues	K3
3.2	Storage Organization	Discuss the storage organization in the run-time environment	K6
3.3	Storage Allocations Strategies	List out the types of storage allocation strategies	K4
3.4	Access to Non-Local Names	Plan the rules to find the access to non-local names	K4
3.5	Parameter Passing	Classify parameter passing	K4
3.6	Symbol Tables	Elaborate on symbol tables	K6
3.7	Language Facilities for Dynamic Storage Allocation	Examine the language facilities for dynamic storage allocation	K4
3.8	Dynamic Storage Allocation Technique	Distinguish static and dynamic storage allocation.	K4
IV	**Intermediate Code Generation**		
4.1	Intermediate Languages	Explain intermediate code representation.	K4

4.2	Declarations: Assignment Statements	Discuss about the assignment statements.	K6
4.3	Boolean Expressions	Elaborate on Boolean Expressions.	K6
4.4	Case Statements	Discuss about Case Statements	K6
4.5	Back Patching	Elaborate Back Patching.	K6
4.6	Procedure Calls.	Explain procedure calls.	K4
V	**Code Generation**		
5.1	Issues in the Design of a Code Generator	Summarize the issues in the design of a code generator.	K2
5.2	The Target Machine	List out the properties of optimizing compilers.	K1
5.3	Runtime Storage Management	Name the techniques in loop optimization.	K1
5.4	Basic Blocks and Flow Graphs	Discuss the concepts of basic blocks and flow graphs.	K6
5.5	Next Use Information	Determine the information about Next-Use.	K5
5.6	A Simple Code Generation	Make use of code generation.	K3
	Code Optimization		
5.7	Principal Sources of Optimization	Discuss the various peephole optimizations techniques.	K6
5.8	Optimization of Basic Blocks	Determine the function preserving transformations and loop optimization process.	K5
5.9	Loops in Flow Graphs.	Explain loops in flow graphs.	K4

4. MAPPING (CO, PO, PSO)

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

L-Low 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, Group Presentation, Group Discussion, Seminar, Quiz (written).
4. Pre-Semester & End Semester Theory Examination

INDIRECT:

1. Course end survey (Feedback)

COURSE COORDINATOR — Dr. B.ARPUTHAMARY

HEAD OF THE DEPARTMENT — Dr.R.THAMARAI SELVI

****

Core XIX: BIGDATA ANALYTICS AND MANAGEMENT

SEMESTER: V **CODE: P18CA519**
CREDITS: 4 **HOURS/WEEK: 4**

1. COURSE OUTCOMES

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

S.No.	Course Outcomes	Level	Unit covered
CO1	Summarize the basic concepts and the components of Big Data	K2	1
CO2	Make use of the cloud as an imperative for Big Data	K3	II
CO3	Design distributed file systems using Hadoop and Map Reduce technologies	K6	III
CO4	Compare the various databases in the Big Data world	K5	III
CO5	Discuss new models and approaches evolving to support Big Data analysis.	K6	IV
CO6	Build a Big Data foundation with the Hadoop as ETL	K6	V

2A. Syllabus

UNIT I - Introduction to Big Data **15 Hours**

Introduction to Big Data**:** Definition–Characteristics- Importance of Big Data – Understanding the waves of managing data – Architecture of Big Data – Examining Big Data types – Integrating data types into a big data environment. Distributed Computing: Understanding Distributed Technologies foundation of computing- Need of Distributed Computing in Big Data.

UNIT II -Technologies Foundation of Big Data **15 Hours**

Big Data Technology Components: - Exploring the Big Data Stack – Big Data Analytics – Big Data Applications. Big Data Virtualization and Distributed Computing: Basics and importance of virtualization - Network virtualization - Data and Storage virtualization - Management and Security challenges with virtualization – Abstraction and Virtualization. Examining the Cloud and Big Data: Defining the cloud in the context of Big Data – Understanding cloud deployment and delivery models – Making use of the cloud for Big Data.

UNIT III - Big Data Management **15 Hours**

Operational Databases: RDBMS – Non-Relational Databases – Key-value pair Databases – Riak-key Value Database – Document Databases – MongoDB - CouchDB – Columnar Databases – Graph Databases – Spatial Databases. Map Reduce Fundamentals – Exploring the world of Hadoop.

UNIT IV - Analytics and Big Data **15 Hours**

Using Big Data to get results – Basic Analytics – Advance Analytics – Operationalized Analytics – Modifying Business Intelligence products to handle Big Data. Analytical Algorithms – Big Data Analytics Solutions: Understand Text Analytics and Big Data

– Text Analytics tools for Big Data – Building new models and approaches to support Big Data – Big Data Analytics Framework.

UNIT V - Big Data Implementation **15 Hours**

Integrating Data Sources: Identifying the Data, Fundamentals of Big Data Integration – Defining Traditional ETL – Using Hadoop as ETL – Best Practices for Data Integration in a Big Data World.

B. TOPICS FOR SELF STUDY

S.No	Topics	Web Link
1	Big Data Security	**https://www.sciencedirect.com/topics/computer-science/big-data-security**
2	Twitter Sentiment Analysis Using Spark	**https://acadgild.com/blog/twitter-sentiment-analysis-using-spark**
3	Learn how to Analyse Hadoop Data using Apache Pig	**https://www.udemy.com/course/learn-how-to-analyse-hadoop-data-using-apache-pig/**
4	Cloud and IT infrastructure as success factors	**https://www.t-systems.com/id/en/cloud-and-infrastructure**

C. Text Book:

1. Judith Hurwitz, Alan Nugent, Dr.FernHalper, Marcia Kaufman, "Big Data for Dummies", Wiley Publications, 2013.

D. Reference Books:

1. O'Reilly Media ,"Big Data Now : Current Perspectives", 2012.
2. Dr.ArvindSathi , "Big Data Analytics : Disruptive Technologies for Changing the game", McPress, 2012.

E. Web links:

1. **www.tutorialspoint.com**
2. **www.geeksforgeeks.org**
3. **www.javatpoint.com**

3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
I	**Introduction to Big Data**		
1.1	The definition of Big Data	Define Big Data	K1
1.2	Characteristics of Big Data	Summarize the characteristics of Big Data	K2
1.3	Importance of Big Data	Examine Big Data's role in the future	K4

1.4	Understanding the waves of managing data	Outline the waves of managing data	K2
1.5	Architecture of Big Data	Build Big Data environment based on the architecture	K6
Examining Big Data Types			
1.6	Integrating data types into a big data environment	Combine all data types into a big data environment	K6
Distributed Computing			
1.7	Understanding the basics of Distributed Computing	Explain the basics of distributed computing	K2
1.8	Need of Distributed Computing in Big Data	Make use of distributed computing in Big Data	K3
II	**Technologies Foundation of Big Data**		
2.1	Exploring the Big Data Stack	Discuss the elements of the Big Data stack	K6
2.2	Big Data Analytics tools	List the tools used in Big Data analytics	K1
2.3	Big Data Applications	Analyze Big Data applications	K4
Big Data Virtualization and Distributed Computing			
2.4	Basics and importance of Virtualization	Assess the importance of virtualization	K5
2.5	Network virtualization	Examine network virtualization	K4
2.6	Data and Storage virtualization	Choose the data and storage virtualization	K6
2.7	Management and Security challenges with virtualization	Summarize the challenges in virtualization	K2
2.8	Abstraction and Virtualization.	Discover abstraction and virtualization	K4
Examining the Cloud and Big Data			
2.9	Defining the cloud in the context of Big Data	Define the fundamental concepts of cloud	K1
2.10	Understanding cloud deployment and delivery models	Examine cloud deployment and delivery models	K4
2.11	Making use of the cloud for Big Data.	Select the cloud environment for Big Data	K3
III	**Big Data Management: Operational Databases**		
3.1	RDBMS	Recall the concepts of RDBMS	K1
3.2	Non-Relational Databases	Explain Non-Relational databases	K2
3.3	Key-value pair Databases	Examine Key-value pair databases	K6
3.4	Riak-key Value Database	Elaborate the concepts of Riak-key value database	K6

3.5	Document Databases	Analyze the concepts of document databases	K3
3.6	Columnar Databases	Select columnar databases	K3
3.7	Graph Databases	Test for graph databases	K4
3.8	Spatial Databases	Apply spatial databases	K3
Map Reduce Fundamentals			
3.9	Exploring the world of Hadoop	Discover Hadoop MapReduce	K4
IV	**Analytics and Big Data**		
4.1	Basic Analytics	Explain basic analytics	K2
4.2	Advanced Analytics	Build models for advanced analytics	K6
4.3	Operationalized Analytics	Make use of operationalized analytics	K3
4.4	Modifying Business Intelligence products to handle Big Data.	Analyze the characteristics of data	K4
4.5	Analytical Algorithms	Apply analytical algorithms	K3
4.6	Big Data Analytics Solutions	List Big Data analytics solutions	K4
Understand Text Analytics and Big Data			
4.7	Text Analytics tools for Big Data	Examine the Big Data text analytic tools	K4
Customized Approaches for Analysis of Big Data			
4.8	Building new models and approaches to support Big Data	Build new models and approaches to support Big Data	K6
4.9	Big Data Analytics Framework	Discuss Big Data analytics framework	K6
V	**Data Implementation: Integrating Data Sources**		
5.1	Identifying the Data	Select real-time data	K1
5.2	Fundamentals of Big Data Integration	Summarize the fundamentals of Big Data integration	K2
5.3	Defining Traditional ETL	Explain the functions of traditional ETL	K2
5.4	Using Hadoop as ETL	Build Hadoop as ETL	K6
5.5	Best Practices for Data Integration in a Big Data World.	Plan best practices for data integration	K6

4. MAPPING (CO, PO, PSO)

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

L-Low M-Moderate H- High

COURSE ASSESSMENT METHODS

DIRECT:

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

INDIRECT:

1. Course end survey (Feedback)

COURSE COORDINATOR **HEAD OF THE DEPARTMENT**

Dr.M.S.MYTHILI Dr.R.THAMARAI SELVI

****

Core Practical IX: PROGRAMMING IN PYTHON LAB

SEMESTER: V **CODE: P18CA5P9**
CREDITS: 3 **HOURS/WEEK: 4**

1. COURSE OUTCOMES

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

S.No.	Course Outcomes	Level	Exercise Covered
CO1	Design programs using control structures and loops	K6	1,2
CO2	Develop programs using functions, classes and objects	K6	6
CO3	Develop Programs using different data structures	K6	4,5
CO4	Demonstrate the Concept of Packages, modules and files and Exception Handling.	K6	3,7,8
CO5	Construct applications with database operations.	K6	9 ,10,11,12, 13
CO6	Demonstrate web programs with Django framework	K6	14,15

2A. Syllabus

Ex. No.	Exercise
1	Write Simple programs using Formulas
2	Write a Python program with Control Statements.
3	Define functions using Python and call them.
4	Create a List and add items into the list and do list operations using Python.
5	Perform various String Operations
6	Write Python program using Classes and Objects.
7	Exercise Error handling mechanisms in Python.
8	Illustrate Modules and Packages in Python.
9	Design a page and perform database connectivity.
10	Perform Various File operations.
11	Create an interactive user login form.
12	Design a Simple Calculator.
13	Design User Registration Form.
14	Illustrate Form creation with Django Framework.
15	Demonstrate rendering forms in Django Framework.

B. TOPICS FOR SELF-STUDY

S.No	Topics	Web Link
1	Python Program to remove punctuations from a given string	**https://www.programiz.com/python-programming/examples**

2	Mail Merge using Python	**https://www.programiz.com/python-programming/examples**
3	Python program to count number of occurrences of key-value pair in a text file	**https://www.geeksforgeeks.org/python-programming-examples/#moreprograms**
4	PyGui and PySide Frameworks	**https://blog.resellerclub.com/the-6-best-python-gui-frameworks-for-developers/**

3. SPECIFIC LEARNING OUTCOMES (SLO)

Ex.No.	Lab Exercises	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
1	Write Simple programs using formulae	Construct Python programs using formulae like area of square, rectangle and circle	K6
2	Write a Python program with Control Statements	Develop programs using control statements such as if, elif and else	K6
3	Define functions using Python and call them	Define a function with user defined name and call the same	K6
4	Create a List and add items into the list and do list operations using Python	Create a list and do all list operations	K6
5	Perform various String Operations	Develop Programs for various string operations	K6
6	Write Python program using Classes and Objects	Construct programs using classes and objects	K6
7	Exercise Error handling mechanisms in Python	Build python programs with exception handling mechanisms	K6
8	Illustrate Modules and Packages in Python	Examine modules and packages	K4
9	Design a page and perform database connectivity	Create a web page and do various database operations	K6
10	Perform Various File operations	Develop programs with various file operations	K6
11	Widget Classes	Create an interactive user login form.	K6
12	Controlling Layouts	Design a Simple Calculator	K6
13	GUI programming	Design User Registration Form	K6
14	Web Programming	Illustrate Form creation with Django Framework.	K4
15.	Forms Rendering	Demonstrate rendering forms in Django Framework.	K2

4. MAPPING (CO, PO, PSO)

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

L-Low M-Moderate H- High

5. COURSE ASSESSMENT METHODS

DIRECT:

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

INDIRECT:

1. Course end survey (Feedback)

COURSE COORDINATOR **HEAD OF THE DEPARTMENT**

Dr.M.S.MYTHILI Dr.R.THAMARAI SELVI

****

Core Project I: MINI PROJECT

SEMESTER: V **CODE: P18CA5PJ**
CREDITS : 3 **HOURS/WEEKS: 4**

1. COURSE OUTCOMES

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

S.No.	Course Outcomes	Level
CO1	Make use of the concepts of Software Engineering	K3
CO2	Utilize the appropriate software development model to create software	K3
CO3	Make use of the testing principles	K3
CO4	Build applications using database connectivity	K6
CO5	Test the quality of the developed software	K6
CO6	Develop an application based on the requirements	K6

2. MAPPING (CO, PO, PSO)-

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

Low **M-Moderate** **H- High**

3. COURSE ASSESSMENT METHODS

DIRECT:

1. 1. Continuous Internal Reviews.
2. 2. End Semester Viva-Voce

INDIRECT:

1. 1.Course end survey (Feedback)

C COURSE COORDINATOR **HEAD OF THE DEPARTMENT**
Dr. B.ARPUTHAMARY Dr.R.THAMARAI SELVI

****

ELECTIVE IV: CLOUD COMPUTING

SEMESTER: V **CODE: P19CA5:1**
CREDITS: 4 **HOURS/WEEK: 4**

1. COURSE OUTCOMES

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

S.No.	Course Outcomes	Level	Unit covered
CO1	Recall the basic component of cloud computing	K1	I
CO2	Apply the technologies of cloud computing in business	K3	II
CO3	Determine the platforms and web applications in accessing the cloud	K5	II
CO4	Utilize the various cloud storages and services for real-time applications	K3	III
CO5	Develop applications using the technologies in cloud	K6	IV
CO6	Discuss the concepts of Fog/Edge	K6	V

2A. Syllabus

UNIT I - Cloud Computing Basics **12 Hours**

Getting Started: Cloud Computing Basics - Cloud Computing Overview - Applications - Intranets and the Cloud – First Movers in the Cloud – **Your Organization and Cloud Computing**: When You Can Use Cloud Computing: - Benefits – Limitations -Security Concerns – Regulatory Issues – **Cloud Computing Titans:** Google, EMC, NetApp, Microsoft, Amazon, Salesforce.com, IBM.

UNIT II - Cloud Computing Technology **12 Hours**

The Business Case for Going to the Cloud : Cloud Computing Services - How Those Applications Help Your Business – **Cloud Computing Technology:Hardwareand Infrastructure:** Clients – Network – Security – Services – **Accessing the Cloud** : Platforms – Web Applications – Web APIs - Web Browsers.

UNIT III - Cloud Storage and Standards **12 Hours**

Cloud Storage: Overview-Cloud Storage providers-**Standards:**Application-Client-Infrastructure-Service.**Cloud Computing at Work:Software as a Service:**overview-Driving Forces-Company Offerings-Industries-**Software plus Services:**Overview-Mobile Device Integration-Providers-Microsoft Online.

UNIT IV - Cloud Applications **12 Hours**

Developing Applications : Google – Microsoft – **Local Clouds and Thin Clients:** Virtualization in your Organization-Server Solutions-Thin Clients-**Migrating to the Cloud :**

Cloud Services for individuals – Cloud Services aimed at the Mid-Market- Enterprise-Class Cloud Offerings – Migration.

UNIT V - Edge and Fog Computing **12 Hours**

Expounding the Edge/Fog Computing Paradigm: Introduction-The Introduction of Fog/Edge Computing-Illustrating the Game-Changing IoT Journey- Describing the Fog Computing-Like Concepts -The Use Cases of Fog/Edge Computing- Why Is Fog Computing Crucial for the Envisaged IoT Success? -Delving into Fog/Edge Analytics.**Edge Analytics: The Prominent Use Cases** -Carving Out Edge Clouds for Edge Analytics -Deep Diving and Digging into the Aspect of Edge Analytics -Introducing Integrated Fog Computing Platforms -The Eclipse Kura—An IoT Device Management and Analytics Platform -Everyware Software Framework-The Solair Platform—IoT Devices: The Integration Options-Altiux Innovations -ParStream Edge Analytics Appliance -Dell Edge Gateway 5000 Series.

B. TOPICS FOR SELF-STUDY

S. No	Topics	Web Link
1	Cloud Cryptography	www.cloudmanagementinsider.com
2	Cloud Load Balancing	www.cloud.google.com
3	Mobile Cloud Computing	www.appypie.com
4	Green Cloud Computing	www.en.wikipedia.org/wiki/Green_computing

C. Text Books:

1. Anthony T. Velte Toby J. Velte, Robert Elsenpeter, "Cloud Computing: A Practical Approach", the McGraw Hill, 2010.
2. Pethuru Raj and Anupama C. Raman. "The Internet of Things: Enabling Technologies, Platforms and Use Cases",CRCPress,Taylor&Francis Group,2017.

D. Reference Books:

1 Barrie Sosinsky, "Cloud Computing Bible",Wiley Publishing, 2011.
2. RajkumarBuyya, James Broberg, and AndrzejGoscinski, "Cloud Computing Principles and Paradigms" Published by Wiley India Pvt Ltd, 2014.
3. OvidiuVermesan and Peter Friess, "Internet of Things - From Research Innovation to Market Deployment", River Publishers, 2014.

E. Web Links:

4. 1. **https://aws.amazon.com/**
5. 2. **https://nptel.ac.in/**

3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic

			Level of Transaction
I	**Getting Started - Cloud Computing Basics**		
1.1	Cloud Computing Overview	Summarize the importance of cloud computing	K2
1.2	Applications of Cloud Computing	List out the applications of cloud	K4
1.3	Intranets and The Cloud	Illustrate the functionalities of intranet	K2
1.4	First Movers in the Cloud	Elaborate on first movers of cloud	K6
	Your Organization and Cloud Computing		
1.5	When you can use cloud Computing	Discuss the scenarios in using cloud storage	K6
1.6	Benefits of cloud computing	Explain the benefits of cloud computing	K5
1.7	Limitations	Identify the limitations of cloud	K3
1.8	Security Concerns	Outline the security concerns of cloud	K2
1.9	Regulatory Issues	Explain the regulatory issues of cloud	K5
	Cloud Computing with the Titans		
1.10	Google	Identify the usage of Google applications	K3
1.11	EMC	Illustrate the functionalities of EMC	K2
1.12	NetApp	Outline the features of NetApp	K6
1.13	Microsoft	Classify the benefits of Microsoft	K4
1.14	Amazon	Elaborate on the features of Amazon	K6
1.15	Salesforce.com	Discuss on Salesforce.com	K6
1.16	IBM	Explain about the partnerships of IBM	K2
II	**The Business Case for Going to the Cloud**		
2.1	Cloud Computing Services	Discuss the services of cloud	K6
2.2	How Those Applications Help Your Business	Build business using the applications of cloud	K6
	Cloud Computing Technology - Hardware and Infrastructure		
2.3	Clients	Compare the type of clients	K5
2.4	Network	Elaborate on cloud providers	K6
2.5	Security	Explain the security benefits in cloud	K5
2.6	Services	Discuss the different services of cloud	K6
	Accessing the Cloud		
2.7	Platforms	Elaborate on the web application framework	K6

2.8	Web Applications	List out the features of Google Apps	K4
2.9	Web APIs	Determine the working of APIs	K5
2.10	Web Browsers	Classify web browsers	K4
III	**Cloud Storage**		
3.1	Overview of Cloud Storage	Elaborate cloud storage	K6
3.2	Cloud Storage Providers	Identify the cloud storage providers	K3
	Standards		
3.3	Application	Explain the applications of cloud	K5
3.4	Client	Assess the different means of store and display information	K5
3.5	Infrastructure	Summarize virtualization in detail	K2
3.6	Service	Recall web services	K1
	Cloud Computing at Work - Software as a Service		
3.7	Overview of SaaS	Identify the advantages in organizations using SaaS	K3
3.8	Driving Forces	Illustrate the driving force for SaaS	K2
3.9	Company Offerings	Analyze the different cloud offerings	K4
3.10	Industries	Discuss various healthcare industries involved in SaaS	K6
	Software plus Services		
3.11	Overview of Software plus Services	Compare the pros and cons of software plus services	K5
3.12	Mobile Device Integration	Recall mobile device integration	K1
3.13	Providers	Explain the providers of software plus services	K2
3.14	Microsoft Online	Identify the software plus service offerings	K3
IV	**Developing Applications**		
4.1	Google	Explain the applications of Google	K5
4.2	Microsoft	Illustrate Microsoft applications	K2
	Local Clouds and Thin Clients		
43	Virtualization in your Organization	Discuss virtualization in the organization	K6
4.4	Server Solutions	Explain Microsoft hyper v	K5
4.5	Thin Clients	Elaborate on thin clients	K6
	Migrating to the Cloud		
4.6	Cloud Services for Individuals	Determine the cloud services for individuals	K5
4.7	Cloud Services Aimed at the Mid-Market	Elaborate on the services at mid-market	K6
4.8	Enterprise-Class Cloud Offerings	Explain the enterprise-class cloud offerings	K5
4.9	Migration	Discuss migration	K6

V	Expounding the Edge/Fog Computing Paradigm		
5.1	Introduction to Edge/Fog Computing	Name the professional devices interconnected	K1
5.2	The Introduction of Fog/Edge Computing	Relate Fog and Edge computing	K1
5.3	Illustrating the Game-Changing IoT Journey	Illustrate game-changing IoT journey	K2
5.4	Describing the Fog Computing-Like Concepts	Discuss the Fog computing -like concepts	K6
5.5	The Use Cases of Fog/Edge Computing	Explain the use cases of Fog/Edge computing	K5
5.6	Why is Fog Computing Crucial for the Envisaged IoT Success?	Make use of Fog computing in IoT	K3
5.7	Edge Analytics:The Prominent Use Cases	Elaborate on Edge Analytics prominent use case	K6
5.8	Carving Our Edge Clouds for Edge Analytics	Explain carving Edge clouds for Edge analytics	K2
5.9	Deep Diving and Digging into the Aspects of Edge Analytics	Recall deep diving and digging into the aspects of Edge analytics	K1
5.10	Introducing Integrated Fog Computing Platforms	Outline the integrated fog computing platforms	K2
5.11	The Eclipse Kura-An IoT Device Management and Analytics Platform	Recall Eclipse Kura	K1
5.12	Everyware Software Framework	Illustrate Everyware software framework	K2
5.13	The Solair Platform-IoT Devices: The Integration Options	Explain Solair platform	K5
5.14	Altiux Innovations	Illustrate Altiux innovations	K2
5.15	ParStream Edge Analytics Appliance	Recall ParStream Edge analytics appliance	K1
5.16	Dell Edge Gateway 5000 Series	Explain the Dell Edge Gateway 5000 series	K2

4. MAPPING (CO, PO, PSO)

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

L-Low M-Moderate H- High

5. COURSE ASSESSMENT METHODS

DIRECT:

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

INDIRECT:

1. Course end survey (Feedback)

C COURSE COORDINATOR **HEAD OF THE DEPARTMENT**

Dr.R.THAMARAI SELVI Dr.R.THAMARAI SELVI

****

Elective IV: MOBILE COMPUTING

SEMESTER: V **CODE: P19CA5:2**
CREDITS: 4 **HOURS/WEEKS: 4**

1. COURSE OUTCOMES

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

S.No.	Course Outcomes	Level	Unit
CO1	Explain the functionalities of the physical layer, multiplexing and modulation	K2	I
CO2	Elaborate the services, system architecture, protocol architecture of GSM and UMTS	K6	II
CO3	Recall the system architecture, Protocol architecture of IEEE 802.11 and Bluetooth	K1	III
CO4	Summarize agent discovery process, registration procedure, tunneling and encapsulation of packet in the mobile network	K2	IV
CO5	Compare the ad-hoc routing algorithms	K4	IV
CO6	Develop applications using Android	K6	V

2A. Syllabus

UNIT I - Wireless transmission **12 Hours**

Introduction: Applications - A Simplified reference model. **Wireless transmission:** Frequencies for radio transmission - Signals – Antennas - Signal propagation - Multiplexing - Modulation - Spread spectrum - Cellular systems.

UNIT II – Telecommunications Systems **12 Hours**

GSM: Mobile services - System architecture - Radio interface – Protocols – Security. **UMTS:** UMTS system architecture - UMTS radio interface. **Satellite Systems:** Applications - Basic Types of Satellite Orbits - GEO - LEO - MEO - Routing - Localization – Handover.

UNIT III – Wireless LAN and Bluetooth **12 Hours**

Wireless LAN: IEEE - System architecture - Protocol architecture. **Bluetooth:** User scenarios - Architecture - Radio layer - Baseband layer - Link manager protocol - L2CAP - Security – SDP - Profiles.

UNIT IV – Mobile Network Layer **12 Hours**

Mobile IP - Goals, assumptions and requirements - Entities and terminology - IP packet delivery - Agent discovery - Registration - Tunneling and encapsulation - Optimizations - Reverse tunneling - IPv6. **Mobile ad-hoc networks:** Routing - Destination sequence distance vector - Dynamic source routing - Overview ad-hoc routing protocols- **Wireless Application Protocol:** Architecture.

UNIT V - Android Application Development **12 hours**

High level overview of android development: The android operating system - Android versions- Android application-Android Developer tools – Device support- Android studio overview and installation- Installing android SDK- **Getting started with Android studio:** Create a new Android project- Review the generated project- Create a virtual device (AVD)- Start your virtual device- Start the application on your virtual device

B. TOPICS FOR SELF-STUDY

S.No	Topics	Web Link
1	6G Technology	**https://arxiv.org/ftp/arxiv/papers/1909/1909.11315.pdf**
2	Mobile Cloud and Edge Computing	**https://www.ibm.com/in-en/cloud/edge-computing**
3	Android Activity Recognition	**https://docs.microsoft.com/en-us/samples/xamarin/monodroid-samples/google-services-location-activityrecognition/**
4	Mobile crowd sourcing	**https://arxiv.org/pdf/1505.07772**

C. Text Books:

1. Jochen Schiller, "Mobile communications", Pearson Education, Second Edition, 2009
2. Lars Vogel, "Android Development Tutorial Based on Android 4.0, 2019" (http://www.vogella.com/tutorials/android.html)

D. Reference Books:

1. Asoke K. Talukder, Hasan Ahmed and Roopa R Yavagal, "Mobile Computing", Second Edition, McGraw Hill, 2011.
2. Wei–Meng Lee, "Beginning Android Application Development", John Wiley and Sons, Inc, 2012.

E. Web links:

1. **https://nptel.ac.in/noc/courses/noc16/SEM2/noc16-cs13/**
2. **https://www.tutorialspoint.com/mobile_computing/index.htm**

3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
I	**Introduction**		
1.1	Applications	Identify the applications of mobile computing.	K3
1.2	A Simplified reference model	Elaborate the layers of simplified reference model	K6
	Wireless Transmission		

1.3	Frequencies for radio transmission	Assess the frequencies for radio communication	K4
1.4	Signals	Illustrate the frequency representation of signal.	K2
1.5	Antennas	Compare the different types of Antenna	K2
1.6	Signal propagation	Explain signal propagation	K2
1.7	Multiplexing	Analyze the multiplexing techniques	K4
1.8	Modulation	Construct the Minimum Shift Keying signal	K6
1.9	Spread spectrum	Analyze the Spread Spectrum. Technologies	K4
1.10	Cellular systems	Build a cellular system with seven cell cluster.	K6
II	**Telecommunications Systems: GSM**		
2.1	Mobile services	Categorize the GSM mobile services	K4
2.2	System architecture	Elaborate the system architecture of GSM	K6
2.3	Radio interface	Explain the radio interface of GSM	K4
2.4	Protocols	Illustrate the protocol Architecture for signaling in GSM..	K2
2.5	Security	Elaborate the authentication mechanism in GSM.	K6
	UMTS		
2.6	UMTS system architecture	Explain the system architecture of UMTS	K5
2.7	UMTS radio interface	Outline the radio interface of UMTS	K2
	Satellite Systems		
2.8	Applications	Identity the applications of satellite system.	K3
2.9	Basic Types of Satellite Orbits	Classify the satellite orbits	K2
2.10	Routing	Identify the drawbacks of ISLs.	K3
2.11	Localization	Explain localization	K2
2.12	Handover.	Summarize the handover procedure in satellite system	K2
III	**Wireless LAN**		
3.1	IEEE System architecture	Make use of the system architecture of IEEE 802.11	K3
3.2	Protocol architecture	Outline the protocol architecture of IEEE 802.11.	K2
	Bluetooth		

3.3	User scenarios	Summarize the uses of Bluetooth	K2
3.4	Architecture	Explain the architecture of Bluetooth	K5
3.5	Radio layer	Identify the functions of blue tooth radio layer	K3
3.6	Baseband layer	Classify the links of Bluetooth baseband layers.	K2
3.7	Link manager protocol	Summarize the functions of link manager protocol	K2
3.8	L2CAP	Illustrate the L2CAP packet format.	K2
3.9	Security	Explain the Bluetooth security components and protocols	K2
3.10	SDP	Explain service discovery protocol.	K2
3.11	Profile	Identify the Bluetooth application profiles	K3
IV	**Mobile Network Layer: Mobile IP**		
4.1	Goals, assumptions and requirements	Explain the goals, assumptions and requirements of Mobile IP.	K2
4.2	Entities and terminology	Identify the entities and terminologies in mobile IP	K6
4.3	IP packet delivery	Explain IP packet delivery.	K5
4.4	Agent discovery	Construct an agent discovery packet	K6
4.5	Registration	Examine the registration procedure in mobile networks	K4
4.6	Tunneling and encapsulation	Categorize the different encapsulation methods	K4
4.7	Optimizations	Analyze the optimizations procedures of mobile network	K4
4.8	Reverse tunneling	Explain the concept of reverse tunneling.	K5
4.9	IPv6	Identify the features of IPv6.	K3
	Mobile ad-hoc networks		
4.10	Routing	Compare wired network and ad-hoc wireless networks	K2
4.11	Destination sequence distance vector	Explain the destination sequence distance vector	K5
4.12	Dynamic source routing	Explain the concept of dynamic source routing.	K5
4.13	Ad-hoc routing protocols	Analyze the ad-hoc routing protocols.	K4
	Wireless Application Protocol		
4.14	Architecture	Illustrate the architecture of wireless application protocol	K2
V	**High level overview of android development**		

5.1	The android operating system	Explain the android operating system.	K2
5.2	Android versions	List the android versions,	K1
5.3	Android application	Elaborate the android application components.	K6
5.4	Android Developer tools	Explain the tools for android development	K2
5.5	Device support.	Recall Android Virtual device	K1
5.6	Android studio overview and installation	Explain the procedure for Installation of Android studio.	K2
5.7	Installing android SDK	Explain the procedure for installation of android SDK	K2
	Getting started with Android studio		
5.8	Create a new Android project	Create a android project.	K6
5.9	Create a virtual device(AVD)	Illustrate the android virtual device	K2
5.10	Start your virtual device	List out the steps to start Android virtual device	K1

4. MAPPING (CO, PO, PSO)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**H**	**-**	**L**	**H**	**M**	**M**	**M**	**L**	**L**	**L**	**L**	**M**	**-**
CO2	**H**	**_**	**M**	**H**	**M**	**-**	**L**	**L**	**M**	**L**	**L**	**M**	**-**
CO3	**H**	**-**	**M**	**H**	**M**	**M**	**L**	**M**	**M**	**L**	**L**	**M**	**-**
CO4	**M**	**L**	**M**	**H**	**M**	**L**	**L**	**M**	**M**	**M**	**M**	**M**	**-**
CO5	**H**	**L**	**H**	**H**	**M**	**L**	**L**	**M**	**M**	**M**	**M**	**M**	**-**
CO6	**H**	**H**	**H**	**H**	**H**	**M**	**H**	**H**	**M**	**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. Open Book Test.
3. Cooperative Learning Report, Assignment, Group Presentation, Group Discussion, Poster Presentation, Seminar, Quiz (written).
4. Pre-Semester & End Semester Theory Examination

INDIRECT:

1. Course end survey (Feedback)

COURSE COORDINATOR **HEAD OF THE DEPARTMENT**

Mrs. PEARLY CHARLES Dr.R.THAMARAI SELVI

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Elective IV:PARALLEL COMPUTING

SEMESTER: V **CODE: P19CA5:3**
CREDITS: 4 **HOURS/WEEKS: 4**

1. COURSE OUTCOMES

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

S.No.	Course Outcomes	Level	Unit
CO1	Analyze the efficiency of parallel computing system and evaluate the types of application for which parallel programming is useful	K4	I
CO2	Identify the development, analyze, and implement algorithms for parallel algorithms design	K3	II
CO3	Assess the different parallel architectures, inter-connect networks, programming models, and algorithms for common operations such as matrix-vector multiplication	K5	III
CO4	Evaluate issues of dense matrix multiplication and efficiency of solving system of linear equations	K5	III
CO5	Apply design and development principles in the construction of software systems of varying complexity	K3	IV
CO6	Choose knowledge of computing and mathematics appropriate to the graph algorithms	K5	V

2A. Syllabus

UNIT I - Introduction to Parallel Computing **12 Hours**

Introduction to Parallel Computing – Motivating Parallelism – Scope of Parallel Computing – Parallel Programming Platforms – Implicit Parallelism – Limitations of Memory System Performance – Dichotomy of Parallel Computing Platforms – Physical Organisation of Parallel Platforms – Communication Costs in Parallel Machines – Routing Mechanisms for Inter Connection Networks – Impact of Process Mapping and Mapping Techniques.

UNIT II – Parallel Algorithm Design **12 Hours**

Principles of Parallel Algorithm Design – Preliminaries – Decomposition Techniques – Characteristics of Tasks and Interactions – Mapping Techniques for Load Balancing – Methods for Containing Interaction Over Heads – Parallel Algorithm Models.

UNIT III – Matrix Algorithms **12 Hours**

Dense Matrix Algorithms – Matrix Vector Multiplication – Matrix _ Matrix Multiplication – Solving a system of Linear Equations.

UNIT IV – Sorting Algorithms **12 Hours**

Sorting: Issues in Sorting on Parallel Computers – Sorting Networks – Bubble Sort and its Variants – Quick Sort – Bucket and Sample Sort – Other sorting Algorithms.

UNIT V - Graph Algorithms **12 Hours**

Graph Algorithms – Definitions and Representation Prim's Algorithm – Dijisktrars Algorithm – All Pairs Shortest Paths – Transitive Closure – Connected Components – Algorithm for Space Graphs.

B. TOPICS FOR SELF-STUDY

S.No	Topics	Web Link
1	Permutation routing in mesh-based networks	**http://pages.cs.wisc.edu/~tvrdik/9/html/Section9.html**
2	NP Completeness Complexity Theory	**https://www.youtube.com/watch?v=2cyryXRmN5Q**
3	Parallel Matrix Operations	**https://www.youtube.com/watch?v=vwakkGWXARw**
4	Parallel Design Patterns	**https://www.youtube.com/watch?v=L7sinmKkbJA**

C. Text Book:

1. Ananth Grama, AnshulGuptha, George Karypis and Vipin Kumar, "Introduction to Parallel Computing ", Pearson Education, 1994.

D. Reference Book:

1. Harry F. Jordan, Gita Alaghband, "Fundamentals of Parallel Processing", Prentice Hall, 2003.

E. Web links:

1.**https://www.classcentral.com/course/swayam-parallel-algorithms-12934**
2.**http://www.digimat.in/nptel/courses/video/106102114/L03.html**

3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
I	**Parallel Computing Basics**		
1.1	Introduction to parallel computing	Classify different types of parallel processing.	K4
1.2	Scope of parallel computing	Discuss the operation of pipelined vector processor system	K6
1.3	Platform for parallel computing	Describe the function of an array processor.	K2
	Parallel Machines		
1.4	Types of Communication costs	Identify the ways of reducing communication costs in parallel machines.	K1

1.5	Methods of Routing mechanisms	Discuss the methods for message routing in parallel machines.	K2
1.6	Problems in Process Mapping	Define maximum degree of concurrency and average degree of concurrency	K1
II	**Parallel Algorithms Design**		
2.1	Principles of parallel algorithm design	Outline the principles of parallel algorithm design.	K1
2.2	Characteristics of parallel algorithms	Summarize the characteristics of parallel algorithms.	K1
2.3	2.3 Decomposition Techniques to solve concurrency problems	Analyse the decomposition techniques for achieving concurrency	K2
	Mapping Techniques		
2.4	Mapping technique for Load Balancing	Classify different types of mapping techniques for load balancing	K6
2.5	Containing interaction overhead methods	Explain the methods for containing interaction overhead	K1
2.6	Models of Parallel algorithm	Compare the different models for parallel algorithm in problem solving.	K6
III	**Dense Matrix Algorithm**		
3.1	Definition of Matrix multiplication	Define matrix multiplication.	K1
3.2	Using Vector matrix multiplication	Distinguish between vector and dense matrix multiplication	K4
3.3	Applying Dense matrix multiplication	Solve the system of linear equations of n variables using dense matrix multiplication	K3
3.4	Principles of dense matrix algorithm	List out the principles of dense matrix algorithm	K1
	Solving a System of Linear Equations		
3.5	Metrics of Parallel Algorithms	Discuss the performance metrics of parallel algorithms	K6
IV	**Sorting**		
4.1	Definition of sorting	Define sorting.	K1
4.2	Issues in sorting on parallel computers	Analyse the criteria that are used to evaluate the cost and performance on sorting parallel computers.	K6
4.3	Sorting networks types	Explain completely-connected, star, linear array and Mesh networks.	K2
4.4	Sorting Management on parallel computers	Interpret the impacts of sorting management on parallel computers.	K2
	Sorting Algorithms		

4.5	Bubble sort algorithm	Examine the operations of bubble sort algorithm.	K5
4.6	Quick sort algorithm	Improve recursive decomposition technique with an example.	K2
4.7	Bucket sort algorithm	Evaluate the operations of bucket sort algorithm.	K2
V	**Graph Algorithms**		
5.1	Prim's algorithm	Apply the Prim's algorithm for solving minimum spanning tree problem in fuzzy environment.	K6
5.2	Dijisktra's algorithm	Elaborate the Dijkstra's algorithm with an example.	K5
5.3	Structure of all pairs shortest paths	Explain the structure of shortest paths.	K2
	Transitive Closure		
5.4	Definition of transitive closure	Define transitive closure	K1
5.5	Connected components of tree	Construct the connected components in a graph with an example	K5
5.6	Algorithms for space graph	Discuss Space Efficient Algorithms for optimization problems in bounded tree-width graph.	K6

4. MAPPING (CO, PO, PSO)

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

L-Low M-Moderate H- High

5. COURSE ASSESSMENT METHODS

DIRECT:

1. Continuous Internal Assessment Test I, II
2. Course-Embedded Assessment (e.g., Homework Assignment, Essays, Locally Developed Tests)
3. End Semester Examination

INDIRECT:

1. Course-End Survey
2. Student Satisfaction Survey

COURSE COORDINATOR **HEAD OF THE DEPARTMENT**

Dr.P.THANGARAJU Dr.R.THAMARAI SELVI

****

Elective IV: ORGANIZATIONAL BEHAVIOUR

SEMESTER: V **CODE: P19CA5:4**
CREDITS: 3 **HOURS/WEEKS: 4**

1. COURSE OUTCOMES

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

S.No.	Course Outcomes	Level	Unit
CO1	Make use of the scientific foundations of Organizational Behavior	K3	I
CO2	Analyze individual and group behavior and understand the implications of organizational behavior in the process of management	K4	II
CO3	Examine the motivational strategies used in a variety of organizational settings	K3	III
CO4	Evaluate the appropriateness of various leadership styles and conflict management strategies used in organizations	K5	IV
CO5	Assess the basic design elements of organizational structure and evaluate their impact on employees	K5	V
CO6	Explain how organizational change and culture affect working relationships within organizations	K6	V

2A. Syllabus

UNIT I - Introduction to Organizational Behaviour **12 Hours**

Introduction: Elements of OB – Nature and Scope of OB – Contributing Disciplines to OB. Organizational Behaviour in Historical Perspective – **Foundations of IndividualBehaviour:** Introduction – The Individual and Individual Differences – Human Behaviour and its Causation.

UNIT II - Personality and Perception **12 Hours**

Personality –Perception –Attitudes: Concept of Attitudes – Formation of Attitudes – Types of Attitudes – Measurement of Attitude – Change of Attitude. **Values:** Concept of Value – Types of Values – Formation of Values – Values and Behaviour. **Job Satisfaction.**

UNIT III - Learning and Motivation **12 Hours**

Learning: Meaning and Definition – Determinants of Learning – Learning Theories – Learning Principles – Reinforcement – Punishment – Learning and Behaviour. **Motivation:** Concepts – Meaning of Motivation – Nature of Motivation – Motivation Cycle or Process – Need for Motivation – Theories of Motivation – Motivation and morale.

UNIT IV - Organizational Conflicts **12 Hours**

Organizational Conflicts: Definition of Conflict – Sources of Conflict – Types of Conflicts – Aspects of Conflicts – Functional Conflict – Dysfunctional Conflict – Conflict Process – Conflict Management. **Job Frustration –Stress Management.**

UNIT V- Communication and Leadership **12 Hours**

Communication: Nature and Need for Communication – Communication Process – Communication Channel – Communication Networks – Communication Barriers – Effective Communication. **Leadership – Organisational Structure – Organisational Culture**.

B. TOPICS FOR SELF-STUDY

S.No	Topics	Web Link
1	Human Resource Management	**https://open.lib.umn.edu/humanresourcemanagement/chapter/1-1-what-is-human-resources/**
2	Stress Management and Emotional Health	**https://my.clevelandclinic.org/health/articles/6409-stress-management-and-emotional-health**
3	Organizational Dynamics	**http://www.managingdynamics.com/organizational-dynamics.asp**
4	Managing for employee retention	**https://www.shrm.org/resourcesandtools/tools-and-samples/toolkits/pages/managingforemployeeretention.aspx**

C. Text Book

1. S.S Khanka, "Organizational Behaviour", S. Chand and Company Ltd, Revised Edition 2009.

D. Reference Books

1. John W Newstrom and Keith Davis, "Organizational Behaviour", TMH, 13th Edition, 2010.
2. Hugh J Arnold and Daniel C Fieldman, "Organizational Behaviour" , Mc Graw Hill, 10th Edition, 2005.

E. Web links

1. **https://open.umn.edu/opentextbooks/textbooks/30**
2. **https://managementhelp.org/organizationalbehavior/**

3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
I	**Organizational Behavior Introduction**		
1.1	Elements of OB	Recall the key elements of OB	K1
1.2	Nature and Scope of OB	Summarize the nature and scope of OB	K2

1.3	Contributing Disciplines to OB	List out the disciplines that contribute to the understanding of OB	K4
1.4	OB in historical perspective	Outline the historic perspective of OB	K2
	Foundations of Individual Behavior		
1.5	The individual and individual differences	Analyze the factors affecting individual behavior	K4
1.6	Human behavior and its causation.	Examine human behavior	K4
1.7	OB Models	Classify the models of OB	K4
II	**Personality, Perception and Attitudes**		
2.1	Definition of Perception	Define perception	K1
2.2	Perceptual Process	Elaborate the process involved in perception	K6
2.3	Determinants of Personality	List out the determinants of Personality	K4
2.4	Types of Personality	Classify personality	K4
2.5	Theories of Personality	Criticize the theories of personality	K5
	Values and Job Satisfaction		
2.6	Concepts of Values	Explain the concepts of values on individual behavior	K5
2.7	Formation of Values	Identify the formation of values	K3
2.8	Types of Values	Categorize values	K4
2.9	Determinants of Job Satisfaction	Analyze the sources of Job Satisfaction	K4
III	**Learning**		
3.1	Definition of Learning	Define learning	K1
3.2	Determinants of Learning	Determine the factors that affect learning	K5
3.3	Theories of Learning	Analyze the theories of learning	K4
3.4	Principles of Learning	Establish relationship between learning and behavior	K6
	Motivation		
3.5	Meaning of Motivation	Explain the need for understanding motivation at work in organizations	K2
3.6	Nature of Motivation	Recall the nature of motivation	K1
3.7	Process of Motivation	Explain the process of motivation	K5
3.8	Theories based on Human Needs	Compare the various motivational theories based on human needs	K4
3.9	Theories based on Human Nature	Analyze the motivational theories based on human nature	K4

3.10	Theories based on expectancy of human beings	Categorize the motivational theories based on expectancy of human beings	K4
IV	**Organizational Conflicts**		
4.1	Definition of Conflict	Recall the definition of Conflicts	K1
4.2	Types of Conflicts	Classify conflicts	K2
4.3	Aspects of Organizational Conflicts	Compare and contrast the aspects of organizational Conflicts	K5
4.4	Management of Conflicts	Discuss the impacts of conflict management on the success of a company	K6
	Job Frustration		
4.5	Definition	Recall the definition of Job Frustration	K1
4.6	Frustration affects Behavior	Identify the reasons for frustration	K3
4.7	Frustration Management	Make use of the techniques to manage frustration	K3
	Stress Management		
4.8	Symptoms of Stress	List out the symptoms for stress	K1
4.9	Measurement of Job Stress	Measure job stress	K5
4.10	Sources of Stress	Identify the sources of stress	K3
4.11	Management of Stress	Make use of the techniques for managing stress	K3
V	**Communication**		
5.1	Nature of Communication	Recall the nature of communication	K1
5.2	Process of Communication	Explain the communication process	K2
5.3	Channels of Communication	Identify the communication channels	K3
5.4	Networks of Communication	Analyze communication networks	K4
5.5	Communication Barriers	List out the barriers for communication	K4
5.6	Effective Communication	Make use of the techniques for effective communication	K3
	Leadership		
5.7	Definition of Leadership	Recall the definition of leadership	K1
5.8	Leadership Styles	Identify the leadership style	K3
	Organizational Structure		
5.9	Definition of Organizational Structure	Outline the structure of organizations	K2
5.10	Elements of Organizational Structure	Examine the elements of organizational structure	K4

	Organizational Culture		
5.11	Types of Organizational Culture	Classify organizational culture	K4
5.12	Functions of Organizational Culture	Assess the functions of Organizational Culture	K5

4. MAPPING (CO, PO, PSO)

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

L-Low M-Moderate H- High

5. COURSE ASSESSMENT METHODS

DIRECT:

1. Continuous Internal Assessment Test I, II
2. Course-Embedded Assessment (e.g., Homework Assignment, Essays, Locally Developed Tests)
3. End Semester Examination Pre-Semester & End Semester Theory Examination

INDIRECT:

1. Course-End Survey
2. Student Satisfaction Survey

COURSE COORDINATOR — Dr. H.B.VINCENTRAJ

HEAD OF THE DEPARTMENT — Dr.R.THAMARAI SELVI

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Elective IV: BUSINESS INTELLIGENCE

SEMESTER: V **CODE: P19CA5:5**
CREDITS: 3 **HOURS/WEEK: 4**

1. COURSE OUTCOMES

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

S.No.	Course Outcomes	Level	Unit covered
CO1	Identify the major frameworks of computerized decision support systems	K3	I
CO2	Categorize complex business problems in terms of analytical models	K4	II
CO3	Demonstrate ethical decision-making in structured or unstructured Problems	K2	III
CO4	Compare the impacts of business reporting, information visualization, and dashboards	K5	IV
CO5	Adapt data mining tools, neural networks, web mining, web analytics in BI	K6	V
CO6	Elaborate how analytics are powering consumer applications and creating a new opportunity for entrepreneurship for analytics	K6	V

2A. Syllabus

UNIT I- Decision making and computerized support **12 Hours**

Management Support Systems: An Overview: Managers and Decision-Making – Managerial Decision-Making and Information Systems – Managers and Computer Support – Computerized Decision Support and the Supporting Technologies A Framework for Decision Support – The Concept of Decision Support Systems – Group Support Systems–Enterprise Information Systems-Knowledge Management Systems-Expert Systems-Artificial Neural Networks-Advanced Intelligent Decision Support Systems-Hybrid Support Systems.

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UNIT II - Decision making modeling overview **12 Hours**

Decision-Making Systems, Modeling, and Support: Decision-Making: Introduction and Definitions-Systems-Models- Phases of the Decision-Making Process-Decision-Making: The Intelligence Phase - The Design Phase- The Choice Phase-The Implementation Phase-How Decisions Are Supported-ersonality Types, Gender, Human Cognition, and Decision Styles-The Decision-Makers.

UNIT III - Decision Support System **12 Hours**

Decision Support Systems: An Overview-DSS Configurations-What Is a DSS?-Characteristics and Capabilities of DSS - Components of DSS-The Data Management Subsystem-The Model Management Subsystem-The User Interface (Dialog) Subsystem -The Knowledge-Based Management Subsystem-The User-DSS Hardware-DSS Classifications.

UNIT IV - Modeling and Analysis **12 Hours**

Modeling and Analysis: MSS Modeling-Static and Dynamic Models-Certainty, Uncertainty, and Risk-Influence Diagrams-MSS Modeling with Spreadsheets-Decision Analysis of a Few Alternatives (Decision Tables and Decision Trees)-The Structure of MSS Mathematical Models-Mathematical Programming Optimization-Multiple Goals, Sensitivity Analysis, What-If, and Goal Seeking-Problem-Solving Search Methods-Heuristic Programming-Simulation.

UNIT V - Business Intelligence –Technologies **12Hours**

Business Intelligence: Data Warehousing, Data Acquisition, Data Mining, Business Analytics, and Visualization: The Nature and Sources of Data-Data Collection, Problems, and Quality-The Web/Internet and Commercial Database Services-Database Management Systems in Decision Support Systems.

Business Intelligence-Database Organization and Structures-Data Warehousing-Data Marts-Business Intelligence/Business Analytics-Online Analytical Processing (OLAP)-Data Mining -Data Visualization, Multidimensionality, and Real-Time Analytics.

B. TOPICS FOR SELF-STUDY

S.No	Topics	Web Link
1	Enterprises Information Systems	**https://www.youtube.com/watch?v=dWYmuowdCL0**
2	Knowledge Acquisition, Representation, and Reasoning	**https://education.stateuniversity.com/pages/2165/Learning-KNOWLEDGE-ACQUISITION-REPRESENTATION-ORGANIZATION.htm**
3	Augmented Analytics	**https://www.youtube.com/watch?v=ZCzAwVNBf_0 https://learn.g2.com/augmented-analytics**
4	Data Quality Management	**https://www.datapine.com/blog/what-are-data-discovery-tools/, https://www.youtube.com/watch?v=MiiANxRHSv4**

C. Text Book:

1. Efraim Turban, Ramesh Sharda, DursunDelen, “Decision Support and Business Intelligence Systems”, 7th Edition, Pearson 2013.

D. Reference Books:

1. Larissa T. Moss, S. Atre, “Business Intelligence Roadmap: The Complete Project Lifecycle of Decision Making”, Addison Wesley, 2003.
2. Carlo Vercellis, “Business Intelligence: Data Mining and Optimization for Decision Making”, Wiley Publications, 2009.
3. David Loshin Morgan, Kaufman, “Business Intelligence: The Savvy Manager‟s Guide”, Second Edition, 2012.

4. Cindi Howson, “Successful Business Intelligence: Secrets to Making BI a Killer App”, McGraw-Hill, 2007.
5. Ralph Kimball ,Margy Ross , Warren Thornthwaite, Joy Mundy, Bob Becker, “The Data Warehouse Lifecycle Toolkit”, Wiley Publication Inc.,2007.

E. Web Link:

1. **https://wciconsulting.com/bi-consulting-services/data-management-consulting/data-warehouse-modeling/**

3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom’s Taxonomic Level of Transaction
I	**Management Support Systems: An Overview**		
1.1	Managers and Decision-Making	Recall the responsibility of managers inorganizations	K1
1.2	The Nature of Managers work	Classify the nature of manager's work	K2
1.3	Managerial Decision-Making and Information Systems	Compare how internet and other information technologies support business processes	K2
1.4	Decision Support and Technologies	Examine the role of information technology and information system in business	K4
	A Framework for Decision Support		
1.5	Anthony and Simon's taxonomies	Demonstrate managerial activities	K2
1.6	Management Science	Adapt systematic processes to solve problems	K6
1.7	Advanced Intelligent Decision Support system	Make use of emerging technologies in BI	K3
II	**Decision-Making Systems, Modelling, and Support**		
2.1	Decision-Making: Introduction and Definitions	Explain the conceptual foundations of decision-making	K2
2.2	Systems	Identify the system and its environment for decision making	K3
2.3	Models	Make use of models for problem solving	K3
	Phases of the Decision-Making Process		
2.4	The Intelligence Phase	Examine the reality to identify and define the problem	K4
2.5	The Design Phase	Build a model to represent the system with assumptions	K6

2.6	The Choice Phase	Choose the proposed model for implementation	K6
2.7	The Implementation Phase	Assess the proposed model in reality system	K4
	How Decisions Are Supported		
2.8	Personality Types, Gender, Human Cognition, and Decision Styles	Outline the relationship between personality and decision making	K2
2.9	The Decision-Makers	Justify the human cognitive decision style in problem solving	K5
III	**Decision Support Systems: An Overview**		
3.1	DSS Configurations	Illustrate the possible DSS configurations	K2
3.2	Characteristics and Capabilities of DSS	Outline the DSS characteristics and capabilities	K2
3.3	Components of DSS	Examine the DSS components and how they integrate	K4
3.4	The Data Management Subsystem	Analyze how DBMS incorporates DSS	K4
3.5	The Model Management Subsystem	Classify management subsystems	K4
3.6	DSS Classifications	Classify DSS models	K4
IV	**Modeling and Analysis**		
4.1	MSS Modeling-Static and Dynamic Models	Make use of the basic concepts of MSS modelling	K3
4.2	Risk- Influence Diagrams	Determine the certainty and uncertainty in risk	K5
	Decision Analysis		
4.3	The Structure of MSS Mathematical Models	Build MSS models that interacts with data and user	K3
4.4	Mathematical Programming Optimization	Compile a model to optimize a measurable goal in managerial problem	K6
4.5	Multiple Goals	Create multiple goals into linear programming models	K6
4.6	Sensitivity Analysis	Assess the impact of input data or parameters on the proposed solution	K5
4.7	Problem-Solving Search Methods-Heuristic Programming-Simulation	Create mathematical models for optimal solution for managerial problems	K6
V	**Business Intelligence: Data Warehousing, Data Acquisition, Data Mining, Business Analytics and Visualization**		
5.1	The Nature and Sources of Data-Data Coll	Analyze the issues in data collection, problems, and quality.	K4
5.2	Problems and Quality	Identify the problems in data sources and quality	K3

5.3	The Web/Internet and Commercial Database Services	Outline the Web intelligence/Web analytics and their importance to organizations.	K2
5.4	Database Management Systems in Decision Support Systems	Analyze the importance of DBMS min DSS	K4
	Business Intelligence		
5.5	Database Organization and Structures	Analyze the characteristics and organization of database management systems.	K4
5.6	Data Warehousing-Data Marts	Determine the importance and use of a data warehouse and data mart.	K5
5.7	Business Intelligence/Business Analytics	Examine how business intelligence/business analytics and their importance to organizations.	K4
5.8	Online Analytical Processing (OLAP)-	Apply the OLAP tools for access the data for DSS	K3
5.9	Data Mining	Apply data mining techniques to discover knowledge from data	K3
5.10	Data Visualization, Multidimensionality, and Real-Time Analytics	Evaluate the discovered knowledge and visualize in real time	K5

4. MAPPING (CO, PO, PSO)

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

L-Low M-Moderate H- High

5. COURSE ASSESSMENT METHODS

DIRECT:

1. Continuous Assessment Test: T1, T2 (Theory & Practical Components): Closed Book
2. Open Book Test.
3. 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)

COURSE COORDINATOR **HEAD OF THE DEPARTMENT**

Dr. M. LOVELIN PONN FELCIAH Dr.R.THAMARAI SELVI

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Elective IV: HUMAN RESOURCE MANAGEMENT

SEMESTER: V **CODE: P19CA5:6**
CREDITS: 3 **HOURS/WEEK: 4**

1. COURSE OUTCOMES

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

S.No.	Course Outcomes	Level	Unit covered
CO1	Outline the basic concepts, functions and processes of human resource management	K2	I
CO2	Analysis Job techniques and methods	K4	II
CO3	Build and communicate the human resources component of the organization's business plan	K3	III
CO4	Develop employability skills	K6	III
CO5	Agree to manage and plan key human resource functions within organizations	K5	IV
CO6	Determine to handle employee issues and evaluate the new trends in HRM	K5	V

2A. Syllabus

UNITI- Human Resource Planning Overview **12 Hours**

Human Resource Planning: How HRP Relates to Organizational Planning or Strategic Planning, the need for Human Resource Planning, The Steps in Human Resource Planning Process, Situation Analysis, Environmental Scanning and Strategic Planning, Forecasting Human Resource Demands.

UNITII- Job Analysis **12 Hours**

Job Analysis and Job Design: Purpose and uses of Job Analysis, Job Analysis Technique, Job Analysis – Methods of Data Collection, Job Design Approaches, Job Characteristic Approach to Job Design.

The Recruitment Process: Environmental Factors Affecting Recruitment Process, Recruitment Methods, Evaluating the Recruitment Process.

UNITIII-Selection Process **12 Hours**

The Selection Process: Step in Selection Process (Techniques of Selection Process), Ethical Standards of Testing, Types of Interviews, Evaluation of the Selection Program.

Training and Development: The Functions of Training, Assessing Training Needs, Types of Training, Evaluation of Training and Development.

UNIT IV-Career Planning and Developing **12 Hours**

Career Planning and Development: Career Development, Career Management. Industrial Relations: Characteristics of Industrial Relations, Significance of Harmonious Industrial Relations, Approaches to Industrial Relations, Factors Affecting Industrial Relations Strategy, Causes of Poor Industrial Relations, Effects of Poor Industrial Relations.

UNIT V-Strategic HRM **12 Hours**

Strategic Human Resource Management: Strategic Human Resource Management, Strategic Planning, Need for Strategic Management, Benefits of Strategic Management, Dysfunctions of Strategic Management.

B. TOPICS FOR SELF-STUDY

S.No	Topics	Web Link
1	Talent Management	**https://www.tutorialspoint.com/talent_management/talent_management_tutorial.pdf**
2	Recruitment Process	**https://www.wisdomjobs.com/e-university/recruitment-and-selection-tutorial-2682/recruitment-process-27164.html**
3	International HR Management	**http://elearning.nokomis.in/uploaddocuments/International%20HRM%20New/chap%201%20International%20HRM%20&%20Introduction/PPT/Chapter%201%20Intro%20to%2** **https://www.ftms.edu.my/images/Document/MOD001055%20-%20International%20Business/CHAPTER%208.pdf**
4	Human Resource in Information Technology Organization-	**https://www.analyticsinhr.com/blog/human-resources-information-system-hris/**

C. Text Book:

1. B. Pattanayak, "Human Resource Management", 3rd Edition, Prentice-Hall of India, 2006.

D. Reference Books:

1. David A. Dedecenezo, Stephen P. Robbins, "Personnel/ Human Resource Management", 3rd Edition, Prentice-Hall of India, 1990.
2. Adwin B. Flippo," Personnel Management", (Mcgraw Hill Series in Management).
3. F. R. David, "Concept of Strategic Management". New York:Macmillan., 1993.
4. Narender. K. Chadha, "Human Resource Management: Issues, Challenges and Case Studies" (2nd revised ed.), Shri Sai Printographers, New Delhi, 2002.
5. Nirmal Singh. "Human Resource Management", Galgotia Publications Pvt. Ltd., New Delhi, 2004.

E. Web Links:

1. **https://www.tutorialspoint.com/human_resource_management/human_resource_management_quick_guide.htm**
2. **https://www.wisdomjobs.com/e-university/hr-management-tutorial-69.html**

3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
I	**Human Resource Planning**		
1.1	Introduction: Definition of HRP	Outline the concepts of HR planning	K2
1.2	Nature and Objective of HRP	Classify the nature of HR planning	K4
1.3	Need for Human Resource Planning in Organization	Identify the need of HR planning in organization	K3
1.4	Importance and Factors Affecting HRP	Examine to gain information about different factors that affect HRP	K4
	Human Resource Planning Process		
1.5	HRP Process	Explain the HRP process	K2
1.6	Requisites for successful HRP	Outline the pre requisites for successful HRP process	K2
1.7	Barriers to HRP	Categorize the barriers to HRP	K4
II	**Job Analysis and Job Design**		
2.1	Introduction to Job Analysis	Illustrate job analysis	K2
2.2	Uses of Job Analysis	Explain the uses of job analysis	K2
2.3	Steps in Job Analysis	Outline the basic steps in job analysis	K2
	Job Analysis and Techniques		
2.4	Methods for collecting Job analysis data	Identify the major methods of collecting job analysis data	K3
2.5	Job Description	Analyze the major elements of job descriptions	K4
2.6	Writing Job Description	Explain how to prepare job descriptions	K2
2.7	Job Specification	Classify job specification	K4
2.8	Job Design and Methods in Job Design	Make use of job design and its various methods	K3
	Recruitment Process		
2.9	Recruitment Meaning and Definition	Explain the meaning of recruitment	K2
2.10	Factors affecting Recruitment Process	Categorize the factors that affects recruitment process	K4
2.11	Recruitment Methods	Examine the methods through which prospective candidates can be recruited.	K4
2.12	Evaluation of Recruitment process	Evaluate the process of recruitment	K5
III	**Selection Process**		

3.1	Steps in Selection Process	Make use of steps in selection and its process.	K3
3.2	Ethical standards of Testing	Identify the standard in testing	K3
3.3	Types of Testing	Distinguish the various testing	K4
3.4	Evaluation of Selection Program	Determine the evaluation of selection program	K5
	Training and Development		
3.5	Functioning of Training	Analyse the functions of training	K4
3.6	Assessing Training Recruitment	Evaluate the processes in training	K5
3.7	Evaluation of Training and Development	Assess the training and development	K5
IV	**Career Planning and Development**		
4.1	Career Development	Identify personal priorities, skills, interests, strengths, and values using a variety of contemporary assessment tools and reflection activities.	K3
4.2	Career Management	Identify the opportunity for career exploration around the globe	K3
	Industrial Relations		
4.3	Characteristic of Industrial Relation	Demonstrate descriptive knowledge in the field of industrial relations.	K2
4.4	Significance of Harmonious Industrial Relations	Identify the significance of industrial relation	K3
4.5	Approaches to Industrial Relations	Categorize the approaches in Industrial relation	K4
4.6	Factors Affecting Industrial Relations Strategy	Identify the factors affecting industrial relation	K3
4.7	Causes and Effects of Poor Industrial Relations	Examine the causes and effects of poor relations	K4
V	**Strategic Human Resource Management**		
5.1	Strategic Planning	Make use of how HR strategies are related to business strategies	K3
5.2	Need for Strategic Management	Identify relevant metrics in strategic human resource management	K3
5.3	Benefits of Strategic Management	Estimate strategic human resource management to promoting and achieving the organisation’s strategic intent	K6
5.4	Dysfunctions of Strategic Management	Experiment with dysfunctions in management	K3

4. MAPPING (CO, PO, PSO)

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

L-Low M-Moderate H- High

5. COURSE ASSESSMENT METHODS

DIRECT:

1. Continuous Assessment Test: T1, T2 : Closed Book
2. Open Book Test.
3. 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)

COURSE COORDINATOR **HEAD OF THE DEPARTMENT**

Dr. M. LOVELIN PONN FELCIAH Dr.R.THAMARAI SELVI

****

Core XX: INTERNET OF THINGS

SEMESTER: VI **CODE: P18CA620**
CREDITS:5 **HOURS/WEEKS: 5**

1. COURSE OUTCOMES

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

S.No.	Course Outcomes	Level	Unit Covered
CO1	Summarize the basic concepts and fundamentals of Internet of Things	K2	I
CO2	Make use of the various protocols for IoT	K3	I
CO3	Analyze the various M2M and IoT architectures	K4	II
CO4	Apply the concept of Internet of Things in the real-world scenario	K3	III
CO5	Develop IoT applications and connect it to the cloud environment	K6	IV
CO6	Design portable IoT using Raspberry Pi	K6	V

2A. Syllabus

UNIT I - Introduction to Iot **15 Hours**

The definition of the Internet of Things, main assumptions and perspectives- Platform for IoT devices. Economics and Technology of the IoT –Issues in IoT and solutions-Architecture of IoT.**Anatomy of IoT:** Traditional Internet Protocol Vs Chirps –Applying network intelligence at propagator nodes-Transport and functional architectures.

UNIT II - IoT Devices **15 Hours**

Temporary and Ad-hoc devices-Addressing Issues-End devices in dedicated networks-Converting states to chirps-RFID integration in the IoT-End devices with higher demands- Small data-Building a web of things-Autonomy and co-ordination-Structuring a tree-Housekeeping message-Role of integrator function-Degrees of functionality-Aggregating end points-Packaging options.

UNIT III - Data and Human Interaction **15 Hours**

Functions of IoT-Analysis and control-Neighborhood and affinities- Public private and other kinds of data- Publishing agent- Searching for and managing agents- High and low level loops- Human interface and control points- Collaborative scheduling tools-Packaging and provisioning- Distributed integrator functions- Filtering the streams-IP Alternative-Protocol based on category classification-Skeletal architecture of chirp packets- Pattern driven-Propagator node networks and operation-Power of local agents and integrator functions-High level interchange.

UNIT IV - IoT Applications **15 Hours**

Moore's Law –Intelligence near the edge- Incorporating legacy devices- Staying in the loop -Social Machines-Applications of IoT–Agriculture- Home healthcare-Efficient process control-Factory application- Home automation- Natural sciences- Living applications- Origin of IoT- Open source networking solutions- Shared software and business process vocabularies.

UNIT V - Creating the IoT projects **15 Hours**

Sensor project-Actuator project – Controller-Camera. Using an IoT service platform-Selecting an IoT.**Platform**- The claysterplatform- Interfacing our devices using XMPP-Creating control application.

B. TOPICS FOR SELF-STUDY

S.No	Topics	Web Link
1	Massive IoT and 5G: New technologies, new possibilities	**https://internetofthingsagenda.techtarget.com/blog/IoT-Agenda/**
2	Predictions 2021: Technology Diversity Drives IoT Growth	**https://go.forrester.com/blogs/predictions-2021-technology-diversity-drives-iot-growth/**
3	Technology Superpower – The Convergence of AI and IoT	**https://www.ncnonline.net/news-in-brief/technology-superpower-the-convergence-of-ai-and-iot**
4	Block chain in IoT	**https://iotbusinessnews.com/2020/09/25/61010-4-ways-blockchain-is-supporting-the-iot/**

C. Text Books:

1.Francis DaCosta, "Rethinking the Internet of Things-A scalable approach to connecting everything", First edition, Apress open publication, 2013.

2. Peter Waher, "Learning Internet of Things", PACKT Publishing-First Edition, 2015.

D. Reference Books:

1.ArhdeepBahga and Vijay Madisetti , "Internet of Things: A Hands on Approach", First Edition, 2014

2.CunoPfister, "Getting started with the internet of things", O'Rielly Publication, First Edition, 2014, Kindle Edition Publication.

E. Web links:

1. **www.tutorialspoint.com**
2. **www.geeksforgeeks.org**
3. **www.javatpoint.com**

3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
I	**Introduction to IoT**		
1.1	The definition of the IoT	Define IoT	K1
1.2	Requirements of IoT	Summarize the requirements of IoT	K2

1.3	Platform for IoT devices	Discuss the platform for IoT devices.	K6
1.4	Economics and Technology of the IoT	Identify the economics and technology of the IoT	K3
1.5	Issues in IoT and solutions	Solve the issues in IoT	K3
1.6	Architecture of IoT	Elaborate on architecture of IoT	K6
	Anatomy of IoT		
1.7	Traditional Internet Protocol Vs Chirps	Compare Traditional Internet Protocol and chirps	K4
1.8	Network intelligence at propagator nodes-	Applying network intelligence at propagator nodes	K3
1.9	Transport and functional architectures	Examine transport and functional architectures	K4
II	**IoT Devices**		
2.1	Temporary and Ad-hoc devices	Identify the temporary and ad-hoc devices	K3
2.2	Addressing issues in IoT devices	Identify the issues in addressing of IoT devices	K2
2.3	End devices in dedicated networks	Apply end devices in dedicated networks	K3
2.4	Converting states to chirps	Inspect the conditions of converting states to chirps	K4
2.5	RFID integration in the IoT	Build RFID integration in the IoT	K3
2.6	End devices with higher demands	Build end devices with higher demands	K6
2.7	Small data	Outline the importance of small data	K2
	Building a web of things		
2.8	Autonomy and co-ordination	Discuss autonomy and co-ordination	K6
2.9	Structuring a tree	Deduct the conditions for structuring a tree	K1
2.10	Housekeeping message	Examine link paths from each node as a housekeeping message	K6
2.11	Role of integrator function	Explain the role of integrator function	K2
2.12	Degrees of functionality	Create multiple classes of degrees of functionality	K6
2.13	Aggregating end points	Make use of all physical interface as aggregating end points	K3
2.14	Packaging options	Combine all the packaging options	K6
III	**Small Data, Big Data, and Human Interaction**		
3.1	Functions of IoT	Recall the functions of IoT	K1

3.2	Analysis and control	Analyze the various IoT devices	K4
3.3	Public and private data	Examine public and private data	K4
3.4	Publishing agent	Choose the publishing agent for IoT devices	K6
3.5	Searching for and managing agents	Summarize the end device type for managing agents	K2
3.6	High- and low-level loops	List the types of loops.	K1
3.7	Human interface and control points	Categorize the human interface and control points	K4
3.8	Collaborative scheduling tools	Outline the use of collaborative scheduling tools	K2
3.9	Packaging and provisioning	Analyze packaging and provisioning	K4
3.10	Distributed integrator functions	Importance of distributed integrator functions	K5
3.11	Filtering the streams-IP	Select filter streams	K3
	Architecture for the Frontier		
3.12	IP Alternative	Plan necessary alternatives to IP	K3
3.13	Protocol based on category classification	Categorize the various protocols	K4
3.14	Skeletal architecture of chirp packets	Discuss the skeletal architecture of chirp packets	K6
3.15	Propagator node networks and operation	Explain propagator node networks and operation	K5
3.16	Power of local agents and integrator functions	Examine thepower of local agents and integrator functions	K4
IV	**IoT Applications**		
4.1	Moore’s Law	Apply Moore's law	K3
4.2	Intelligence near the edge	Explain intelligence near the edge	K2
4.3	Incorporating legacy devices	Build legacy devices	K6
4.4	Staying in the loop	Develop the concepts of staying in the loop	K6
4.5	Agriculture	Apply the concepts of IoT in agriculture	K3
4.6	Home healthcare	Design home healthcare devices	K6
4.7	Efficient process control	Explain efficient process control	K2
4.8	Factory application	Construct factory applications in IoT	K6
4.9	Home automation	Plan home automation in IoT	K3
4.10	Natural sciences	Build natural sciences in IoT	K6
4.11	Living applications	Develop living applications using IoT	K6
	Pathways to the Internet of Things		

4.12	Origin of IoT	Outline the origin of IoT	K2
4.13	Open source networking solutions	Apply open source networking solutions	K3
4.14	Shared software and business process vocabularies.	Summarize the shared software and business process vocabularies	K2
V	**Creating the IoT Projects**		
5.1	5.1 Sensor project	Build sensor projects	K6
5.2	5.2 Actuator project	Develop the actuator Project	K6
5.3	5.3 Controller	Design a controller	K6
5.4	5.4 Camera	Create a camera	K6
	Using an IoT Service Platform		
5.5	Selecting an IoTPlatform	Choose an IoTplatform	K6
5.6	The claysterplatform	Importance of the claysterplatform	K5
5.7	Interfacing devices using XMPP	Develop Interfacing devices using XMPP	K6
5.8	Control applications	Design control applications	K6

4. MAPPING (CO, PO, PSO)

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

L-Low M-Moderate H- High

5. COURSE ASSESSMENT METHODS

DIRECT:

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

INDIRECT:

1. Course end survey (Feedback)

COURSE COORDINATOR **HEAD OF THE DEPARTMENT**

Dr.M.S.MYTHILI Dr.R.THAMARAI SELVI

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Core XXI: DATA ANALYTICAL TOOLS

SEMESTER: VI **CODE: P18CA621**
CREDITS: 4 **HOURS/WEEK: 5**

1. COURSE OUTCOMES

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

S.No.	Course Outcomes	Level	Unit covered
CO1	Demonstrate the usage of R Packages and its applications.	K2	I
CO2	Develop R programs using control structures and looping statements	K3	II
CO3	Analyze Statistical methods using analytical tools	K4	III
CO4	Introduce MongoDB and query with MongoDB	K2	IV
CO5	Compose web applications using Firebase Database	K6	V
CO6	Maximize the security in web application	K6	V

2A. Syllabus

UNIT I - Overview of R **15 Hours**

History and Overview of R – Getting started with R – R Nuts and Bolts - Getting Data In and Out of R : Reading and Writing Data - Reading Data Files with read.table() - Reading in Larger Datasets with read.table - Calculating Memory Requirements for R Objects. Using the readr Package - Using Textual and Binary Formats for Storing Data - Interfaces to the Outside World - Subsetting R Objects - Vectorized Operations - Dates and Times - Managing Data Frames with the dplyr package.

UNIT II - Control Structures and Functions in R **15 Hours**

Control Structures : if-else - for Loops - Nested for loops - while Loops - repeat Loops - next, break. **Functions :** Functions in R - Your First Function - Argument Matching - Lazy Evaluation - The ... Argument - Arguments Coming After the ... Argument - Scoping Rules of R – Loop Functions – Debugging – Simulation.

UNIT III - Data Analysis and Statistical Methods **15 Hours**

Data Analysis and Statistical methods: Exploratory Data Analysis (EDA) – Naïve Bayes – K-nearest neighbors – Classification & Regression trees – Time Series – Regression.

UNIT IV - Working with MongoDB **15 Hours**

Databases: Getting and Starting MongoDB-Introduction to the MongoDB Shell-Datatypes-Using the MongoDB Shell- Inserting and Saving Documents-removing Documents-Updating Documents-Querying-Introduction to Find- Query Criteria-Type-Specific Queries-where queries-Cursors

UNIT V - Working with Firebase **15 Hours**

Getting Started with Firebase-Firebase User Authentication-Email/Password authentication using FirebaseUI Auth-Google Sign-In Authentication using Firebase -UI Auth-Firebase Real-time database-Writing Firebase Real-Time database data-Reading Firebase Real-Time database data

B. TOPICS FOR SELF STUDY

S.No	Topics	Web Link
1	Random Sampling in R	**https://www.programiz.com/python-programming/examples**
2	Predictive Analytics using R	**https://youtu.be/DPAsYtUHkkM**
3	Bayesian Inference in R	**https://youtu.be/fiWIK7ONX3U**
4	Descriptive Statistics in R	**https://www.statmethods.net/stats/descriptives.html**

C. Text Books:

1. Roger D.Peng, "R Programming for Data Science", Leabpub, 2015.
2. Kristina Chodorow, Shannon Bradshaw, "MongoDB: The Definitive Guide", 3rd Edition, by O'Reilly Publications, June 2019.
3. Neil Smith , "Firebase Essentials-Android Edition",First Edition-,Payload Media, ebookFrenzy-2017

D. Reference Books:

1. Nina Zumel, John Mount "Practical Data Science with R", Manning, 2014.
2. F. Provost, T Fawcett, "Data Science for business", 2013

E. Web links:

1. **https://www.javatpoint.com/firebase**
2. **https://www.w3schools.in/r/**

3. SPECIFIC LEARNING OUTCOMES (SLO)

Unit/ Section	Course Content	Learning Outcomes	Highest Bloom's Taxonomic Level of Transaction
I	**Introduction to R Programming**		
1.1	History and Overview of R	Recall the basics of R Programming	K1
	Getting Data In and Out of R		
1.2	Getting Data In and Out of R	Illustrate Read and write operations with large datasets	K2
1.3	Using the readr Package	Outline the usage of readr package	K2
1.4	Textual and Binary format for storing data	Summarize Textual and Binary File format	K2

1.5	R interfaces	Construct Simple programs	K6
1.6	Subsetting R objects	Make use of R objects	K3
1.7	Date and Time Operations	Utilize Date and Time Operations	K3
1.8	Managing Data Frames with the dplyr package	Explain Data Frames with dplyr package	K2
II	**Control Structures**		
2.1	Control Structures	Illustrate Control Structures in R	K2
	Functions		
2.2	Functions	Illustrate Functions in R	K2
2.3	Argument Matching	Explain Arguments	K6
	Loopings		
2.4	Loop Functions	Construct a loop function	K6
	Debugging		
2.5	Debugging	Discuss about debugging process in R.	K6
	Simulation		
2.6	Simulation	Discuss on Simulation	K6
III	**Analytical And Statistical Methods in R**		
3.1	Exploratory Data Analysis(EDA)	Classify exploratory data analysis methods	K2
3.2	Naïve Bayes	Experiment with Naïve Bayes	K3
3.3	K-nearest neighbours	Construct a model with k-nearest neighbours	K3
3.4	Classification & Regression trees	Apply classification and regression trees	K3
3.5	Time Series	Analyse Time Series data	K4
3.6	Regression	Explain regression techniques	K5
IV	**Database Operations With MongoDb**		
4.1	Getting and Starting MongoDB	Outline the working principles of MongoDB	K2
4.2	Data types	Illustrate the data types	K2
4.3	MongoDB Shell	Develop shell programs with MongoDB	K6
4.4	Working with Documents	Develop documents, insert, save and update them	K6
4.5	Querying with MongoDB	Construct queries with MongoDB	K6
V	**Firebase**		
5.1	Getting Started with Firebase	Outline the basics of Firebase	K2
5.2	Firebase User Authentication	Apply firebase username, password authentication in real time applications	K3

5.3	Firebase Real-time database	Illustrate firebase real time database	K3
5.4	Reading and Writing in real time firebase	Elaborate read and write operations with real time firebase	K6

4. MAPPING (CO, PO, PSO)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**H**	**H**	**H**	**H**	**H**	**L**	**M**	**M**	**H**	**H**	**H**	**M**	**L**
CO2	**H**	**H**	**H**	**M**	**H**	**M**	**L**	**L**	**M**	**H**	**H**	**M**	**-**
CO3	**H**	**H**	**H**	**H**	**H**	**H**	**M**	**M**	**M**	**H**	**H**	**H**	**L**
CO4	**H**	**H**	**H**	**H**	**H**	**M**	**L**	**L**	**M**	**H**	**H**	**L**	**L**
CO5	**H**	**H**	**H**	**H**	**H**	**M**	**L**	**L**	**M**	**H**	**H**	**L**	**L**
CO6	**H**	**H**	**H**	**H**	**H**	**M**	**M**	**M**	**M**	**H**	**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, Group Presentation, Group Discussion, Project Report, Poster Presentation, Seminar, Quiz (written).
4. Pre-Semester & End Semester Theory Examination

INDIRECT:

1. Course end survey (Feedback)

COURSE COORDINATOR Dr. B.ARPUTHAMARY

HEAD OF THE DEPARTMENT Dr.R.THAMARAI SELVI

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Core Project II: PROJECT

SEMESTER: VI **CODE: P18CA6PJ**
CREDITS: 10 **HOURS/WEEKS: 20**

1. COURSE OUTCOMES

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

S.No.	Course Outcomes	Level
CO1	Make use of the concepts of Software Engineering.	K3
CO2	Utilize the appropriate software development model to create software.	K3
CO3	Make use of the testing principles.	K3
CO4	Build applications using database connectivity.	K6
CO5	Test the quality of the developed software.	K6
CO6	Develop an application based on the requirements.	K6

2. MAPPING (CO, PO, PSO)

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

L-Low M-Moderate H- High

3. COURSE ASSESSMENT METHODS

DIRECT:

1. Continuous Internal Reviews.
2. End Semester Viva-Voce

INDIRECT:

1. Course end survey (Feedback)

COURSE COORDINATOR
Dr.R.THAMARAI SELVI

HEAD OF THE DEPARTMENT
Dr.R.THAMARAI SELVI

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