PG DEPARTMENT OF INFORMATION TECHNOLOGYAND B.C.A

Outcome Based Education Syllabus

Choice Based Credit System (CBCS)

UNDERGRADUATE

BACHELOR OF COMPUTER APPLICATIONS (B.C.A) PROGRAMME

Effective for the students admitted from the academic year

2023-2024 and onwards

DWARAKA DOSS GOVERDHAN DOSS VAISHNAV COLLEGE

(AUTONOMOUS)

Reaccredited with A++ Grade by NAAC

COLLEGE WITH POTENTIAL FOR EXCELLENCE, LINGUISTIC MINORITY INSTITUTION,

AFFILIATED TO UNIVERSITY OF MADRAS,

E.V.R. PERIYAR HIGH ROAD, ARUMBAKKAM, CHENNAI – 600106, TAMILNADU

INSTITUTION

VISION

To emerge as an institute of eminence in the fields of engineering, technology and management in serving the industry and the nation by empowering students with a high degree of technical, managerial and practical competence.

MISSION

M1	To strengthen the theoretical, practical and ethical dimensions of the learning process by fostering a culture of research and innovation among faculty members and students.
M2	To encourage long-term interaction between the academia and industry through the involvement of the industry in the design of the curriculum and its hands-on implementation.
M3	To strengthen and mould students in professional, ethical, social and environmental dimensions by encouraging participation in co-curricular and extracurricular activities.

B.C.A PROGRAMME

VISION

Imparting quality education, equipping students with latest tools and technologies of computer science to face in computer industry and society

MISSION

M1	To provide the ambience for learning.
M2	To provide the team-sprit and leadership qualities.
M3	Strengthening the competence level in computer science through analytical learning
M4	Enhancing the entrepreneurship skills through Internship and Industrial Visit.

PROGRAM EDUCATIONAL OUTCOMES (PEOs)

PEO1	To help students to practice computer science in a broad range of industries.
PEO2	To provide student with an academic environment that fosters excellence, transparency, leadership and promote awareness of life-long learning
PEO3	To prepare students to succeed in employment/profession or to pursue postgraduate & research education in Computer Science

PEO TO MISSION STATEMENT MAPPING

MISSION STATEMENTS	PEO1	PEO2	PEO3
M1	3	3	2
M2	2	2	3
M3	2	3	3
M4	3	3	3

3: Strong **2: Medium** **1: Low** **-: No Correlation**

PROGRAM OUTCOMES (PO) IN RELATION TO GRADUATE ATTRIBUTES

PO1	To participate in various types of employment, development activities and public discourses particularly in response to the needs of the community one serve.
PO2	To implement discipline, professionalism, team spirit, communication skills, social and ethical commitment in the under graduates in order to embellish leadership roles expediting perfection in different sector with a categorical professional distinctiveness, business savvy, international recognition and imperishable expansion.
PO3	To improve the problem-solving skill to identify possible solutions and choosing the correct solution for any problem.
PO4	To enhance the competencies to support national, regional and local development plans and to create questioning mind.
PO5	To enhance the critical thinking ability to think clearly and rationally while understanding the logical connection between ideas in a reflective and independent thinking.
PO6	To engage in Lifelong learning and enduring proficient progress.

Mapping of POs TO PEOs

PEO/PO	PO1	PO2	PO3	PO4	PO5	PO6
PEO 1	2	2	3	3	3	3
PEO 2	2	3	3	2	3	3
PEO 3	2	2	2	3	3	2

3: Strong 2: Medium 1: Low -: No Correlation

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1	Gain theoretical knowledge in computer fields.
PSO2	Apply the knowledge of computer in practice.
PSO3	Ability to design and develop an application to meet the desired.
PSO4	Enhance programming skills in student.
PSO5	Enhance the critical thinking and problem solving abilities.
PSO6	Use computer skills in different fields.

ASSESSMENT PATTERN

BLOOM'S TAXONOMY BASED ASSESSMENT PATTERN

K1-Remember; **K2**- Understand; **K3**- Apply; **K4**-Analyze; **K5**- Evaluate; **K6**-Create;

1. **THEORY EXAMINATION**

CIA- Continuous Internal Assessment (50 Marks) Test – I & II: 30 Marks (Theory)

Bloom's Category	Section	Description	Marks	Total
K1, K2	A-5 x 2 Marks	50 Words	10	**50**
K2,K3	B-4 x 5 Marks (Either or pattern)	150 Words	20	
K4	C-2 x 10 Marks (One compulsory question, one Either or pattern)	250 Words	20	

Components of Continuous Internal Assessment (CIA)

Components			Calculation	CIA Total
Test	I	50	(Test1 + Test2) *0.3= **30**	**50**
	II	50		
Test III- Generic Skills (Group discussion/Assignment/Seminar/Poster Presentation)			**15**	
Attendance			**05**	

ESE- End Semester Examination (100 Marks; Weightage is 50%)

Bloom's Category	Section	Description	Marks	Total
K1, K2,K3,K4	A – 10 x 2 Marks	100 Words	20	**100**
K2,K3, K4	B– 5 (Either or pattern) x 7 Marks	250 Words	35	
K2,K3, K4	C– 1 Question Compulsory & 2 (Either or pattern) x 15 Marks	500 Words	45	

2. **PRACTICAL EXAMINATION (100 Marks)**

Bloom's Category	CIA	ESE		Total
	Lab Performance	Lab Performance	Record Work	
K3, K4, K6	50	40	10	**100**

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SCHEME OF I SEMESTER B.C.A PROGRAMME

(For the students admitted from the academic year 2023-2024 and onwards)

Under Choice Based Credit System (CBCS)

PART	Course Code	Study Components and Course Title	Instruction Hours/Week	Total Contact Hours	CIA	ESE	Total	Credits
I	23AT18101/ 23AT19101/ 23AT16101	Language Paper- I	4	60	50	50	100	3
II	23AT00101	English Paper- I	4	60	50	50	100	3
III	2307101	**Core** - Computer Programming using C++	4	60	50	50	100	4
III	2307102	**Core** - Introduction to Digital Logic Design	4	60	50	50	100	4
III	2307104	**Core Practical** I - Computer Programming using C++ Lab	4	60	50	50	100	2
III*	18-23/ 36107	**Allied** I - Mathematical Foundations	6	90	50	50	100	5
IV	Basic Tamil 18-23/ 16102 Computer Fundamentals 20-23/ 07103	**Non-Major Elective- I** a) Those who have studied Tamil up to XII Std. shall take either Computer Fundamentals or Advanced Tamil. b) Those who have not studied Tamil up to XII Std. and taken a Non-Tamil Language under Part-I shall take Tamil comprising of two courses (level will be at 6th Standard).	2	30	50	50	100	2
IV**	18-23/ 40101	Soft Skills-I	2	30	50	50	100	2
		Total	**30**	**450**	**400**	**400**	**800**	**25**

CIA-Continuous Internal Assessment

ESE-End Semester Examination

*Syllabus framed and approved by Mathematics Department

**Syllabus framed and approved by English Department

SCHEME OF II SEMESTER B.C.A PROGRAMME

PART	Course Code	Study Components and Course Title	Instruction Hours/Week	Total Contact Hours	CIA	ESE	Total	Credits
I	23AT18202/ 23AT19202/ 23AT16204	Language Paper- II	4	60	50	50	100	3
II	23AT00201	English Paper- II	4	60	50	50	100	3
III	2307205	**Core** – Java with OOPS Principles	4	60	50	50	100	4
III	2307206	**Core** - Fundamentals of Data Structures	4	60	50	50	100	4
III	2307208	**Core Practical II** - Java with OOPS Lab	4	60	50	50	100	2
III*	18-23/ 36216	**Allied II**– Statistical Methods	6	90	50	50	100	5
IV	Basic Tamil 18-23/ 16205 Introduction to HTML 20-23/ 07207	**NON-MAJOR ELECTIVE- II** a) Those who have studied Tamil up to XII Std. shall take either Introduction to Html or Advanced Tamil. b) Those who have not studied Tamil up to XII Std. and taken a Non-Tamil Language under Part-I shall take Tamil comprising of two courses (level will be at 6th Standard).	2	30	50	50	100	2
IV**	18-23/ 40201	Soft Skills-II	2	30	50	50	100	2
IV	2307209	Field Work	-	-	-	-	-	1
		Total	**30**	**450**	**400**	**400**	**800**	**26**

CIA-Continuous Internal Assessment

ESE-End Semester Examination

*Syllabus framed and approved by Mathematics Department

**Syllabus framed and approved by English Department

SCHEME OF III SEMESTER B.C.A PROGRAMME

PART	Course Code	Study Components and Course Title	Instruction Hours/Week	Total Contact Hours	CIA	ESE	Total	Credits
III	2307310	**Core** - Problem Solving using Python	5	75	50	50	100	5
III	2307311	**Core** - Web Development Technologies	5	75	50	50	100	5
III	2307312	**Core** - Essentials of Operating Systems	4	60	50	50	100	4
III	2307313	**Core Practical III** - Problem Solving using Python Lab	4	60	50	50	100	2
III	2307314	**Core Practical IV** - Web Development Technologies Lab	4	60	50	50	100	2
III*	18-23/ 05314	**Allied Paper III**-Financial Accounting	6	90	50	50	100	5
IV **	18-23/ 40301	Soft Skills- III	2	30	50	50	100	2
		Total	**30**	**450**	**350**	**350**	**700**	**25**

CIA-Continuous Internal Assessment

ESE-End Semester Examination

*Syllabus framed and approved by Commerce Department

**Syllabus framed and approved by English Department

SCHEME OF IV SEMESTER B.C.A PROGRAMME

PART	Course Code	Study Components and Course Title	Instruction Hours/Week	Total Contact Hours	CIA	ESE	Total	Credits
III	2307415	**Core** - Relational Database Management Systems	5	75	50	50	100	5
III	2307416	**Core** - Open Source Technologies	4	60	50	50	100	4
III	2307417	**Core** - Foundations of Software Engineering	4	60	50	50	100	4
III	2307418	**Core Practical V** - Relational Database Management Systems Lab	4	60	50	50	100	2
III	2307419	**Core Practical VI** - Open Source Technologies Lab	4	60	50	50	100	2
III*	18-23/ 05420	**Allied Paper IV**- Cost and Management Accounting	6	90	50	50	100	5
IV **	18-23/ 40403	Soft Skills- IV	2	30	50	50	100	2
IV	18-23/ 13412	Environmental Studies	1	15	50	50	100	2
IV	2307420	Internship	-	-	-	-	-	1
		Total	**30**	**450**	**400**	**400**	**800**	**27**

CIA-Continuous Internal Assessment

ESE-End Semester Examination

*Syllabus framed and approved by Commerce Department

**Syllabus framed and approved by English Department

SCHEME OF V SEMESTER B.C.A PROGRAMME

PART	Course Code	Study Components and Course Title	Instruction Hours/Week	Total Contact Hours	CIA	ESE	Total	Credits
III	2307521	**Core** - Dot Net Framework Programming	5	75	50	50	100	5
III	2307522	**Core** - Data Mining Concepts	5	75	50	50	100	5
III	2307523	**Core** - Principles of Computer Networks	5	75	50	50	100	5
III	2307524	**ELECTIVE- I** (DISCIPLINE SPECIFIC ELECTIVE):	5	75	50	50	100	5
III	2307525	**Core Practical VII** - Dot Net Framework Programming Lab	5	75	50	50	100	3
III	2307526	**Core Practical VIII**- Data Mining Concepts Lab	5	75	50	50	100	3
IV	18-23/ 70501	Value Education	-	-	50	50	100	2
		Total	**30**	**450**	**350**	**350**	**700**	**28**

CIA-Continuous Internal Assessment

ESE-End Semester Examination

SCHEME OF VI SEMESTER B.C.A PROGRAMME

PART	Course Code	Study Components and Course Title	Instruction Hours/Week	Total Contact Hours	CIA	ESE	Total	Credits
III	2307627	**Core** - PHP & MySQL	5	75	50	50	100	5
III	2307628	**Core** - Android Programming	5	75	50	50	100	5
III	2307629	**Core** - Algorithmic Design Techniques	5	75	50	50	100	5
III	2307630	**ELECTIVE -II** (DISCIPLINE SPECIFIC ELECTIVE)	5	75	50	50	100	5
III	2307631	**Core Practical IX** - PHP & MySQL Lab	4	60	50	50	100	2
III	2307632	**Core Practical X** - Android Programming Lab	4	60	50	50	100	2
III	2307633	**Core Practical XI** - Mini Project Work	2	30	50	50	100	1
IV	18-23/ 80601	Extension Activities	-	-	-	-	-	1
		Total	**30**	**450**	**300**	**300**	**700**	**26**
Grand Credit Total								**157**

CIA-Continuous Internal Assessment

ESE-End Semester Examination

Abstract of Scheme of Examination

(For the students admitted from the academic year 2023-2024 and onwards)

Part	*Course*	*Papers*	*Credit*	*Total Credits*	*Marks*	*Total Marks*
Part I	**Language**	2	3	06	100	200
Part II	**English**	2	3	06	100	200
Part III	**Core Theory**	7	4	28	100	700
		9	5	45	100	900
	Core Practical	8	2	16	100	800
		2	3	06	100	200
		1	1	01	100	100
	Allied	4	5	20	100	400
	Electives	2	5	10	100	200
PART I+II+III				**138**		**3700**
PART IV	**NME**	2	2	4	100	200
	EVS	1	2	2	100	100
	Soft Skills	4	2	8	100	400
	Value Education	1	2	2	100	100
	Field Work	1	1	1		
	Internship	1	1	1		
	Extension Activities	1	1	1		
	TOTAL			**157**		**4500**

Non Major Electives (Open Electives)	**Courses offered by the Department to other Programme**
NME I	**Computer Fundamentals**
NME II	**Introduction to HTML**

List of Elective Papers (Can choose any one of the paper as Electives)		
Component	**Course Code**	**Course Name**
Elective-I	2307524 (A)	**Essentials of Digital Marketing**
	2307524 (B)	**Web Commerce**
	2307524 (C)	**Management Information Systems**
	2307524 (D)	**Supply Chain Management**
	2307524 (E)	**Resource Management Techniques**
Elective-II	2307630 (A)	**Fundamentals of Cloud Computing**
	2307630 (B)	**Applications of Internet of Things**
	2307630 (C)	**Information and Cyber Security**
	2307630 (D)	**Basic Concepts of Artificial Intelligence**
	2307630 (E)	**Mechanisms of Block Chain Technology**

Syllabus Coordinator **BOS-Chairman**

Academic Council -Member Secretary

FIRST SEMESTER

Course Title: CORE - COMPUTER PROGRAMMING USING C++

Course Code : 2307101	**Credits : 04**
L:T:P:S : 3:1:0:0	**CIA Marks : 50**
Exam Hours : 03	**ESE Marks : 50**

Course Objectives:

- *Discuss and elaborate the concept of OOPs.*
- *Analyze the problem and apply the retreated concept in Application areas.*
- *Usage of Inheritance.*

Course Outcomes: At the end of the Course, the Student will be able to:

CO1	Revise the basics of Building any programming language. Introduction of OOPs and its Concept.
CO2	Creating programs in Conditional/Decision Making Statement Creating programs in Loop Statements. Defining programs in Jump Statements
CO3	Definition of Classes and important of Object. Benefits of using Friend Function. Define functions and its important in building the code Advantage of using Inline function.
CO4	Develop programs for overloading Unary and Binary Operators. Define the concept of constructor, destructor and its usage and its implementations.
CO5	Enhance reusability features using the concept inheritance. Avoid the duplicate of multiple inheritances using virtual base class. Access the program using polymorphism

Mapping of Course Outcomes to Program Specific Outcomes:

	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	3	-	-	1	-	3
CO2	2	2	2	3	2	2
CO3	2	3	2	2	3	3
CO4	1	3	3	2	3	3
CO5	2	3	3	2	3	3

3: Strong 2: Medium 1: Low -: No Correlation

Sl. No.	Contents of Module	Hrs	COs
1	**Unit I: Introduction to Object Technology:** Object Oriented Programming Concepts–OOP Benefits and OOP applications. Elementary C++ Programming: Keywords- Variables- Operators- Fundamental Data Types -Input Statement – Output Statement – General Format of a C++ program – Arrays – Strings.	**12**	**CO1**
2	**Unit II: Conditional/Decision Making Statements**: if, if-else, else-if ladder nested if and switch Statements. Loop Statements: while, do-while, for loop. Jump Statements: break, continue, go-to statements.	**12**	**CO2**
3	**Unit III: Library Functions in C++:** Mathematical and String functions. User-Defined Functions: Function Prototyping – Function call - Parameters Passing methods. Inline Functions - Function Overloading. Classes and Objects: -Declaring class and objects- Member functions -Friend Functions-Passing object to function – Returning object from function.	**12**	**CO1, CO3**
4	**Unit IV:** Constructors: Features of constructors – Types of Constructors. Destructors: Features of Destructor. Operator Overloading: Rules for Operator Overloading – Overloading of unary and binary operators using member function	**12**	**CO1, CO4**
5	**Unit V: Inheritance:** Single Inheritance - Multilevel inheritance - Multiple Inheritance - Hierarchical Inheritance - Hybrid Inheritance. Polymorphism: Rules for Virtual functions - Command Line Arguments.	**12**	**CO1, CO5**

TEXT BOOKS:

1. **E. Balaguruswamy**, "*Object Oriented Programming in C++",* Sixth Edition, 2012, TMH.

REFERENCE BOOKS:

1. **H. Schildt**, "*The Complete Reference C++",* Fourth Edition, 2017, TMH.
2. **Y. Kanetkar**," Let *us C++",* Third Edition, BPB Publishers.

E-REFERENCES:

1. http://en.highscore.de/cpp/boost/
2. http://bookboon.com/en/structural-programming-with-c-plus-plus-ebook

FIRST SEMESTER

Course Title: CORE - INTRODUCTION TO DIGITAL LOGIC DESIGN

Course Code	**: 2307102**	**Credits**	**: 04**
L:T:P:S	**: 4:0:0:0**	**CIA Marks**	**: 50**
Exam Hours	**: 03**	**ESE Marks**	**: 50**

Course Objectives:

- *To Impart the Knowledge of Fundamentals of Digital.*
- *To discuss and utilization of Various Number Systems.*
- *Demonstration of Flip Flops associated.*
- *Instructions of Counters.*

Course Outcomes: At the end of the Course, the Student will be able to:

CO1	To demonstrate the functional codes of Binary Systems. To study about the concepts of Logic Gates.
CO2	To clarify the concepts of Boolean Functions. Construction of K-Map
CO3	Demonstrating Binary Arithmetic. Extracting the nature of Combinational Logic Circuits. To impart the applications of Encoders and Decoders.
CO4	To differentiate the types of Registers and their applications. Classification of Flip-flops.
CO5	Demonstrating the Classification of Counters. Explanation of Memory and its types.

Mapping of Course Outcomes to Program Specific Outcomes:

	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	3	3	1	-	-	2
CO2	3	3	2	2	3	2
CO3	2	2	-	1	2	3
CO4	1	3	-	-	2	2
CO5	2	3	2	-	1	2

3: Strong 2: Medium 1: Low -: No Correlation

Sl. No.	Contents of Module	Hrs	COs
1	**Unit I: Digital Computers and Digital Systems:** Number Systems &Codes: Number System - Base Conversion - Binary Codes (8421, 2421, 4221). Digital Logic: Logic Gates- Truth Tables–Universal Gates: NAND and NOR.	**12**	**CO1**
2	**Unit II: Boolean algebra:** Laws & Theorems- SOP, POS Methods- Simplification of Boolean Functions using theorems–Simplification of Boolean Functions using K-Map (Two and Three variables).	**12**	**CO1, CO2**
3	**Unit III: Binary Arithmetic:** Binary Addition – Binary Subtraction. **Arithmetic Building Blocks**: Adders: Half Adder and Full Adder. Subtractors: Half Subtractor and Full Subtractor. **Combinational Logic:** Multiplexers (2 to 1 and 4 to 1)– Demultiplexers (1 to 2 and 1 to 4) –Decoders (1 to 2, 2 to 4)– Encoders (2 to 1 and 4 to 2)	**12**	**CO1, CO3**
4	**Unit IV: Sequential Logic:** RS, JK, D and T Flip-Flops. **Registers:** Shift Registers- Types of Shift Registers: Left Shift Register, Right Shift Register. Implementation -Serial-In Serial-Out Shift Register and Serial-In Parallel-Out Shift Register.	**12**	**CO4**
5	**Unit V: Counters:** Asynchronous Counters: Mod, Up-Down Counters-Synchronous Counters-Types of ROM and RAM.	**12**	**CO5**

TEXT BOOK:

1. **V. Vijayendran,** "*Digital Fundamentals*", Printers & Publishers Pvt Ltd, 2009.
2. **V. Rajaraman and T. Radhakrishnan**, "*Digital Computer Design"*, Fifth Edition, 2012, Prentice Hall of India.

REFERENCE BOOKS:

1. **D. P. Leach and A. P. Malvino**, "*Digital Principles and Applications",* Seventh Edition, 2011, TMH.
2. **T. C. Bartee**, "*Digital Computer Fundamentals"*, Sixth Edition, Tata McGraw Hill.
3. **Floyd and Jain**, "*Digital Fundamentals*", Ninth Edition, Pearson Education.

E-REFERENCES:

1. http://nptel.iitm.ac.in/video.php?subjectId=117106086
2. http://nptel.iitm.ac.in/Onlinecourses/Srinivasan/

FIRST SEMESTER

Course Title: CORE PRACTICAL I – COMPUTER PROGRAMMING USING C++ LAB

Course Code	**: 2307104**	**Credits**	**: 02**
L:T:P:S	**: 0:0:4:0**	**CIA Marks**	**: 50**
Exam Hours	**: 03**	**ESE Marks**	**: 50**

Course Objectives:

- *Be able to create a program using basic operators, decision making statements, Loop concepts.*
- *To understand and create a program using constructor and Destructor.*
- *Be able to create a program using C++ features such as composition of objects, Operator overloading, inheritance, Polymorphism etc.*

Lab Exercise:

1. C++ Operators
2. Decision-making statements
3. Loop statements
4. Library functions
5. Inline function
6. Function overloading
7. Class and object
8. Passing object to function
9. Returning object from function
10. Constructor and Destructor
11. Operator Overloading
12. Inheritance
13. Virtual function
14. Command Line Arguments

FIRST SEMESTER

Course Title: NON-MAJOR ELECTIVE-I - COMPUTER FUNDAMENTALS

Course Code	**: 20-23/07103**	**Credits**	**: 02**
L:T:P:S	**: 2:0:0:0**	**CIA Marks**	**: 50**
Exam Hours	**: 03**	**ESE Marks**	**: 50**

Course Objectives:

- *Discuss the Introduction about Computer and its Components.*
- *To Perform the Microsoft Word, Excel, PowerPoint and its operations.*
- *To get Knowledge about the Internet and Intranet*

Course Outcomes: At the end of the Course, the Student will be able to:

CO1	Understand the basics of Computer and its Generations. Be able to understand the components of computer.
CO2	To Understand the introduction about MS Word. Be able to perform the Elements of window, Text Formatting, Text Manipulating options in MS Word.
CO3	To Understand the introduction about MS Excel. Be able to inserting and sizing the cells Implementing formulas and inserting worksheet.
CO4	To Understand the introduction about MS PowerPoint Be able to perform the slides manipulation. Implementing Multimedia and templates.
CO5	To Understand the introduction about Internet and Intranet. Be able to access the browsers. To get knowledge about basic components of E-Mail and E-Commerce

Mapping of Course Outcomes to Program Specific Outcomes:

	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	3	-	-	1	-	3
CO2	2	3	3	3	2	2
CO3	2	3	3	2	3	3
CO4	3	3	3	2	3	3
CO5	3	3	3	2	3	3

3: Strong 2: Medium 1: Low -: No Correlation

Sl. No.	Contents of Module	Hrs	COs
1	**Unit I: Introduction to Computers** - Generations of Computer – Data and Information – Components of Computer – Software – Hardware – Input Devices - Output Devices — Types of Operating System.	**6**	**CO1**
2	**Unit II: MS Word**: Introduction – Elements of Window – Files, Folders and Directories – Text Manipulating: Cut, Copy, Paste, Drag and Drop – Text Formatting: Font – Style, Size, Face and Colors (Both foreground and background) – Alignment - Bullets and Numbering - Header and footer- watermark – inserting objects (images, other application document) – Table creation – Mail merge.	**6**	**CO2**
3	**Unit III: MS Excel**: Introduction – Inserting rows and columns – Sizing rows and columns – Implementing formulas – Generating series - Functions in excel – Creation of Chart – Inserting objects – Filter – Sorting – Inserting worksheet.	**6**	**CO3**
4	**Unit IV: MS PowerPoint**: Introduction – Slides Manipulation (Inserting new, Copy, paste, delete and duplicate slides) – Slide show– Types of Views – Types of Animations – Inserting Objects – Implementing multimedia (Video and Audio) – Templates (Built-in and User-Defined).	**6**	**CO4**
5	**Unit V: Internet**: Introduction to Internet and Intranet – Services of Internet - Domain Name – URL – Browser – Types of Browsers – Search Engine - E-Mail – Basic Components of E-Mail –How to send group mail. **E-Commerce**: Digital Signature – Digital Currency – Online shopping and transaction.	**6**	**CO5**

TEXTBOOKS:

1. **G. Manjunath**, "*Computer Basics*", Vasan Publications, 2010.
2. **Pradeep K. Sinha & Priti Sinha,** "*Computer Fundamentals*", 6th Edition, BPB Publications, 2004.

E-REFERENCES:

1. https://www.tutorialspoint.com/computer_fundamentals/index.htm
2. https://www.tutorialspoint.com/basics_of_computers/index.htm
3. https://www.tutorialspoint.com/word/index.htm
4. https://www.tutorialspoint.com/excel/index.htm
5. https://www.tutorialspoint.com/powerpoint/index.htm

SECOND SEMESTER

Course Title: CORE - JAVA WITH OOPS PRINCIPLES

Course Code	**: 2307205**	**Credits**	**: 04**
L:T:P:S	**: 3:1:0:0**	**CIA Marks**	**: 50**
Exam Hours	**: 03**	**ESE Marks**	**: 50**

Course Objectives:

- *To get in-depth Knowledge about the evolution of java and its Features.*
- *Bring out the difference and similarities between C, C++ and java.*
- *Develop programmers in Java with its special Features.*
- *Implementing the code in internet using Applet with AWT controls.*

Course Outcomes: At the end of the Course, the Student will be able to:

CO1	Knows the reason about the evolution of Java its development. Study the basic of Java and to develop code. Importance of Java comparing the other language.
CO2	Develop program using constructors and its types. Definition of inheritance and Writing program related to it Differentiate string class and string buffer.
CO3	Concept of packages, interface, threads. Implementing the concept Exception handling various application. Significance of exception handling. Life cycle of thread.
CO4	Explain I/O Streams. Create file using Byte Stream and character Stream classes.
CO5	Usage of Java in internet Definition of Applet and Developing code to connect to internet. Life Build Applet code using AWT controls and Layout managers

Mapping of Course Outcomes to Program Specific Outcomes:

	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	3	1	2	-	-	1
CO2	2	3	3	2	2	3
CO3	3	3	2	3	2	2
CO4	3	2	1	1	-	2
CO5	2	3	3	3	3	3

3: Strong 2: Medium 1: Low - : No Correlation

Sl. No.	Contents of Module	Hrs	COs
1	**Unit I: Introduction to Java** - Features of Java – Java Environment - Tokens- Data Types - Variables - Arrays - Operators – Conditional Statements-Iterative Statements-General Structure of a Java Program - Command Line Arguments.	**12**	**CO1**
2	**Unit II: Classes and Objects** – Fields and Methods Declaration - Constructors – Method Overloading - Static keyword - Final keyword -String & String Buffer Class. **Inheritance**: Keyword extends -Types of Inheritance – Keyword super - Overriding of methods - Abstract class and methods.	**12**	**CO1, CO2**
3	**Unit III: User-Defined Packages:** Naming conventions – Creating and accessing Packages. **Interface**: Defining Interface-Keyword implements -Multiple Inheritance using Interface. **Exception Handling**: Types of errors - Syntax of Exception handling code – Built-in Exceptions – Multiple catch statements – Nested try block – Finally statement- Throwing our own exception using throw – Method throwing exception using throws keyword. **Threads**: Introduction-Thread States or life cycle of thread- Creation of threads using Thread class and Runnable interface –Thread methods -Thread Priorities - Thread Synchronization.	**12**	**CO1, CO3**
4	**Unit IV: I/O Streams**: Stream classes – Byte stream classes - Character stream classes - File Streams – Using File class – I/O Exceptions–Random access files.	**12**	**CO4**
5	**Unit V: Applets**: Difference between applet and application -Applet life cycle - Building Applet code using Applet tag – Passing parameters to Applets- Drawing various shapes using Graphics Class. AWT Controls: Buttons, Labels, TextField, TextArea, Choice, CheckBox, List, ScrollBar and Layout Managers.	**12**	**CO5**

TEXT BOOKS:

1. **E. Balagurusamy**, "*Programming with Java*", Fifth Edition, 2014, Tata McGraw- Hill.

REFERENCE BOOKS:

1. **P Radha Krishna**, "*Object Oriented Programming through Java*", Second Edition, 2007, Universities Press.
2. **P. Naughton and H. Schildt**, "*Java2 (The Complete Reference)*", Ninth Edition, 2014, Tata McGraw-Hill.

E- REFERENCES:

1. www.tutorialspoint.com/java/java-quick-guide.htm
2. www.tutorialspoint.com/java/java_overview.htm
3. https://www.programiz.com/java-programming
4. https://www.javatpoint.com/java-tutorial
5. https://www.geeksforgeeks.org/java/

SECOND SEMESTER

Course Title: CORE - FUNDAMENTALS OF DATA STRUCTURES

Course Code	**: 2307206**	**Credits**	**: 04**
L:T:P:S	**: 4:0:0:0**	**CIA Marks**	**: 50**
Exam Hours	**: 03**	**ESE Marks**	**: 50**

Course Objectives:

- *Understand and remember algorithms and its analysis procedure.*
- *Introduce the concept of data structures through ADT including List, Stack, Queues*
- *To design and implement various data structure algorithms.*
- *To introduce various techniques for representation of the data in the real world.*
- *To develop application using data structure algorithms.*

Course outcomes: At the end of course, the student will be able to:

CO1	Describe the various operations and applications of stacks, arrays and queues Understands the concepts of infix, postfix and prefix
CO2	Understands the Basic operations on linked list and Applications of Linked List in Addition of Polynomials.
CO3	Describes Binary Trees and Binary Tree Traversals: Inorder, Preorder and Post order Applies the concepts of BST.
CO4	Describes and analyses Graph Traversals: Breadth First Traversal and Depth First Traversal. And Applies the concepts Graphs in Minimum Cost Spanning tree and Dijkstra's Shortest Path
CO5	Analyses and Applies the concepts of searching and sorting. Understands the concepts of Hashing and evaluates Collision Resolution.

Mapping of Course outcomes to program outcomes:

	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	3	3	1	2	-	1
CO2	3	3	2	3	1	-
CO3	3	3	2	1	1	1
CO4	3	3	2	2	2	2
CO5	3	-	-	-	1	1

3: Strong 2: Medium 1: Low -: No Correlation

Sl. No.	Contents of module	Hrs	COS
1	**UNIT I: Data Structures:** Definition and Classification. **Arrays**: Array Operations – Representation of Arrays – Applications of Arrays. **Stack**: Operations on Stacks -**Stack applications:** Infix to postfix notation and Evaluation of Postfix notation. **Queues**: Operations on the Queues - Circular queue – Applications of queue.	**12**	**CO1**
2	**UNIT II: Introduction to the Linked List** - Basic operations on linked list – Singly Linked Lists – Doubly Linked Lists – Circularly Linked Lists	**12**	**CO2**
3	**UNIT III: B**asic Terminology - Binary Trees - Representation of Trees and Binary trees. **Binary Tree Traversals**: Inorder, Preorder and Postorder. **Binary Search Tree (BST):** Insertion and Deletion operations in BST- Applications of Trees.	**12**	**CO3**
4	**UNIT IV:** Basic Terminology – Representation of Graphs. **Graph Traversals**: Breadth First Traversal and Depth First Traversal. **Applications of Graphs:** Dijkstra's Shortest Path.	**12**	**CO4**
5	**UNIT V: Searching:** Linear Search and Binary Search. **Sorting**: Bubble Sort, Selection Sort, and Insertion Sort. **Hashing**: Introduction – Hash table structure – Hash Functions. **Collision Resolution**: Linear Open Addressing and Chaining.	**12**	**CO5**

TEXT BOOKS:

1. **G.A. Vijayalakshmi Pai**, "*Data structures and Algorithms- Concepts, Techniques and Applications"*, First Edition, 2011, Tata McGraw-Hill.

REFERENCE BOOKS:

1. **Dr. A. Chitra**, "*Data Structures*", Vijay Nicole Imprints Private Limited.
2. **S. Sahni and E. Horowitz**, "*Fundamentals of Data Structure*", Ninth Edition, Galgotia Publications.

E- REFERENCES:

1. http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT-%20Guwahati/data_str_algo/frameset.htm
2. http://www.personal.kent.edu/~rmuhamma/Algorithms/algorithm.html
3. en.wikibooks.org/wiki/Data structures

SECOND SEMESTER

Course Title: CORE PRACTICAL II –JAVA WITH OOPS LAB

Course Code	**: 2307208**	**Credits**	**: 02**
L:T:P:S	**: 0:0:4:0**	**CIA Marks**	**: 50**
Exam Hours	**: 03**	**ESE Marks**	**: 50**

Course Objectives:

- *Use an integrated development environment to write, compile, run, and test simple object-oriented Java programs.*
- *Read and make elementary modifications to Java programs that solve real-world problems.*
- *Be able to create an application using string concept.*
- *Be able to create a program using files in application.*
- *Be able to create an Applet to create an application.*
- *Identify and fix defects and common security issues in code.*

Lab Exercises:

Applications:

1. Program using Class and Object.
2. Program using Constructors.
3. Program using Command-Line Arguments.
4. Program using Random Class.
5. Program using Vectors.
6. Program using String Tokenizer Class.
7. Program using Interface.
8. Program using all forms of Inheritance.
9. Program using String class.
10. Program using String Buffer class.
11. Program using Exception Handling.
12. Implementing Thread based applications
13. Program using Packages.
14. Program using Files.

Applets:

15. Working with Colors and Fonts.
16. Parameter passing technique.
17. Drawing various shapes using Graphical statements.
18. Draw an object using Applet Components.
19. Usage of AWT components and Listener in suitable applications.

SECOND SEMESTER

Course Title: NON-MAJOR ELECTIVE –II - INTRODUCTION TO HTML

Course Code	**: 20-23/07207**	**Credits**	**: 02**
L:T:P:S	**: 2:0:0:0**	**CIA Marks**	**: 50**
Exam Hours	**: 03**	**ESE Marks**	**: 50**

Course Objectives:

- *Insert a graphic within a web page.*
- *Create a link within a web page*
- *Create a table within a web page*
- *Insert heading levels within a web page.*
- *Insert ordered and unordered lists within a web page.*
- *Create a web page*

Course Outcomes: At the end of the Course, the Student will be able to:

CO1	Knows the basic concept in HTML Concept of resources in HTML
CO2	Knows Design concept. Concept of Meta Data Understand the concept of save the files.
CO3	Understand the page formatting. Concept of list
CO4	Creating Links. Know the concept of creating link toe mail address
CO5	Concept of adding images Understand the table creation.

Mapping of Course outcomes to program outcomes:

	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	3	3	2	1	-	-
CO2	2	3	2	2	1	1
CO3	2	1	1	2	2	2
CO4	3	2	2	2	1	1
CO5	2	2	3	-	2	2

3: Strong 2: Medium 1: Low -: No Correlation

Sl. No.	Contents of Module	Hrs	COs
1	**Unit I: Introduction to HTML** – Opening for writing HTML – Unicode Transformation Format – HTML 5 Resources – What is different in HTML 5- <DOCTYPE> in HTML 5	**6**	**CO1**
2	**Unit II: Designing a Webpage**: Design Considerations and Planning – Basic Tags and Document structure – HTML Tags <HTML> … </HTML> - Head Tags <HEAD> … </HEAD> - Title Tags – Body Tags <BODY> … </BODY> - Metadata – Saving an HTML document – Actions.	**6**	**CO2**
3	**Unit III: Formatting**: Page Formatting – Adding a New Paragraph – Adding a Line Break – Inserting Blank Space – Preformatted Text – Changing a Page's Background Color – Div Element - Text items and objects – Headings – Comments – Block Quotes – Horizontal Lines – Special Characters – Creating Lists – Numbered (Ordered) Lists – Bulleted (Unordered) Lists – Nested Lists- Definition Lists.	**6**	**CO3**
4	**Unit IV: Links**: Introduction to Links – Text Links – Image Links – Opening a web page in a new window/Tab – Setting All Links on a page to open in a new window/Tab – Linking to an area on the same page (Bookmarks) – Linking to an E-mail Address – Linking to other types of Files.	**6**	**CO4**
5	**Unit V: Images**: Introduction to Images: Adding Images – Resizing images – Alternative (ALT) Text – Image Labels. **Tables:** Introduction to Tables - Inserting a Table – Table Borders - Table Headers	**6**	**CO5**

TEXT BOOK:

1. "*Mastering HTML5 and CSS3 Made Easy*", TeachUComp Inc., 2014.

E-REFERENCE:

1. https://www.teachucomp.com/samples/html/5/manuals/Mastering-HTML5-CSS3.pdf
2. https://www.w3schools.com/html/default.asp

THIRD SEMESTER

Course Title: CORE – PROBLEM SOLVING USING PYTHON

Course Code	**: 2307310**	**Credits**	**: 05**
L:T:P:S	**: 4:1:0:0**	**CIA Marks**	**: 50**
Exam Hours	**: 03**	**ESE Marks**	**: 50**

Course Objectives:

- *To make students understand the concepts of PYTHON programming.*
- *To apply the OOPs concept in PYTHON programming.*
- *To make the students learn best practices in PYTHON programming.*

Course Outcomes: At the end of the Course, the Student will be able to:

CO1	Learn the basics of python Do simple programs on python Learn how to use an array
CO2	Develop program using selection statement Work with Looping and jump statements Do programs on Loops and jump statements
CO3	Concept of function, function arguments. Implementing the concept strings in various application. Significance of Modules. Work with functions, Strings and modules
CO4	Work with List, tuples and dictionary Write program using list, tuples and dictionary
CO5	Usage of File handlings in python Concept of reading and writing files Do programs using files

Mapping of Course Outcomes to Program Specific Outcomes:

	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	3	2	1	1	-	3
CO2	2	3	2	1	-	2
CO3	3	2	3	2	2	2
CO4	1	3	3	3	3	3
CO5	2	3	2	3	2	3

3: Strong 2: Medium 1: Low -: No Correlation

Sl. No.	Contents of Module	Hrs	COs
1	**UNIT I: Basics of Python Programming**: History of Python-Features of Python-Literal constants -Variables - Identifiers–Keywords-Built-in Data types -Output Statements – Input Statements-Comments – Indentation-Operators-Expressions-Type conversions. **Python Arrays**: Defining and Processing Arrays – Array methods.	**15**	**CO1**
2	**UNIT II: Control Statements**: Selection/Conditional Branching statements: if, if-else, nested if and if-elif-else statements. **Iterative Statements**: while loop, for loop, else suite in loop and nested loops. **Jump Statements**: break, continue and pass statements.	**15**	**CO1, CO2**
3	**UNIT III: Functions**: Function Definition – Function Call – Variable Scope and its lifetime-Return Statement. **Function Arguments**: Required Arguments, Keyword Arguments, Default Arguments and Variable Length Arguments- Recursion. **Python Strings**: String operations- Immutable Strings - Built-in String Methods and Functions - String Comparison. **Modules**: import statement- The Python module –NumPy( ),SciPy(),dir() function – Modules and Namespace – Defining our own modules.	**15**	**CO1, CO3**
4	**UNIT IV**: **Lists**: Creating a list -Access values in list-Updating values in lists-Nested lists -Basic list operations-List Methods. **Tuples**: Creating, Accessing, Updating and Deleting Elements in a tuple – Nested tuples– Difference between lists and tuples. **Dictionaries**: Creating, Accessing, Updating and Deleting Elements in a Dictionary – Dictionary Functions and Methods - Difference between Lists and Dictionaries.	**15**	**CO4**
5	**UNIT V: Python File Handling**: Types of files in Python - Opening and Closing files-**Reading and Writing files**: write() and writelines() methods- append() method – read() and readlines() methods – File methods - File Positions- Renaming and deleting files.	**15**	**CO5**

TEXT BOOK:

1. **Reema Thareja**, "*Python Programming using problem solving approach*", First Edition, 2017, Oxford University Press.
2. **Dr. R. Nageswara Rao,** *"Core Python Programming",* First Edition, 2017, Dreamtech Publishers.

REFERENCE BOOKS:

1. **Vamsi Kurama,** "*Python Programming: A Modern Approach*", Pearson Education.
2. **Mark Lutz**, "*Learning Python*", Orielly.
3. **Kenneth A. Lambert**, "*Fundamentals of Python – First Programs*", CENGAGE Publication.
4. **James Payne,"** *Beginning Python: Using Python 2.6 and Python 3*",Wiley India,2010

E-REFERENCES:

1. https://www.programiz.com/python-programming
2. https://www.guru99.com/python-tutorials.html

THIRD SEMESTER

Course Title: CORE - WEB DEVELOPMENT TECHNOLOGIES

Course Code	**: 2307311**	**Credits**	**: 05**
L:T:P:S	**: 4:1:0:0**	**CIA Marks**	**: 50**
Exam Hours	**: 03**	**ESE Marks**	**: 50**

Course Objectives:

- *Set up a programming concept using the basic knowledge of HTML.*
- *To learn different types of arrays in Java Script*
- *To create different style sheets.*
- *To comprehend and analyze the basic concepts of web programming and internet protocols.*
- *To describe how the client-server model of Internet programming works.*
- *To demonstrate the uses of scripting languages*
- *To write simple scripts for the creation of web sites*

Course Outcomes: At the end of the Course, the Student will be able to:

CO1	To understand the basic concepts of internet and HTML language with different types of tags like formatting the text, inserting the tables.
CO2	Enable to apply technical knowledge and create different style sheets
CO3	Understand the data types, variables constants, operators and looping structure, arrays used in Java Script.
CO4	Understand functions, arguments used in Java Script.
CO5	Understand the Validations used in Java Script.

Mapping of Course Outcomes to Program Specific Outcomes:

	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	3	3	2	1	1	-
CO2	3	3	2	1	-	-
CO3	3	3	2	2	2	2
CO4	3	2	3	3	1	1
CO5	3	3	3	3	3	3

3: Strong 2: Medium 1: Low -: No Correlation

Sl. No.	Contents of Module	Hrs	COs
1	**Unit I: Internet:** Basic Concepts-Communicating on Internet. Introduction to HTML-Anchor Tag-Hyperlink - Head and Body Section-Heading - Horizontal Ruler - Paragraphs -Images and Picture-Lists-Tables-Frames-Forms and forms elements.	**15**	**CO1**
2	**Unit II: CSS:** Introduction – inline styles, creating style sheets with the style element, conflicting styles, linking external style sheets, positioning elements, backgrounds, element dimensions, text flow and the box model, user style sheets	**15**	**CO2**
3	**Unit III: Introduction to Scripting:** Introduction - Java Script Structure - Java Script Variables – Global variable - Data types - Java Script Operators – Java Script Control Statements – Java Script Looping statements - Java script Arrays - Array literal – Creating instance of Array directly- using an array constructor- JavaScript Array methods.	**15**	**CO3**
4	**Unit IV: JavaScript Functions:** JavaScript Function Arguments – Function with Return Value – JavaScript Function Object –JavaScript Function methods – Passing arrays to functions – recursion – java script global functions - JavaScript String methods – JavaScript Number methods- Java Script Get date function- Java Script Set date function	**15**	**CO4**
5	**Unit V:** JavaScript Validation - JavaScript Form Validation- JavaScript Retype Password Validation - JavaScript Number Validation- JavaScript Validation with image - JavaScript email validation- JavaScript Events- JavaScript onclick event, JavaScript dblclick event - JavaScript onload event.	**15**	**CO5**

TEXTBOOKS:

1. **Jeffrey C Jackson**, "*Web Technologies A Computer Science Perspective*", 2007, Pearson Education Inc.
2. **David Flanagan**, *JavaScript: The Definitive Guide,* 7th edition, O'Reilly publishers, 2011, ISBN-10-05-0596805527
3. **Mark Myers**, "*A Smarter Way to learn JavaScript"*, 1st edition, Lightning Source Inc Publishers, ISBN-10:1497408180,2014.

REFERENCEBOOKS:

1. **M. Srinivasan**, *"Web Technology: Theory and Practice*", June 2012, Pearson India.
2. **N. P. Gopalan, T. A. Adikesavan**, "*WEB TECHNOLOGY: A Developer's Perspective***",** PHI Learning Pvt. Ltd
3. **Ivelin Demirov. "***Learn JavaScript with Interactive Exercises Visually", (*3rd Edition), Sams publishers, 2014.

E-REFERENCES:

1. https://www.w3schools.com/html/
2. https://www.w3schools.com/css/default.asp
3. https://www.tutorialspoint.com/vbscript/index.htm
4. https://www.tutorialspoint.com/javascript/index.htm

THIRD SEMESTER

Course Title: CORE – ESSENTIALS OF OPERATING SYSTEMS

Course Code : 2307312	**Credits : 04**
L:T:P:S : 4:0:0:0	**CIA Marks : 50**
Exam Hours : 03	**ESE Marks : 50**

Course Objectives:

- *To understand the main components of an OS & their functions.*
- *To study the process management and scheduling.*
- *To understand various issues in Inter Process Communication (IPC) and the role of OS in IPC.*
- *To understand the concepts and implementation Memory management policies and virtual memory.*
- *To understand the working of an OS as a resource manager, file system manages, process manager, memory manager and I/O manager and methods used to implement the different parts of OS.*

Course outcomes: **At the end of course, the student will be able to**

CO1	Describe the important computer system resources and the role of operating system and scheduling of processes by CPU algorithms.
CO2	Understand the process synchronization and Deadlock algorithms.
CO3	Evaluate the requirement for process synchronization and coordination handled by Operating system.
CO4	Describe and analyze the memory management and its allocation policies.
CO5	Identify use and evaluate the file management policies with respect to different Storage management technologies.

Mapping of Course outcomes to program outcomes:

	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	3	3	3	2	1	-
CO2	3	-	-	-	1	-
CO3	3	-	1	-	1	-
CO4	3	3	2	1	1	1
CO5	3	3	2	1	1	1

3: Strong 2: Medium 1: Low -: No Correlation

Sl. No.	Contents of Module	Hrs	COs
1	**UNIT I:** Views – Goals – Types of Operating Systems - Services – System Calls. **Process Management:** Definition- Process States- Process Control Block (PCB)-Process Scheduling– Types of Process Scheduling-**Thread**-Types of threads- Concept of Multithread.	**12**	**CO1**
2	**UNITII: Process Synchronization**: Critical-Section problem – Semaphores. **CPU Scheduling**: CPU Schedulers–Scheduling criteria–**CPU Scheduling Algorithms:** First Come First Serve (FCFS), Shortest Job First (SJF), Round Robin (RR).	**12**	**CO2**
3	**UNIT III: Deadlocks**: Characterization – Methods for handling Deadlocks–Prevention, Avoidance: Bankers Algorithm, Detection of Deadlock and Recovery from deadlock.	**12**	**CO3**
4	**UNITIV: Memory Management**: Address Binding–Dynamic Loading and Linking – Overlays –Swapping- Logical and Physical Address Space - Contiguous Allocation – Internal and External Fragmentation- Non-contiguous Allocation - Paging and Segmentation schemes.	**12**	**CO4**
5	**UNITV: Virtual Memory:** Demand Paging –Page Replacement Algorithms–Optimal Page Replacement, First In First Out (FIFO), Least Recently Used (LRU): **File Management**: File Concepts– Access methods– Directory Structure Protection and consistency semantics.	**12**	**CO5**

TEXTBOOK:

1. **Silberschatz A., Galvin P. B., Gange**, "*Operating System Concepts",* Ninth Edition, 2015, John Wiley & Sons.

REFERENCEBOOKS:

1. **Bhatt P. C. P.**, "*An Introduction to Operating Systems: Concepts and Practice*", Third Edition, 2010, Prentice Hall of India.
2. **William Stallings**, "*Operating Systems: Internals and Design Principles*", Pearson, 2015, Global Edition.

E-REFERENCES:

1. Operating Systems – Geeks for Geeks
2. http://engineeringppt.blogspot.in/2009/07/operating-system-concepts-8th-edition.html

THIRD SEMESTER

Course Title: CORE PRACTICAL III- PROBLEM SOLVING USING PYTHON LAB

Course Code	**: 2307313**	**Credits**	**: 02**
L:T:P:S	**: 0:0:4:0**	**CIA Marks**	**: 50**
Exam Hours	**: 03**	**ESE Marks**	**: 50**

Course Objectives:

- *Be able to design and program Python applications.*
- *Be able to create loops and decision statements in Python.*
- *Be able to work with functions and pass arguments in Python.*
- *Be able to build and package Python modules for reusability.*
- *Be able to read and write files in Python.*
- *Be able to implement searching and sorting techniques in Data structures.*

Lab Exercises:

1. Program using variables, constants, I/O statements in Python.
2. Program using Operators in Python.
3. Program using Conditional Statements.
4. Program using Loops.
5. Program using Jump Statements.
6. Program using Functions.
7. Program using Recursion.
8. Program using Arrays.
9. Program using Strings.
10. Program using Import Statements.
11. Program using Modules.
12. Program using Lists.
13. Program using Tuples.
14. Program using Dictionaries.
15. Program for File Handling.
16. Write a Python Program to implement Binary Search.
17. Write a Python Program to implement Linear Search.
18. Write a Python Program to implement Bubble Sort.
19. Write a Python Program to implement Quick Sort.
20. Write a Python Program to implement Selection Sort.

THIRD SEMESTER

Course Title: CORE PRACTRICAL IV- WEB DEVELOPMENT TECHNOLOGIES LAB

Course Code	**: 2307314**	**Credits**	**: 02**
L:T:P:S	**: 0:0:4:0**	**CIA Marks**	**: 50**
Exam Hours	**: 03**	**ESE Marks**	**: 50**

Course Objectives:

- *To explain basics of HTML concepts and controls.*
- *To explain the table creation and manipulation*
- *To demonstrate the design of style sheets.*
- *To demonstrate the uses of various functions and validation in Java Script.*
- *To explain Arrays and Constructors of Java Script.*

Lab Exercises:

1. Write an HTML code to display your education details in a tabular format.
2. Write an HTML code to display your CV on a web page.
3. Write an HTML code to create a Home page having three links: About Us, Services and Contact. Create separate web pages for the three links.
4. Write an HTML code to create a login form. On submitting, the user should get navigated to a profile page.
5. Write an HTML code to create your Department Website.
6. Write an HTML code to demonstrate the usage of inline CSS.
7. Write an HTML code to demonstrate the usage of internal CSS.
8. Write an HTML code to demonstrate the usage of external CSS.
9. Create a calculator using JavaScript.
10. Write a script to Sort numbers and strings
11. Create a program to verify whether email address provided by user is valid or invalid.
12. Write a program to scroll the text on status bar.
13. Write a script to create a digital clock.
14. Build a WWW page with an image and buttons.
15. Create a frameset that has two frames, side by side.
16. Create a program using array in JavaScript
17. Write a JavaScript program using Array Constructors.

FOURTH SEMESTER

Course Title: CORE - RELATIONAL DATABASE MANAGEMENT SYSTEMS

Course Code : 2307415	**Credits : 05**
L:T:P:S : 4:1:0:0	**CIA Marks : 50**
Exam Hours : 03	**ESE Marks : 50**

Course Objectives:

- *To understand the different issues involved in the design and implementation of a database system.*
- *To study the physical and logical database designs, database modeling, relational, hierarchical, and network models*
- *To understand and use data manipulation language to query, update, and manage a database*
- *To develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency,*
- *To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.*

Course Outcomes: At the end of the Course, the Student will be able to:

CO1	To demonstrate the characteristics of Database Management Systems. To study about the concepts and models of database. To impart the concepts of System Development Life Cycle and E-R Model.
CO2	To classify the keys and the concepts of Relational Algebra. To impart the applications of various Normal Forms Classification of Dependency.
CO3	To elaborate the different types of Functions and Joins and their applications. Introduction of Views, Sequence, Index and Procedure.
CO4	Representation of PL-SQL Structure. To impart the knowledge of Implicit and Explicit Cursors.
CO5	Representation of Exception and Pre-Defined Exception. To Point out the Importance of Triggers, Sub Programs, Functions and Procedures.

Mapping of Course Outcomes to Program Outcomes

	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	3	3	2	1	2	1
CO2	3	3	3	1	3	-
CO3	3	2	3	2	1	-
CO4	2	1	1	2	2	2
CO5	1	1	-	2	1	1

3: Strong 2: Medium 1: Low -: No Correlation

Sl. No.	Contents of Module	Hrs	COs
1	**UNIT I: Introduction:** Database System-Characteristics of Database Management Systems- Architecture of Database Management Systems-Database Models-System Development Life Cycle-Entity Relationship Model.	**15**	**CO1**
2	**UNIT II: Relational Database Model:** Structure of Relational Model-Types of keys. Relational Algebra: Unary operations-Set operations-Join operations. Normalization: Functional Dependency- First Normal form-Second Normal Form-Third Normal form- Boyce-Codd Normal Form-Fourth Normal Form.	**15**	**CO2**
3	**UNIT III**: **SQL**: Introduction. **Data Definition Language**: Create, alter, drop, rename and truncate statements. **Data Manipulation Language**: Insert, Update and Delete Statements. **Data Retrieval Language**: Select statement. **Transaction Control Language**: Commit, Rollback and Savepoint statements. **Single row functions using dual**: Date, Numeric and Character functions. **Group/Aggregate functions:** count, max, min, avg and sum functions. **Set Functions**: Union, union all, intersect and minus. **Subquery**: Scalar, Multiple and Correlated subquery. **Joins**: Inner and Outer joins. **Defining Constraints:** Primary Key, Foreign Key, Unique, Check, Not Null.	**15**	**CO3**
4	**UNIT IV: PL/SQL**: Introduction-PL/SQL Basic-Character Set-PL/SQL Structure-SQL Cursor- Implicit and Explicit Cursors.	**15**	**CO4**
5	**UNIT V**: **Exception Handling:** Introduction-Predefined Exception-User Defined Exception – Triggers – Subprograms – Functions-Procedures.	**15**	**CO5**

TEXT BOOK:

1. **Pranab Kumar Das Gupta and P. Radha Krishnan**, "*Database Management System Oracle SQL and PL/SQL"*, Second Edition, 2013, PHI Learning Private Limited.

REFERENCE BOOKS:

1. **Ramez Elmasri and Shamkant B. Navathe**, "*Fundamentals of Database Systems*", Seventh Edition, Pearson Publications.
2. **Abraham Silberschatz, Henry Korth, S. Sudarshan**, "*Database System Concepts*", Seventh Edition, TMH.

E-REFERENCE:

1. http://www.amazon.in/DATABASE-MANAGEMENT-SYSTEM-ORACLE-SQL ebook/dp/B00LPGBWZ0#reader_B00LPGBWZ0

FOURTH SEMESTER

Course Title: CORE - OPEN SOURCE TECHNOLOGIES

Course Code	**: 2307416**	**Credits**	**: 04**
L:T:P:S	**: 4:0:0:0**	**CIA Marks**	**: 50**
Exam Hours	**: 03**	**ESE Marks**	**: 50**

Course Objectives:

- *To understand the basics of Linux OS.*
- *To Study the shell programming.*
- *To understand various Decision making and Looping Statements of Shell.*
- *To understand the concepts of Arrays, Functions, Command line Arguments used in shell.*
- *To understand Basic system administration concepts of Shell programming.*

Course outcomes: **At the end of course, the student will be able**

CO1	Describe the history and Architecture of Linux OS.
CO2	Understand the Shell programming basics like variables, operators.
CO3	Evaluate various decision making, Looping statements in shell.
CO4	Describe and analyze the arrays and command line arguments in shell.
CO5	Identify and evaluate Basic system administration concepts of Shell programming.

Mapping of Course outcomes to program outcomes:

	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	3	3	3	2	1	-
CO2	3	2	1	-	1	1
CO3	3	1	3	2	1	-
CO4	3	3	2	1	1	1
CO5	3	3	2	1	1	1

3: Strong 2: Medium 1: Low -: No Correlation

Sl. No.	Contents of Module	Hrs	Cos
1	**UNIT I:Introduction to Linux:** History of Linux – Linux Architecture – Kernel – Uses of Linux – Linux distributions - Linux Essential Commands – Files and directories - File types - Linux System Standard Files– The vi Editor.	**12**	**CO1**
2	**UNIT II: Introduction to Shell scripting**: Shell – Shell Types – Structure of bash shell script – Script file namesandpermissions– **Variables:**Variablenames,Definingandaccessingvariables,Variabletypes,Specialvariables – Read and Echo commands – **Basic operators:** Arithmetic Operators, Relational Operators, Boolean Operators, String Operators and File Test Operators	**12**	**CO2**
3	**UNIT III: Decision Making:** if statement, if else statement, elif ladder and case statement- **Looping:** while loop, for loop and until loop – break and continue statements – Meta characters-Substitution in expression and command substitution-Input and Output redirection.	**12**	**CO3**
4	**UNIT IV: Arrays -** User-defined functions – Command line arguments – String processing – Process basics –Commands related with processes– Filter commands.	**12**	**CO4**
5	**UNIT V: Basic System administration:** Super User Control – Scheduling tasks using cron – System run levels –Configuration directories and files– User configuration files– Adding and Removing Users and Groups.	**12**	**CO5**

TEXT BOOK:

1. **Richard L. Petersen**, "*The Complete Reference LINUX*", McGraw Hill.
2. **Ganesh Naik** , "*LINUX shell scripting*", Packt Publishing Ltd.,

REFERENCE BOOKS:

1. Ken O. Burtch, "*Linux Shell Scripting with Bash*", 1st Edition.

E-REFERENCES:

1. http://mindmajix.com/linux-tutorial
2. http://www.kobo.com/in/en/ebook/linux-command-line-and-shell-scripting-bible-3
3. http://www.oreilly.com/library/view/classic-shell-scripting/0596005954/

FOURTH SEMESTER

Course Title: CORE - FOUNDATIONS OF SOFTWARE ENGINEERING

Course Code : 2307417	**Credits : 04**
L:T:P:S : 4:0:0:0	**CIA Marks : 50**
Exam Hours : 03	**ESE Marks : 50**

Course Objectives:

- *To introduce the students to a branch of study associated with the development of a software product.*
- *To gain basic knowledge about the pre-requisites for planning a software project.*
- *To gain knowledge about the project scheduling concept in software engineering.*
- *To learn how to design of software.*
- *To enable the students to perform testing of a software.*

Course outcomes: At the end of course, the student will be able to:

CO1	Familiarization with the concept of software engineering and its relevance
CO2	Understanding of various methods or models for developing a software product
CO3	Understand tools and techniques of software engineering
CO4	Skill to design and code a software
CO5	Verify and validate the problem of software programming

Mapping of Course outcomes to program outcomes:

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	1	1	-	2	1
CO2	3	1	1	-	1	2
CO3	1	-	2	1	2	1
CO4	-	-	3	2	2	2
CO5	3	-	2	-	2	1

3: Strong 2: Medium 1: Low -: No Correlation

Sl. No.	Contents of Module	Hrs	COs
1	**UNIT I: Introduction to Software Engineering**: Need and Software problem -Software Crises – A Process framework **Software Engineering:** a layered technology - **Process models**: The waterfall model– Incremental process models– Prototyping–The Spiral model. **System Engineering Hierarchy**: System modeling and simulation	**12**	**CO1**
2	**UNIT II: Project Management:** The Management Spectrum – The People–The Product– The Process– The Project–The W5HH Principle. **Metrics in the Process and Project Domains**: Metrics in the Process and Project Domains–Process Metrics and Project Metrics – Software measurement- Size-oriented metrics – Function-oriented metrics. - Cost Estimation Models in Software Engineering – COCOMO Model. **Project Scheduling:** Defining task set and a task network– Scheduling– Timeline charts –Tracking the Schedule.	**12**	**CO2**
3	**UNITIII: Software Design**: Design concepts-Abstraction–Architecture Modularity. **Basic Design Principles:** Component-level Design Guidelines-Cohesion–Coupling-Designing Conventional Components-Graphical Design Notation – Tabular Design Notation –Program Design Language– Comparison of notations.	**12**	**CO3**
4	**UNITIV: Risk Management**: Reactive and Proactive risks–Software risks–Risk identification–Risk projection-Risk Refinement – Risk mitigation, monitoring and management – The RMMM plan. **Software Quality Assurance**: Concepts - SQA activities–Formal Technical Reviews (FTR).	**12**	**CO4**
5	**UNIT V: Software Testing:** Definition- Verification and validation – Test strategies – Unit Testing – Integration Testing – Alpha and Beta testing – White Box testing – Basis path testing – Control Structure Testing – Black box testing. **Software Configuration Management (SCM):** Elements of SCM – Baselines – The SCM repository	**12**	**CO5**

TEXT BOOK:

1. **Roger S. Pressman,** "*Software Engineering a Practitioner's Approach*", Seventh Edition, Tata McGraw Hill

REFERENCE BOOKS:

1. **Watts S. Humphrey**, "*A Discipline for Software Engineering*", Addition Wesley Company.
2. **Sommer ville**, "*Software Engineering*", Ninth Edition, Pearson Education.

E-REFERENCES:

1. http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT%20Kharagpur/Soft%20Engg/New_index1.html
2. http://it-ebooks.info/book/2609/

FOURTH SEMESTER

Course Title: CORE PRACTICAL V- RELATIONAL DATABASE MANAGEMENT SYSTEMS LAB

Course Code	**: 2307418**	**Credits**	**: 02**
L:T:P:S	**: 0:0:4:0**	**CIA Marks**	**: 50**
Exam Hours	**: 03**	**ESE Marks**	**: 50**

Course Objectives:

- *To explain basic database concepts, applications, data models, schemas and instances.*
- *To demonstrate the use of constraints and relational algebra operations*
- *Describe the basics of SQL and construct queries using SQL.*
- *To emphasize the importance of normalization in databases*
- *To facilitate students in Database design*

Lab Exercises:

SQL:

1. DDL commands.
2. Specifying constraints-Primary Key, Foreign Key, Unique, Check, Not Null.
3. DML commands.
4. Set Operations.
5. Joins.
6. Sub-queries.

PL/SQL:

7. Control Constructs.
8. Exception Handlers.
9. Implicit Cursor.
10. Explicit Cursor.
11. Procedures.
12. Functions.
13. Triggers.
14. TCL Commands usage (Commit, Rollback, Savepoint)

FOURTH SEMESTER

Course Title: CORE PRACTICAL VI- OPEN SOURCE TECHNOLOGIES LAB

Course Code	**: 2307419**	**Credits**	**: 02**
L:T:P:S	**: 0:0:4:0**	**CIA Marks**	**: 50**
Exam Hours	**: 03**	**ESE Marks**	**: 50**

Course Objectives:

- *To study shell programming basics.*
- *To study decision making statements.*
- *To understand various system configuration like user details, directory information.*
- *To understand the concepts of file commands.*

Lab Exercises:

1. Write a shell script for basic arithmetic and logical calculations
2. Write a shell script to demonstrate the file commands: rm, cp, cat, mv, cmp, wc, split, diffusing choice menus (use elif ladder).
3. Write a shell script to show the following system configuration:
   a. Currently logged user and his log name.
   b. Current shell, home directory, Operating System type, current Path setting, current working directory.
   c. Show currently logged number of users, show all available shells.
   d. Show CPU information like processor type, speed.
   e. Show memory information.
4. Write a Shell Script to demonstrate the following: pipes, Redirection and tee commands.
5. Write a shell script for displaying current date, user name, file listing and directories by getting user choice (use case statement).
6. Write a shell script to create an array and perform various operations in that array.
7. Write a shell script to demonstrate the filter commands.
8. Write a shell script to remove the files which has file size as zero bytes.
9. Write a shell script to find the sum of the individual digits of a given number.
10. Write a shell script to find the greatest among the given set of numbers using command line arguments.
11. Write a shell script for palindrome checking.
12. Write a shell script to print the multiplication table of the given argument using for-loop.

FIFTH SEMESTER

Course Title: CORE - DOT NET FRAMEWORK PROGRAMMING

Course Code	**: 2307521**	**Credits**	**: 05**
L:T:P:S	**: 4:1:0:0**	**CIA Marks**	**: 50**
Exam Hours	**: 03**	**ESE Marks**	**: 50**

Course Objectives:

- *Set up a programming concept using the basic knowledge of DHTML.*
- *To learn the data types, different controls in VB.NET*
- *Creating VB.Net applications using standard .net controls to develop a data driven web application for connecting to data sources and managing them.*
- *To maintain session and controls related information for user used in multi-user web applications.*
- *To Understand the fundamentals of developing modular application by using object-oriented methodologies*

Course Outcomes: At the end of the Course, the Student will be able to:

CO1	To gain knowledge in object-event models in DHTML.
CO2	To gain the basic knowledge in VB NET with the Frame work
CO3	Enable to apply technical knowledge and perform specific technical skills
CO4	Understand to design web applications using ASP.NET 2. Successful students will be able to use ASP.NET controls in web applications
CO5	Apply the concept to create database driven ASP.NET web applications and web services

Mapping of Course Outcomes to Program Specific Outcomes:

	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	3	3	3	3	3	2
CO2	2	2	2	1	-	2
CO3	3	3	2	2	1	1
CO4	3	2	3	3	2	1
CO5	3	3	3	3	2	2

3: Strong 2: Medium 1: Low -: No Correlation

Sl. No.	Contents of Module	Hrs	COs
1	**Unit I: Introduction:** .Net Framework- Components of the .Net framework - Introduction to Visual Basic.Net - Features of VB.Net - VB.Net - Program Structure – VB.Net Integrated Development Environment- Types of VB.Net Applications. **VB.Net Basics:** Identifiers Keywords- Data Types- Variables- Constants and Enumerations- Modifiers- Operators – Statements & Directives.	**15**	**CO1**
2	**Unit II: Control Structures:** Decision Making Statement - Loops- Loop Control Statements. Arrays: Arrays- Strings - VB.Net- Collections. **Functions & Sub Procedures:** Defining a Function – Function Returning a Value – Recursive Function – Param Arrays – Passing Arrays as Function Arguments - Sub Procedures.	**15**	**CO2**
3	**Unit III: Object Oriented Programming Paradigm:** Classes & Objects- Interfaces – Delegate – Events - Event Handling - Exception Handling- File Handling.	**15**	**CO3**
4	**Unit IV: VB.Net Controls:** Vb.Net Tool Box- Forms- Textbox- Label- Button- List Box - ComboBox- RadioButton- Check Box- PictureBox - ScrollBar – TrackBar – Container Controls. Advanced Controls: Progress Bar- DateTimePicker – Tree View – The TreeNode Class – ListView -ImageList –Tooltip – Rich Textbox –Timer Control – MDI Form.	**15**	**CO4**
5	**Unit V: Dialog Boxes and Menus:** Dialog Box- Modal Forms – Menus – Adding Cut, Copy and Paste Functionalities in a Form – Anchoring and Docking Controls in a Form. **Database Access:** Introduction to ADO.Net – ADO.Net Object Model – Connecting to a SQL Server Database – Cystral Reports.	**15**	**CO5**

TEXT BOOKS:

1. VB.NET Seeds, K. Krishnaveni, S. Sasikala, S. Pradeep Kumar Kenny, KK Publications, 2013. Chapters: Unit I: 1, 2 Unit II: 3, 4, 5 Unit III: 6, 7 Unit IV: 8, 9 Unit V: 10, 11, 12.

REFERENCE BOOKS:

1. Microsoft Visual Basic .NET 2003 Unleashed, Heinrich Gantenbein, SAMs Publications, First Edition, 2004.
2. Programming VB.NET, A Guide for Experienced Programmers, Gary Cornell & Jonathan Morrison, Apress, 2002.
3. Visual Basic .NET Programming Black Book, Steven Holzner, Dream Tech Press, 2010.
4. Programming Visual Basic .NET Dave Grundgeiger Publisher: O'Reilly First Edition January 2002.
5. Visual Basic .NET The Complete Reference Jeffrey R. Shapiro, The McGraw−Hill Companies,2002.

E-REFERENCES:

1. https://www.tutorialspoint.com/vb.net/index.htm
2. https://www.javatpoint.com/vb-net

FIFTH SEMESTER

Course Title: CORE –DATA MINING CONCEPTS

Course Code : 2307522	**Credits : 05**
L:T:P:S : 4:1:0:0	**CIA Marks : 50**
Exam Hours : 03	**ESE Marks : 50**

Course Objectives:

- *To introduce students to the basic concepts and techniques of Data Mining*
- *To develop skills of using recent data mining software for solving practical problems.*
- *To gain experience of doing independent study and research.*
- *Develop and apply critical thinking, problem-solving, and decision- making skills.*
- *Develop and apply enthusiasm for learning. Class participation is encouraged in this course.*

Course Outcomes: At the end of the Course, the Student will be able to:

CO1	Know the basic knowledge of data mining, Study the techniques, Implement the applications
CO2	Understand the data preparations, Know the types of data and display graphically, and Compute the distance.
CO3	Know the Naive and Apriori Algorithm. Improve the algorithm. Study of Direct Hashing and Pruning
CO4	Introduce Decision tree and Tree induction algorithm. Classified the methods. Evaluate the criteria of classification methods
CO5	Describe the cluster analysis. Study about K-means, Hierarchical and Agglomerative method. Check the quality and validity

Mapping of Course Outcomes to Program Specific Outcomes:

	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	2	-	-	1	-	-
CO2	1	1	-	-	-	2
CO3	2	-	-	1	2	-
CO4	-	1	2	-	-	-
CO5	-	-	1	2	3	-

3: Strong 2: Medium 1: Low –: No Correlation

Sl. No.	Contents of Module	Hrs	COs
1	**Unit I: Introduction**: What is Data Mining – What Kinds of Data can be mined- Data mining process – KDD Process-Crisp DM Approach- Issues in Data Mining - Data mining techniques- Data mining applications	**15**	**CO1**
2	**Unit II: Data Understanding and Data Preparation**: Introduction – Data collection and preprocessing – Outliers – Types of data – Computing Distance – Displaying data graphically.	**15**	**CO2**
3	**Unit III: Association Rules Mining**: Introduction - Basics – Naïve algorithm – Improved Naïve algorithm – The Apriori algorithm – Improving the efficiency of the Apriori algorithm – Multilevel Association Rules.	**15**	**CO3**
4	**Unit IV: Classification:** Introduction – Decision tree Classification – Naïve Bayes Classification – Prediction – Regression – Types of Regression – Linear Regression – Difference between Regression and Classification – Classifiers Accuracy using Confusion Matrix.	**15**	**CO4**
5	**Unit V: Cluster Analysis**: Introduction – Features of Cluster Analysis – Types of Cluster Analysis – The K-Means method – Hierarchical method – Agglomerative Method - Quality and Validity of Cluster Analysis Method.	**15**	**CO5**

TEXT BOOKS:

1. **G. K. Gupta**, "Introduction to Data Mining with Case Studies", 3rd Edition, 2014, PHI.

REFERENCE BOOKS:

1. **Jiawei Han and Micheline Kamber**, "*Data Mining Concepts & Techniques*", Third Edition, Academic Press.
2. **Margaret H. Dunbam**, "*Data Mining Introductory and Advanced Topics*", First Edition, Pearson Education.

E-REFERENCES:

1. http://guidetodatamining.com/
2. http://freecomputerbooks.com/Introduction_to_Data_Mining.html
3. http://it-ebooks.info/book/2506/

FIFTH SEMESTER

Course Title: CORE –PRINCIPLES OF COMPUTER NETWORKS

Course Code : 2307523	**Credits : 05**
L:T:P:S : 5:0:0:0	**CIA Marks : 50**
Exam Hours : 03	**ESE Marks : 50**

Course Objectives:

- *To develop an understanding of modern network architectures from a design and performance perspective.*
- *To introduce the student to the major concepts involved in wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs).*
- *To clarify network terminology.*
- *To provide an opportunity to do network programming using **TCP/IP**.*
- *To give the students experience working in programming teams.*
- *To provide a WLAN measurement experience.*
- *To expose students to emerging technologies and their potential impact.*

Course Outcomes: At the end of the Course, the Student will be able to:

CO1	Define computer networks, Demonstrate the types of networks, distinguish topologies, Differentiate Transmission mode, Design OSI and TCP/IP Reference model
CO2	Illustrate Transmission media, Analyze the wireless media, Create the structure of Telephone system
CO3	Formulate framing control and flow control, Explain error correcting codes and error detecting codes
CO4	Discuss store and forward switching network, Explain Routing algorithm, Examine congestion control algorithm
CO5	Summarize the elements of transport protocol, Describe DNS,EMAIL,WWW

Mapping of Course Outcomes to Program Specific Outcomes:

	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	3	2	1	-	-	-
CO2	2	3	2	1	-	-
CO3	-	1	3	3	2	-
CO4	-	-	1	3	3	2
CO5	-	-	1	2	3	3

3: Strong 2: Medium 1: Low -: No Correlation

Sl. No.	Contents of Module	Hrs	COs
1	**Unit I: Introduction**: Definition and Uses of Computer Networks. **Network Hardware/Categories of Networks:** LAN, WAN and MAN. **Line Configuration**: Broad Casting and Point to Point **Transmission Mode**: Simplex, Half duplex and Full Duplex. **Network Software:** Protocol Hierarchies- Connection Oriented and Connectionless Services – Service Primitives. **Reference Models:** OSI Reference Model – TCP/IP Reference Model.	**15**	**CO1**
2	**Unit II: Physical Layer: Guided Transmission Media:** Magnetic Media, Twisted Pair, Coaxial Cable and Fiber Optics. **Wireless Transmission**: Electromagnetic Spectrum, Radio Transmission, Microwave Transmission, Infrared Transmission and Light Waves.	**15**	**CO2**
3	**Unit III: Data Link Layer: Design Issues:** Framing, Error Control and Flow Control. **Error Correcting Codes**: Hamming Codes. **Error Detecting Codes. Elementary Data-link Protocols:** A Utopian Simplex Protocol. **Sliding Window Protocols:** A One-Bit Sliding Window Protocol.	**15**	**CO3**
4	**Unit IV: Network Layer: Design Issues:** Store and Forward Packet Switching – Services provided to the Transport Layer. **Routing Algorithms:** The Optimality Principle, Flooding, The Shortest Path Routing and Hierarchical Routing.	**15**	**CO4**
5	**Unit V: Transport Layer: Elements of Transport Protocols:** Addressing, Connection Establishment and Connection Release. **TCP**: Introduction, TCP Service Model and TCP Segment Header. **Application Layer:** DNS – Electronic Mail – The World Wide Web.	**15**	**CO5**

TEXT BOOKS:

1. **Andrew S. Tanenbaum and David J. Wetherall,** "*Computer Networks*", Fifth edition, 2011, PHI.

REFERENCE BOOKS:

1. **Behrouz A. Forouzan**, "*Data Communication and Networking*", Fifth Edition, Tata McGraw Hill.
2. **William Stallings**, "*Data and Computer Communications*", Eighth Edition, Pearson education Asia.

E-REFERENCES:

1. http://nptel.iitm.ac.in/courses/IIT-MADRAS/Computer_Networks/index.php
2. http://www.cse.iitk.ac.in/users/dheeraj/cs425/
3. http://people.du.ac.in/~ngupta/teach_networks.html

FIFTH SEMESTER

Course Title: ELECTIVE I – ESSENTIALS OF DIGITAL MARKETING

Course Code : 2307524(A)	**Credits : 05**
L:T:P:S : 5:0:0:0	**CIA Marks : 50**
Exam Hours : 03	**ESE Marks : 50**

Course Objectives:

- *Today's marketer has to be aware of the digital Market interventions and this course has been designed keeping in mind the requirement of industry on one end and competence enhancement on the other.*
- *At the end of this course you will be equipped with the skill to understand and initiate digital marketing.*

Course Outcomes: At the end of the Course, the Student will be able to:

CO1	Infer digital marketing practices, inclination of digital consumers and their behaviors.
CO2	Discover various search engine optimization techniques for digital marketing analysis.
CO3	Determine the value of integrated marketing campaigns across SEO, Paid Search, Social, Mobile, Email, Display Media, Marketing Analytics
CO4	Develop understanding of the latest digital practices for social media marketing and promotions
CO5	Distinguish among the different technology used in Digital Marketing. Construct insights on building organizational competency by way of digital marketing practices and cost considerations.

Mapping of Course Outcomes to Program Specific Outcomes:

	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	2	2	1	2	-	-
CO2	2	2	-	2	2	2
CO3	3	3	2	2	2	2
CO4	3	3	1	2	2	1
CO5	2	1	1	1	-	1

3: Strong 2: Medium 1: Low –: No Correlation

Sl. No.	Contents of Module	Hrs	COs
1	**Unit I: Introduction to Digital Marketing**: What is digital marketing - Aligning Internet with Business Objectives - User Behavior & Navigation.	**15**	**CO1**
2	**Unit II: Search Engine Optimisation:** Stakeholders in Search - On & off-page Optimisation - Meta Tags, Layout, Content updates Inbound Links & Link Building.	**15**	**CO2**
3	**Unit III: Web Site Analytics:** Goal Configuration &Funnels - Intelligence Reporting - Conversions, Bounce Rate, Traffic Sources, Scheduling.	**15**	**CO3**
4	**Unit IV: Social Media Marketing:** What is Social Media Marketing? - Overview of Facebook, Twitter, LinkedIn, Blogging, YouTube and Flickr - Building Brand Awareness Using Social Media.	**15**	**CO4**
5	**Unit V: Digital Marketing Strategy:** Understanding strategy - Email Marketing - Affiliate marketing - Mobile Marketing - Display Advertising.	**15**	**CO5**

TEXTBOOKS:

1. Jerry Wind, Vijay Mahajan, "*Digital Marketing: Global Strategies from the World's Leading Experts*".

REFERENCEBOOKS:

1. Kathryn Waite and Rodrigo Perez-Vega, "*The Essentials of Digital Marketing".*

E-REFERENCES:

1. https://www.tutorialspoint.com/digital_marketing/index.htm
2. https://www.javatpoint.com/digital-marketing

FIFTH SEMESTER

Course Title: ELECTIVE I –WEB COMMERCE

Course Code	**: 2307524(B)**	**Credits**	**: 05**
L:T:P:S	**: 5:0:0:0**	**CIA Marks**	**: 50**
Exam Hours	**: 03**	**ESE Marks**	**: 50**

Course Objectives:

- *Understanding of the foundations and importance of E-commerce*
- *Understanding of retailing in E-commerce by in terms of branding and pricing strategies and determining the effectiveness of market research*
- *Implement the impact of E-commerce on business models and strategy*
- *Assess the Internet trading relationships including Business to Consumer, Business-to-Business, Intra-organizational.*
- *Knowing key features of Internet, Intranets and Extranets and how they relate to each other.*
- *Understanding legal issues and privacy in E-Commerce*
- *Assess electronic payment systems*
- *Recognize and discuss global E-commerce issues*

Course Outcomes: At the end of the Course, the Student will be able to:

CO1	Demonstrate E-Commerce Frameworks. Distinguish E-Commerce and media Convergence .Illustrate E-Commerce Applications.
CO2	Describe the E-Commerce Networks and Research Networks, Analyze the Internet Commercialization.
CO3	Evaluate the E-Commerce how incorporate the Internet, Construct the Web Security.
CO4	Distinguish the different payment system. Illustrate the data interchange.
CO5	Understanding the Advertising and Marketing on the Internet, Describe Software Agents

Mapping of Course Outcomes to Program Specific Outcomes:

	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	3	2	-	-	-	-
CO2	2	3	3	1	-	-
CO3	2	2	3	3	-	-
CO4	2	1	-	3	3	-
CO5	1	1	-	-	3	3

3: Strong 2: Medium 1: Low –: No Correlation

Sl. No.	Contents of Module	Hrs	COs
1	**Unit I: E-Commerce Framework** – E-Commerce and Media Convergence – The anatomy of E-commerce applications-E-Commerce Consumer Applications- E-Commerce Organization Applications.	**15**	**CO1**
2	**Unit II: The Internet Terminology**– NSFNET–Architecture and Components–National Research and Education Network–Internet Governance–An Overview of Internet Applications. **The Business of Internet Commercialization**: Telco/Cable/Online companies-National Independent ISPs –Regional level ISPs– Local level ISPs.	**15**	**CO2**
3	**Unit III: E-Commerce and the World Wide Web**: Architectural Framework for E-commerce– WWW as the architecture–Technology behind the web–Security and the web.	**15**	**CO3**
4	**Unit IV: Electronic Payment Systems**: Types of Electronic Payment Systems–Digital token Electronic Payment Systems–Credit Card Based Electronic Payment Systems–Risk and Electronic Payment Systems. **Electronic Data Interchange**: Legal, Security and Privacy issues.	**15**	**CO4**
5	**Unit V: Advertising and Marketing on the Internet**: E-Commerce Catalogs–Information Filtering–Consumer Data Interface–Emerging tools. **Software Agents**: Characteristics and Properties of Software Agents–Technology behind Software Agents-Applets, Browsers, and Software Agents.	**15**	**CO5**

TEXTBOOKS:

1. **Ravi Kalakota & Andrew Whinston,** "*Frontiers of Electronic-Commerce*", Addison Wesley.

REFERENCEBOOKS:

1. **Efraim Turvan J. Lee, David Kug and Chung**, "*Electronic Commerce*", Pearson Education, Asia.
2. **Manlyn Greenstein and Miklos**, "*Electronic Commerce*", TMH.

E-REFERENCES:

1. https://www.the-reference.com/en/expertise/creation-and.../e-commerce
2. https://en.wikipedia.org/wiki/E-commerce
3. https://www.tutorialspoint.com/e_commerce/index.htm

FIFTH SEMESTER

Course Title: ELECTIVE I – MANAGEMENT INFORMATION SYSTEMS

Course Code : 2307524(C)	**Credits : 05**
L:T:P:S : 5:0:0:0	**CIA Marks : 50**
Exam Hours : 03	**ESE Marks : 50**

Course Objectives:

- *To introduce students to the basic concepts of Management Information System*
- *To develop skills of using recent MIS technology for solving practical problems.*
- *To gain experience of doing independent study and research.*
- *Develop and apply critical thinking, problem-solving, and decision-making skills.*
- *Develop and apply enthusiasm for learning.*
- *Class participation is encouraged in this course.*

Course outcomes: **At the end of course, the student will be able to:**

CO1	Know the basic knowledge of Management Information System, Study the techniques, Implement the applications
CO2	Understand the data preparations, Know the types of database, data warehouse and basics of data mining concepts.
CO3	Know the concepts ERP and CRM. Role of Decision making and Knowledge Management System in MIS
CO4	Introduce Software Development Life Cycle. Product based MIS valuation and System maintenance.
CO5	Describe the Information System Security Threats. Study about Disaster Recovery Plan, Social and Ethical Issues.

Mapping of Course Outcomes to Program Specific Outcomes:

	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	2	-	-	1	-	-
CO2	1	1	-	-	-	2
CO3	2	-	-	1	2	-
CO4	-	1	2	-	-	-
CO5	-	-	1	2	3	-

3: Strong 2: Medium 1: Low –: No Correlation

Sl. No.	Contents of Module	Hrs	COs
1	**Unit I: MIS Overview**: Introduction– Need for MIS – Nature and scope of MIS–MIS Characteristics–Structure of MIS–Types of MIS – Role of MIS in global business–Challenges of managing information systems.	**15**	**CO1**
2	**Unit II: Data Resource Management**: Data base concepts – The Traditional Approach–Database Management Approach: The Modern Approach–Data base management system– Data Warehousing and Data Mining	**15**	**CO2**
3	**Unit III: Business Application of IS**: Enterprise Systems - ERP – CRM –SCM–Decision Making Concepts–Types of Decision–Decision Making and Role of MIS – DSSs – Business Intelligence – Knowledge Management Systems	**15**	**CO3**
4	**Unit IV: Management of IS:** Project Planning–SDLC–System Development Models–Project Management–System Analysis–System Design–Implementation Process– Product based MIS Evaluation – System Maintenance.	**15**	**CO4**
5	**Unit V: Security, Ethical and Social Issues**: IS Security Threats–Protecting Information System–IS Security Technologies–Disaster Recovery Plan–Issues of IS: Ethical Issues– Social Issues	**15**	**CO5**

TEXT BOOKS:

1. **D.P. Goyal**, "*Management Information System*", 4th Edition, Vikas Publications, 2014.

REFERENCE BOOKS:

1. **Kenneth C. Laudon and Jane P. Laudon,** "*Management Information System*", Thirteenth Edition, Pearson Education.
2. **James A. Obrein and George M. Markas**," *Management Information Systems*", Seventh Edition, Tata Mc-Graw Hills.

E-REFERENCES:

1. https://www.docsity.com/en/lecture-notes/management/management-information-systems/
2. http://www.mbaexamnotes.com/management-information-system-notes.html
3. https://nptel.ac.in/courses/122105022

FIFTH SEMESTER

Course Title: ELECTIVE I – SUPPLY CHAIN MANAGEMENT

Course Code	**: 2307524(D)**	**Credits**	**: 05**
L:T:P:S	**: 5:0:0:0**	**CIA Marks**	**: 50**
Exam Hours	**: 03**	**ESE Marks**	**: 50**

Course Objectives:

- *Understanding the scope and importance of supply chain management.*
- *Understanding the framework of supply chain networks and functions*
- *To gain experience of doing independent study and research.*
- *Develop and apply critical thinking, problem-solving, and decision-making skills.*
- *Understanding the role of IT in supply chain management.*

Course Outcomes: At the end of the Course, the Student will be able to:

CO1	Demonstrate the evolution and importance of supply chain management, Distinguish decision phase in supply chain. Illustrate supply chain applications.
CO2	Describe the Supply Chain Networks, Framework of supply chain and Role of network design in supply chain.
CO3	Evaluate the Role of transportation in Supply Chain, Construct the transportation network.
CO4	Distinguish sourcing and coordination in supply chain, Illustrate the effect of co-ordination in supply chain and building strategies.
CO5	Understanding the role of IT in supply chain, Study of E-Business in supply chain.

Mapping of Course Outcomes to Program Specific Outcomes:

	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	3	2	-	-	-	-
CO2	2	3	3	1	-	-
CO3	2	2	3	3	-	-
CO4	2	1	-	3	3	-
CO5	1	1	-	-	3	3

3: Strong 2: Medium 1: Low –: No Correlation

Sl. No.	Contents of Module	Hrs	COs
1	**Unit I: Introduction**: Role of Logistics and Supply Chain Management: Scope and Importance–Evolution of Supply Chain, Decision Phase in Supply Chain–Competitive and Supply chain strategies – Drivers of Supply Chain Performance and Obstacles.	**15**	**CO1**
2	**Unit II: Supply Chain Network Design:** Role of Distribution in Supply Chain–Factors influencing Distribution network design –Design options for Distribution Network – Role of Network Design in Supply Chain – Framework for network Decisions.	**15**	**CO2**
3	**Unit III: Logistics in Supply Chain**: Role of Transportation in Supply Chain –Factors affecting transportation decision–Design options for transportation network-Tailored Transportation – Routing and Scheduling in transportation.	**15**	**CO3**
4	**Unit IV: Sourcing and Coordination in Supply Chain**: Role of Sourcing supply chain supplier selection assessment and contracts – Design collaboration–sourcing planning and analysis–supply chain co-ordination – Bull whip effect – Effect of lack of co-ordination in supply chain and obstacles – Building strategic partnerships and trust within a supply chain	**15**	**CO4**
5	**Unit V: Supply Chain and Information Technology**: The role IT in supply chain –The supply chain IT frame work Customer Relationship Management–Internal supply chain management –supplier relationship management – future of IT in supply chain - E-Business in supply chain.	**15**	**CO5**

TEXTBOOKS:

1.**Sunil Chopra, Peter Meindl and Kalra,** "*Supply Chain Management, Strategy, Planning, and Operation*", Pearson Education, 2010.

REFERENCEBOOKS:

1. **Jeremy F.Shapiro,** "*Modeling the Supply Chain*", Thomson Duxbury, 2002.
2. **Srinivasan G.S**, "*Quantitative models in Operations and Supply Chain Management*", PHI, 2010.
3. **David J.Bloomberg , Stephen Lemay and Joe B.Hanna,** "*Logistics*", PHI 2002.
4. **James B.Ayers,** "*Handbook of Supply Chain Management*", St.Lucle press, 2000.

E-REFERENCES:

1. https://ocw.mit.edu/courses/esd-273j-logistics-and-supply-chain-management-fall-2009/pages/lecture-notes/
2. https://onlinecourses.swayam2.ac.in/ugc19_hs51/preview
3. https://nptel.ac.in/courses/110106045

FIFTH SEMESTER

Course Title: ELECTIVE I – RESOURCE MANAGEMENT TECHNIQUES

Course Code : 2307524(E)	**Credits : 05**
L:T:P:S : 5:0:0:0	**CIA Marks : 50**
Exam Hours : 03	**ESE Marks : 50**

Course Objectives:

- *To get in-depth Knowledge about the evolution of operations research and its Features*
- *Understand the characteristics of Operations Research.*
- *Understanding how to apply Operations Research in industry.*
- *Understanding how Operations Research helps in decision making.*

Course outcomes: At the end of course, the student will be able

CO1	Applying features of Operations Research in decision making for industries. Develop formulations for Linear programming problem
CO2	Obtain the Algebraic Solution using Simplex method and Big M method
CO3	Obtain solution for Transportation Model and Assignment Model Problems and also understand the difference between the same
CO4	Understanding Sequencing Problem and Processing each of 'n' jobs through m machines Understanding the characteristics of game theory and obtaining the algebraic solution for solving games.
CO5	Applying PERT and CPM computations and thereby scheduling the resources

Mapping of Course outcomes to program outcomes:

	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	3	3	2	-	1	1
CO2	1	2	3	-	3	-
CO3	2	1	3	-	3	-
CO4	3	2	3	-	3	1
CO5	3	1	3	-	3	1

3: Strong 2: Medium 1: Low -: No Correlation

Sl. No.	Content of module	Hrs	COs
1	**Unit I: Basics of Operations Research (OR):** Characteristics of O.R-Necessity of O.R in Industry-OR and Decision making-Role of computers in O.R. **Linear Programming**: Formulations and Graphical solution canonical and standard terms of LPP.	**15**	**CO1**
2	**Unit II: Algebraic Solution**: Simplex method - Charnes method of penalties – Two Phase Simplex Method – Concept of Duality- Properties of Duality.	**15**	**CO2**
3	**Unit III: Transportation Model**: Definition –n formulation and solution of transportation models- North–West Corner Method- the row – minima, column – minima, matrix minima and Vogel's approximation methods **(Note: no optimal solution problems)**. **Assignment Model**: Definition of Assignment Model – comparison with Transportation Model – solution of Assignment model –Variations of Assignment problem – Finding Optimal Solution of Assignment Problem.	**15**	**CO3**
4	**Unit IV: Sequencing Problem**: Processing each of 'n' jobs through m machines – Processing 'n' jobs through 2 machines – Processing 'n' jobs through 3 machines – Processing 2 jobs through 'm' machines – Processing 'n' jobs through 'm' machines – Travelling Salesman Problem. **Game Theory**: Characteristics of games – Maximin, Minimax criteria of optimality – Dominance property.	**15**	**CO4**
5	**Unit V: Network models and simulation:** Pert – CPM Networks- Measure of activity – PERT and CPM computation – Resource Scheduling – Floats Calculations – Basics of Monte Carlo Simulation	**15**	**CO5**

TEXTBOOK:

1. **Kanti Swarub, P. K. Gupta, Manmohan**, "*Operations Research*", S. Chand & Sons.

REFERENCE BOOKS:

1. **Ackoff R. L. and Sasieni M.W**, "*Fundamentals of Operations Research*", John Wiley & Sons, New York.
2. **Charnes A. Cooper W. and Hendersen A**., "*Introduction to Linear Programming*", Wiley & Sons. New York.
3. **Srinath L.S**, "*PERT and CPM Principles and Applications*", Affiliated East West Press Pvt. Ltd., New York.

E-REFERENCES:

1. https://en.wikipedia.org/wiki/Operations_research

FIFTH SEMESTER

Course Title: CORE PRACTICAL VII - DOT NET FRAMEWORK PROGRAMMING LAB

Course Code	**: 2307525**	**Credits**	**: 03**
L:T:P:S	**: 0:0:5:0**	**CIA Marks**	**: 50**
Exam Hours	**: 03**	**ESE Marks**	**: 50**

Course Objectives:

- *To demonstrate the design VB.NET form with controls.*
- *To demonstrate the creation of Console application.s*
- *To demonstrate the creation of Windows applications.*
- *To facilitate students in Database design*

Lab Exercises: Console Applications

1. To perform Number Checking (Sum of Digits, Factorial, Armstrong)
2. To prepare a Student Mark Sheet using Struct & Enum.
3. To perform String Manipulation.
4. To Handle Built – in Exceptions.
5. To Handle User Defined Exceptions.
6. To prepare Pay Bill for Employees using Functions.
7. To prepare EB Bill using Constructor.
8. To perform Sorting on Numbers using an Array.
9. To calculate the area of different shapes using function overloading.

Windows Applications

10. To perform Number Checking (Sum of Digits, Factorial, Armstrong)
11. To prepare a Student Mark Sheet using Struct & Enum.
12. To perform String Manipulation.
13. To Handle Built – in Exceptions.
14. To Handle User Defined Exceptions.
15. To prepare Pay Bill for Employees using Functions.
16. To prepare EB Bill using Constructor.
17. To Design an Application Form using Win Form Controls.
18. To Design Login Form using Read – Write only Properties.
19. To prepare student mark statement using Database.

FIFTH SEMESTER

Course Title: CORE PRACTICAL VIII -DATA MINING CONCEPTS LAB

Course Code	**: 2307526**	**Credits**	**: 03**
L:T:P:S	**: 0:0:5:0**	**CIA Marks**	**: 50**
Exam Hours	**: 03**	**ESE Marks**	**: 50**

Course Objectives:

- *On taking this course the student will be able to create a Data Frame*
- *Load a dataset and perform data cleaning operations*
- *To integrate data from different sources*
- *To select the relevant data and remove the irrelevant data*
- *To perform classification using classification algorithms*
- *Apply clustering algorithms to cluster the data.*

Lab Exercises:

1. Data Preprocessing
2. Missing Values
3. Checking Null Values
4. Data Integration
5. Programs using Min max Normalization
6. Z-Score Normalization
7. Programs to remove Outliers
8. Programs using Association Rule Mining
9. Programs using Classification
10. Programs using Clustering

SIXTH SEMESTER

Course Title: CORE - PHP & MySQL

Course Code	**: 2307627**	**Credits**	**: 05**
L: T: P: S	**: 4:1:0:0**	**CIA Marks**	**: 50**
Exam Hours	**: 03**	**ESE Marks**	**: 50**

Course Objectives:

- *Understand the usage of PHP and MySQL in dynamic web development.*
- *Understand PHP language data types, logic controls, built-in and user-defined functions*
- *Be able to setup and configure MySQL, PHP, Apache web server development environment.*
- *Select, insert, update and delete data using SQL language.*
- *Understand Object oriented programming paradigm in PHP.*
- *Build a simple, yet functional web application using PHP/MySQL*

Course Outcomes: At the end of the Course, the Student will be able to:

CO1	Discuss the basic concepts, creating basic scripts, Implement data types, variables and operators
CO2	Illustrate the conditional statements, Implementing String and numeric functions
CO3	Create and processing array functions, Express the date and time functions
CO4	Creating User-Defined Functions and classes, Implement files and directories
CO5	Demonstrate database connectivity, Examine the user input through Database layer and Application layer, Construct query output with Character, Numeric, Date and time.

Mapping of Course Outcomes to Program Specific Outcomes:

	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	3	2	-	-	-	-
CO2	2	3	1	-	-	-
CO3	1	1	3	3	2	-
CO4	-	-	1	3	3	2
CO5	-	-	-	2	3	3

3: Strong 2: Medium 1: Low -: No Correlation

Sl. No.	Contents of Module	Hrs	COs
1	**Unit I: Introducing PHP** – Basic development Concepts – Creating first PHP Scripts – Using Variable and Operators – Storing Data in variable – Understanding Data types – Setting and Checking variables Data types – Using Constants – Manipulating Variables with Operators.	**15**	**CO1**
2	**Unit II: Controlling Program Flow**: Writing Simple Conditional Statements - Writing More Complex Conditional Statements – Repeating Action with Loops – Working with String and Numeric Functions.	**15**	**CO2**
3	**Unit III: Working with Arrays**: Storing Data in Arrays – Processing Arrays with Loops and Iterations – Using Arrays with Forms - Working with Array Functions – Working with Dates and Times	**15**	**CO3**
4	**Unit IV: Using Functions and Classes**: Creating User-Defined Functions - Creating Classes – Using Advanced OOP Concepts. **Working with Files and Directories:** Reading Files-Writing Files-Processing Directories –Cookies – Session Management.	**15**	**CO4**
5	**Unit V: Working MySQL with PHP**: Database connectivity- Usage of MYSQL commands in PHP- Processing result sets of queries - Validating user input through Database layer and Application layer-Formatting query output with Character, Numeric, Date and time.	**15**	**CO5**

TEXT BOOKS:

1. **Vikram Vaswani**, "*PHP A Beginner's Guide*", First Edition, TMH.
2. **Mike Mcgrath**, "*PHP and MySQL*", 2012, TMH.

REFERENCE BOOKS:

1. **Rasmus Lerdorf, Kevin Tatroe**, "*Programming PHP"*, Third Edition, O'Reilly.
2. **Robin Nixon**," *PHP, MySQL, and JavaScript: A Step-By-Step Guide to Creating Dynamic Websites"*, First Edition, O'Reilly Media.
3. **Leon Atkinson**, "*Core PHP Programming*", Prentice Hall, ISBN0130463469.
4. **W. Jason Gilmore**, "*Beginning PHP5 and MySQL: From Novice to Professional*", 2004, Apress, ISBN:1-893115-51-8.
5. **Steven Holzner**, "*The PHP Complete Reference*", Tata McGraw-Hill.

E-REFERENCES:

1. http://www.w3schools.com/php/
2. http://www.codingunit.com/php-tutorial-language-introduction

SIXTH SEMESTER

Course Title: CORE – ANDROID PROGRAMMING

Course Code	**: 2307628**	**Credits**	**: 05**
L:T:P:S	**: 4:1:0:0**	**CIA Marks**	**: 50**
Exam Hours	**: 03**	**ESE Marks**	**: 50**

Course Objectives:

- *Develop in-depth Knowledge about the architecture and features of Android.*
- *Implementing the various options available in views.*
- *Understand the file handling concepts and thereby enabling to manage data efficiently.*
- *Able to describe clearly the features of SMS messaging.*
- *Illustrate the concepts of Location Based Services.*

Course outcomes: At the end of course, the student will be able to

CO1	Understand the Overview, Architecture and Features of Android. Study the setting up of Android environment. Developing simple Android application.
CO2	Understand the concepts of Android user interface. Exploring the different types of views available.
CO3	Understand the concepts of Saving and Loading User Preferences. Studies the File Handling methods and thereby able to manage data.
CO4	Able to Send and Receive messages. Understands how to send E-mail. Explores the concepts of Networking thereby able to download Binary Data and Text Files.
CO5	Explore the concepts of Location Based Services thereby able to Display maps and zoom control and add Markers Able to get the location – Geocoding. Understand Publishing Android Applications concepts

Mapping of Course outcomes to program outcomes:

	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	3	2	1	-	-	-
CO2	3	2	1	-	-	-
CO3	3	3	3	2	1	1
CO4	3	2	2	2	1	1
CO5	3	3	3	2	2	2

3: Strong 2: Medium 1: Low -: No Correlation

S. No.	Content of module	Hrs	COs
1	**Unit I: Android Fundamentals:** Android overview and Versions – Features of Android – Architecture of Android - Setting up Android Environment (Eclipse/Android Studio, SDK, AVD)- Anatomy of an Android Application - Simple Android Application Development.	**15**	**CO1**
2	**Unit II: Android User Interface: Layouts**: Linear, Relative, Frame, Grid and Scroll view- Managing changes to Screen Orientation. **Views**: Text View, Button, Image Button, Edit Text, Check Box, Radio Button, Radio Group, Progress Bar, Auto Complete Text View, List Views and Web View.	**15**	**CO2**
3	**Unit III: Data Persistence:** Saving and Loading User Preferences. **File Handling**: File System-Internal and External Storage-Permissions-File Manipulation- **Managing Data using Sqlite:** Creation of database-Insertion, Retrieval and Updation of records.	**15**	**CO3**
4	**Unit IV: SMS Messaging:** Sending and Receiving SMS messages - Sending E-mail **–Networking:** Downloading Binary Data – Downloading Text Files.	**15**	**CO4**
5	**Unit V: Location Based Services**: Displaying maps- Displaying zoom control- Changing view – Adding Markers- Getting the location – Geocoding. **Publishing Android Applications:** Preparing for publishing-Deploying APK Files.	**15**	**CO5**

TEXT BOOK:

1. **Wei Meng Lee,** "*Beginning Android Application Development*", Wrox Publications (John Wiley, New York), 2012.

REFERENCE BOOKS:

1. **Ed Burnette**, "*Hello Android: Introducing Google's Mobile Development Platform*", 3rd edition, 2010, The Pragmatic Publishers.
2. **Reto Meier**, "*Professional Android 4 Application Development*", Wrox Publications, 2012, (John Wiley, New York).

E-REFERENCES:

1. https://www.tutorialspoint.com/mobile_development_tutorials.htm
2. https://www.tutorialspoint.com › Android › Android - Home

SIXTH SEMESTER

Course Title: CORE – ALGORITHMIC DESIGN TECHNIQUES

Course Code : 2307629	**Credits : 05**
L:T:P:S : 5:0:0:0	**CIA Marks : 50**
Exam Hours : 03	**ESE Marks : 50**

Course Objectives:

- *Ability to analyze the performance of algorithms.*
- *Ability to choose appropriate algorithm design techniques for solving problems.*
- *To clear up troubles the usage of set of rules design methods including the grasping approach, divide and conquer, dynamic programming, backtracking and department and certain*

Course outcome: At the end of course, the student will be able to

CO1	Knows how to solve the basic Problems. Derive asymptotic runtime bounds for reasonably straightforward pseudo-code with nested loop Concept of Space complexity, Time complexity
CO2	Knows sorting and searching. Concept of Knap sack problems, Job sequencing with deadlines Definition of Optimal Merge Patterns.
CO3	Know the basic representation of undirected and directed graphs. Understand the shortest path problems and their applications Usage of 0/1 Knapsack
CO4	Concept of Backtracking. Knows to solve the 4-Queens Problem Definition of Hamiltonian Cycle Problem.
CO5	Understand the Travelling Salesman Problem. Definition of Branch and Bound general method.

Mapping of Course outcomes to program outcomes:

	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	3	2	2	1	-	1
CO2	3	3	2	2	1	2
CO3	2	-	1	2	3	2
CO4	3	2	2	2	-	1
CO5	2	2	3	-	2	2

3: Strong 2: Medium 1: Low - : No correlation

Sl. No.	Content of Module	Hrs	COs
1	**Unit I: Introduction:** Problem solving – Procedure – Top-Down and Bottom- up approaches to algorithm design – Use of algorithms in problem solving– Characteristics of algorithmic language. **Developing an algorithm**: Design of algorithms – Implementation of algorithm – Verification of algorithm – Asymptotic notation-Linear Search.	**15**	**CO1**
2	**Unit II: Divide and Conquer**: General Method – Binary Search – Finding Maximum and Minimum – Merge Sort. **Greedy Method**: General method – Optimal storage on tapes – Knap sack problems – Job sequencing with deadlines – Optimal Merge Patterns.	**15**	**CO2**
3	**Unit III: Dynamic Programming**: General Method – Multistage Graphs – All-Pair Shortest Paths – 0/1 Knapsack.	**15**	**CO3**
4	**Unit IV: Backtracking:** General Method–Graph Coloring - Hamiltonian Cycle Problem-– 4-Queens Problem.	**15**	**CO4**
5	**Unit V: Branch and Bound**: General Method (FIFO and LC) – 0/1 Knapsack Problem – Travelling Salesman Problem.	**15**	**CO5**

TEXT BOOKS:

1. **A.A Puntambekar**, "*Analysis and Design of Algorithms*", Technical Publications.
2. **I. Chandra Mohan**, "*Design and Analysis of Algorithms"*, PHI Learning Pvt. Ltd.

REFERENCE BOOKS:

1. **Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, "***Computer Algorithms*", Second Edition, Universities Press.
2. **K. Raghav Rao**, "*Introduction to Design Analysis of Algorithms*", 2013, Smash Words.

E-REFERENCES:

1. http://people.du.ac.in/~ngupta/teach_algorithms_cs301.html#301
2. http://www.uptu.ac.in/pdf/sub_ecs_502_30sep14.pdf

SIXTH SEMESTER

Course Title: ELECTIVE II – FUNDAMENTALS OF CLOUD COMPUTING

Course Code	**: 2307630(A)**	**Credits**	**: 05**
L:T:P:S	**: 5:0:0:0**	**CIA Marks**	**: 50**
Exam Hours	**: 03**	**ESE Marks**	**: 50**

Course Objectives:

- *On taking this course the student will be able to give an insight into the basics of cloud computing along with virtualization, cloud computing is one of the fastest growing domain from a while now.*
- *It will provide the students basic understanding about cloud and virtualization along with it how one can migrate over it*

Course Outcomes: At the end of the Course, the Student will be able to:

CO1	Knows the reason about the basic Cloud models and Importance of various kinds of cloud platforms
CO2	Develop Cloud Concepts and how to implement a software virtualization concept to meet desired needs and Requirements.
CO3	Analyze the Concepts of cloud Utility and Enterprise grid computing, implementing security level of third party in cloud computing, cloud security benefitsand Government policies.
CO4	Design the Cloud Architecture- Layers and Models
CO5	Usage of cloud Configuration using Cloud Simulators

Mapping of Course Outcomes to Program Specific Outcomes:

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	2	2	3	2	1
CO2	2	3	-	3	3	3
CO3	2	-	3	3	3	2
CO4	2	3	3	-	3	2
CO5	2	3	2	3	2	3

3: Strong 2: Medium 1: Low –: No Correlation

Sl. No.	Contents of Module	Hrs	COs
1	**UNIT I:** Cloud Computing Overview- Origins of Cloud computing – Cloud components - Essential characteristics – On-demand self-service, Broad network access, Location independent resource pooling ,Rapid elasticity , Measured service, Comparing cloud providers with traditional IT service providers, Roots of cloud computing.	**15**	**CO1**
2	**UNIT II:** Cloud Insights Architectural influences – High-performance computing, Utility and Enterprise grid computing, Cloud scenarios – Benefits: scalability ,simplicity ,vendors ,security, Limitations – Sensitive information - Application development- security level of third party - security benefits.	**15**	**CO2**
3	**UNIT III:** Cloud Architecture- Layers and Models Layers in cloud architecture, Software as a Service (SaaS), features of SaaS and benefits, Platform as a Service (PaaS), features of PaaS and benefits, Infrastructure as a Service (IaaS), features of IaaS and benefits, Service providers, challenges and risks in cloud adoption.	**15**	**CO3**
4	**UNIT IV: Cloud deployment model**: Public clouds – Private clouds – Community clouds - Hybrid clouds - Advantages of Cloud computing. Cloud Simulators- CloudSim and CloudSim Architecture(User code, CloudSim,)	**15**	**CO4**
5	**UNIT V:** Introduction to VMWare Simulator Basics of VMWare, advantages of VMware virtualization, using Vmware workstation, creating virtual machines-understanding virtual machines.	**15**	**CO5**

TEXT BOOKS

1. **Anthony T. Velte , Toby J. Velte Robert** (2010) "*Cloud computing a practical approach*" - TATA McGraw- Hill , New Delhi ISBN no:978-0-07-162695
2. **Michael Miller** (2008) "*Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online*", Que Print Publishers ,ISBN no: 9780768686227

REFERENCE BOOKS

1. **Judith Hurwitz , Robin Bloor , Marcia Kaufman ,Fern Halper**, (2010) "*Cloud computing for dummies*"- Wiley Publishing, ISBN no:978-0-470-48470-8
2. **Rajkumar Buyya, James Broberg, Andrzej Goscinski**. (2011) "*Cloud Computing Principles and Paradigms*", Wiley & Sons, Inc publications. ISBN no: 978-0-470-88799-8

E-REFERENCES

1. https://www.ibm.com/in-en/cloud/learn/cloud-computing
2. http://dhoto.lecturer.pens.ac.id/lecture_notes/internet_of_things/cloud%20computing
3. https://ptgmedia.pearsoncmg.com/images/9780133387520/samplepages/0133387526.pdf
4. https://searchaws.techtarget.com/definition/Amazon-Web-Services
5. https://www.simplilearn.com/tutorials/aws-tutorial/what-is-aws

SIXTH SEMESTER

Course Title: ELECTIVE II – APPLICATIONS OF INTERNET OF THINGS

Course Code	**: 2307630(B)**	**Credits**	**: 05**
L:T:P:S	**: 5:0:0:0**	**CIA Marks**	**: 50**
Exam Hours	**: 03**	**ESE Marks**	**: 50**

Course Objectives:

- *On taking this course, student will be able to understand the fundamentals of Internet of Things and its architecture.*
- *To learn about the basics of IOT protocol, to gain understanding and build a small low cost embedded system using RaspberryPi.*
- *To apply the concept of Internet of Things in the real world scenario.*

Course Outcomes: At the end of the Course, the Student will be able to:

CO1	Interpret the vision of IoT from a global context
CO2	Describe the fundamentals of IoT and M2M
CO3	Analyze applications of IoT in Raspberry PI
CO4	Appreciate the role of cloud computing and services in IoT.
CO5	Appreciate the role of Big data analytics in a typical IoT system and determine its industrial perspective.

Mapping of Course Outcomes to Program Specific Outcomes:

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	2	2	3	2	2
CO2	2	3	3	3	-	3
CO3	2	3	3	3	3	-
CO4	2	-	3	-	3	3
CO5	2	3	2	3	2	2

3: Strong 2: Medium 1: Low –: No Correlation

Sl. No.	Contents of Module	Hrs	COs
1	**UNIT I:** Introduction - Physical Design of IoT- Logical Design of IoT- IoT Enabling Technologies - IoT Levels & Deployment Templates.	**15**	**CO1**
2	**UNIT II:** Iot and M2M: M2M – Difference between IoT and M2M-SDN and NFV for IoT. IoT system management: Need for SNMP-Network operator requirements- NETCONF - YANG - IoT System Management with NETCONF-YANG.	**15**	**CO2**
3	**UNIT III:** IoT Platforms Design Methodology: Ten steps in IoT design methodology- IoT Physical Devices & Endpoints: Basic building blocks of IoT devices – Exemplary device: Raspberry Pi – Linux on Raspberry Pi – Raspberry Pi Interfaces.	**15**	**CO3**
4	**UNIT IV:** IoT Physical Servers and Cloud Offerings : Introduction to Cloud storage models and Communication APIs – WAMPAutoBahn for IoT – Xively Cloud for IoT – Python Web Application Framework for DJANGO – DJANGO Architecture.	**15**	**CO4**
5	**UNIT V:** Amazon Web Services for IoT – Amazon EC2 – Amazon AutoScaling – Amazon S3 – AmazonRDS – Amazon DynamoDB – Data Analytics for IoT.	**15**	**CO5**

TEXT BOOKS

1. **Arshdeep Bahga, Vijay Madisetti**, "*Internet of Things: A Hands-on Approach"*, I Edition, Universities Press, 2015, ISBN: 978-8173719547
2. **Dimitrios Serpanos, Marilyn Wolf**, "*Internet-of-Things (IoT) Systems: Architectures, Algorithms, Methodologies",* I Edition, Springer, 2018, ISBN: 978-3319697147

REFERENCE BOOKS

1. **Honbo Zhou**, "*The Internet of Things in the Cloud: A Middleware Perspective"*, I Edition, CRC Press, 2012. ISBN: 978-1439892992
2. **Olivier Hersent, David Boswarthick, Omar Elloumi**, "*The Internet of Things – Key applications and Protocols"*, Wiley, 2012, ISBN: 978-8126557653
3. **Raj Kamal**, "*Internet of Things Architecture and Design Principles"*, First Edition, Mc-Graw Hill Education, 2017. ISBN: 978-9352605224
4. **Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stamatis, Karnouskos, Stefan Avesand. David Boyle**, "*From Machine-to-Machine to the Internet of Things - Introduction to a New Age of Intelligence",* First Edition, Academic Press, 2014, ISBN : 012407684X

E-REFERENCES

1. https://nptel.ac.in/courses/106/105/106105166/
2. https://www.edureka.co/blog/iot-tutorial/
3. https://www.javatpoint.com/iot-internet-of-things

SIXTH SEMESTER

Course Title: ELECTIVE II – INFORMATION AND CYBER SECURITY

Course Code	**: 2307630(C)**	**Credits**	**: 05**
L:T:P:S	**: 5:0:0:0**	**CIA Marks**	**: 50**
Exam Hours	**: 03**	**ESE Marks**	**: 50**

Course Objectives:

- *On taking this course the student will be able to understand and revise the common threats faced today.*
- *To understand the foundational theory behind information security and analyze what are the basic principles and techniques when designing a secure system.*
- *To apply attacks and defenses work in practice.*
- *How to assess threats for their significance.*
- *How to gauge the protections and limitations provided by today's technology.*

Course Outcomes: At the end of the Course, the Student will be able to:

CO1	Understand Information Security Principles such as security attacks and services.
CO2	Design Terms, concepts related to Security Attacks and Services.
CO3	Apply the Concepts of various privacy methods.
CO4	Analyze the cyber security concepts and principles.
CO5	Understand the classification, remedial, frauds, legal privacies of cybercriminals.

Mapping of Course Outcomes to Program Specific Outcomes:

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	2	3	1
CO2	3	3	3	2	3	3
CO3	3	3	3	3	3	2
CO4	3	3	3	3	3	2
CO5	3	3	3	3	3	3

3: Strong 2: Medium 1: Low –: No Correlation

S. No	CONTENTS OF MODULE	Hrs	COs
1	**UNIT I:** Overview of Information Security - What is Information and why should be protect it? - Threats – Frauds-Thefts- Malicious Hackers- Malicious Code- Denial-of-Services Attacks and Social Engineering – Vulnerability: Types.	**15**	**CO1**
2	**UNIT II:** Security Attacks - Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms	**15**	**CO2**
3	**UNIT III:** Email privacy: Pretty Good Privacy (PGP) and S/MIME.P Security Overview - IP Security Architecture - Authentication Header - Encapsulating Security Payload - Combining Security Associations and Key Management	**15**	**CO3**
4	**UNIT IV:** Defining Cyberspace - Architecture of cyberspace - Communication and web technology - Advent of internet - Internet infrastructure for data transfer and governance - Internet society - Concept of cyber security - Issues and challenges of cyber security.	**15**	**CO4**
5	**UNIT V:** Classification of Cyber Crimes - Common Cyber Crimes - Cyber Crime targeting computers and mobiles - Cyber Crime against women and children - financial frauds - social engineering attacks - malware and ransom ware attacks - zero day and zero click attacks.	**15**	**CO5**

TEXT BOOKS:

1. **William Stallings**, "*Network Security Essentials (Applications and Standards)*", Pearson Education, 2008.
2. **R. C Mishra**, Cyber Crime Impact in the New Millennium, Auther Press. Edition 2010.

REFERENCE BOOKS:

1. **Eric Maiwald,** "*Fundamentals of Network Security"*, Dreamt ech press, 2004.
2. **Sumit Belapure and Nina Godbole**, "*Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives*", Wiley India Pvt. Ltd., First Edition, 2011**.**

E-REFERENCES:

1. http://www.freetechbooks.com/an-introduction-to-computer-security-the-nist-handbook-t725.html

SIXTH SEMESTER

Course Title: ELECTIVE II – BASIC CONCEPTS OF ARTIFICIAL INTELLIGENCE

Course Code : 2307630(D)	**Credits : 05**
L: T: P: S : 5:0:0:0	**CIA Marks : 50**
Exam Hours : 03	**ESE Marks : 50**

Course Objectives:

- *To get in-depth Knowledge about the evolution of AI and Export Systems.*
- *Bring out the Features of Artificial Intelligence.*
- *Develop Heuristic Search Techniques.*
- *Implementing the Predicate Logic and Expert Systems.*

Course Outcomes: At the end of the Course, the Student will be able to:

CO1	Definition, AI Problem, AI Applications, AI Techniques and criteria for success. Defining the problem as a state space search.
CO2	Heuristic search techniques –Generate and test, simple hill climbing. Best first search –OR graph, A* Algorithm. Problem Reduction- AND OR graph, AO* Algorithm.
CO3	Knowledge representations and Mapping, Properties for Knowledge representation system, Frame Problem
CO4	Representing simple facts in logic, Representing Instance and ISA relationship, Computable function and Predicate, Resolution and Natural Deduction.
CO5	Characteristics of Expert System, Architecture of Expert Systems, Benefits and Limitations of Expert systems, Development States, Applications and Expert systems Tools

Mapping of Course Outcomes to Program Specific Outcomes:

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	1	2	-	-	1
CO2	2	3	3	2	2	3
CO3	3	3	2	3	2	2
CO4	3	2	1	1	-	2
CO5	2	3	3	3	3	3

3: Strong 2: Medium 1: Low –: No Correlation

Sl. No.	Contents of Module	Hrs	COs
1	**UNIT I: What is Artificial Intelligence?:** he AI Problems - The Underlying Assumption - What is an AI Technique? - The Level of the Model - Criteria for Success - Some General References - One Final Word and Beyond. **Problems, Problem Spaces, and Search:** Defining the Problem as a State Space Search - Production Systems - Problem Characteristics -Production System Characteristics - Issues in the Design of Search Programs.	**15**	**CO1**
2	**UNIT II: Heuristic Search Techniques:** Generate-and-Test - Hill Climbing - Best-first Search - Problem Reduction - Constraint Satisfaction - Means-ends Analysis. **Knowledge Representation Issues:** Representations and Mappings - Approaches to Knowledge Representation - Issues in Knowledge Representation - The Frame Problem.	**15**	**CO2**
3	**UNIT III: Using Predicate Logic:** Representing Simple Facts in Logic - Representing Instance and ISA Relationships - Computable Functions and Predicates - Resolution - Natural Deduction. **Representing Knowledge Using Rules:** Procedural Versus Declarative Knowledge - Logic Programming - Forward Versus Backward Reasoning - Matching - Control Knowledge.	**15**	**CO3**
4	**UNIT IV: Symbolic Reasoning Under Uncertainty:** Introduction to Nonmonotonic Reasoning - Logics for Nonmonotonic Reasoning - Implementation Issues - Augmenting a Problem-solver - Implementation: Depth-first Search - Implementation: Breadth-first Search. **Statistical Reasoning:** Probability and Bayes' Theorem - Certainty Factors and Rule-based Systems - Bayesian Networks - Dempster-Shafer Theory - Fuzzy Logic.	**15**	**CO4**
5	**UNIT V: Weak Slot-and-Filler Structures:** Semantic Nets – Frames. **Strong Slot-and-Filler Structures:** Conceptual Dependency - Scripts – CYC. **Knowledge Representation Summary:** Syntactic-semantic Spectrum of Representation - Logic and Slot-and-filler Structures - Other Representational Techniques - Summary of the Role of Knowledge.	**15**	**CO5**

TEXT BOOKS:

1. **Eline Rich, Kevin Knight and Shivashankar B. Nair**, "*Artificial Intelligence*", Third Edition, 2017, TMH.
2. **Stuart Russell & Peter Norvig**, "*Artificial Intelligence a modern Approach*", Second Edition, Pearson Education.

REFERENCE BOOKS:

1. **V S Janaki Raman, K Sarukesi, P Gopalakrishnan, "***Foundations of Artificial Intelligence and Expert Systems",* MacMillan India limited.
2. **D.W. Patterson, "***Introduction to AI and Expert Systems***",** PHI**.**

E-REFERENCES:

1. www.vssut.ac.in/lecture_notes/lecture1428643004.pdf
2. http://vfu.bg/en/e-Learning/Artificial-Intelligence--AI_and_ES_Nowledge_base_systems.pdf

SIXTH SEMESTER

Course Title: ELECTIVE II – MECHANISMS OF BLOCK CHAIN TECHNOLOGY

Course Code : 2307630(E)	**Credits : 05**
L: T: P: S : 5:0:0:0	**CIA Marks : 50**
Exam Hours : 03	**ESE Marks : 50**

Course Objectives:

- Understand how blockchain systems (mainly Bitcoin and Ethereum) work.
- To securely interact with them.
- Design, build, and deploy smart contracts and distributed applications.
- Integrate ideas from blockchain technology into their own projects.

Course Outcomes: At the end of the Course, the Student will be able to:

CO1	Understand the abstract models behind Blockchain Technology.
CO2	Identify the insights of crypto currency domain-Bitcoin.
CO3	Demonstrate the Ethereum platform as an example for Blockchain technology.
CO4	Apply hyper ledger Fabric to implement the Block chain Application.
CO5	Discuss the various application areas of Blockchain

Mapping of Course Outcomes to Program Specific Outcomes:

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	2	3	2
CO3	3	-	1	3	2	3
CO4	3	3	3	2	2	-
CO5	3	3	2	3	3	2

3: Strong 2: Medium 1: Low –: No Correlation

Sl. No.	Contents of Module	Hrs	COs
1	**UNIT I: Introduction to Blockchain:** Blockchain-Centralized vs Decentralized systems-Layers of block chain- Limitations of Centralized Systems - Blockchain adoption so far-Blockchain uses and Use cases-Byzantine Generals' Problem-The block chain and Merkle Trees-Properties of Blockchain Solutions-Blockchain Transactions-Distributed Consensus Mechanisms-Blockchain applications.	**15**	CO1
2	**UNIT II: Working of Bit Coin:** Bitcoin -Working with bit coins-The Bitcoin Blockchain: Block Structure, The Genesis Block-The Bitcoin Network: Bitcoin Transactions, Consensus and Block Mining, Block Propagation-Full Nodes vs SPVs.	**15**	CO2
3	**UNIT III: Working of Ethereum:** Design Philosophy of Ehtereum-Etherreum Blockchain-Ethereum accounts-Trie Usage-Merkle Patricia Tree -Ethereum Transaction and Message Structure-Ethereum State Transaction Function-Gas and Transaction Cost-Ethereum smart contracts-Ethereum virtual machine and code execution- Ethereum Ecosystem: Swarm, Whisper, DApp, Development Components.	**15**	CO3
4	**UNIT IV: Hyperledger:** Introduction to Hyperledger-Blockchain for business-Advantages of Hyperledger fabric-Problems with existing block chain technology-Hyperledger fabric architecture-Consensus in Hyperledger-Hyperledger tools-Hyperledger components.	**15**	CO4
5	**UNIT V: Blockchain-Outside of Currencies:** Internet of Things: Physical Object Layer, Device Layer, Network Layer, Management Layer and Application Layer-Government: Border control, Voting, ID cards-Health-Finance: Insurance, Post trade settlement and Financial Crime Prevention, Media.	**15**	CO5

Text Books:

1. **B. Singhal & G. Dhameja**, "*Beginning Blockchain: A Beginner's Guide to Building Blockchain Solutions*", First Edition, Apress 2018.
2. **Nakul Shah**, "*Blockchain for Business with Hyperledger Fabric: A complete guide to enterprise blockchain implementation using Hyperledger Fabric*", BPB Publications, 2019
3. **Bashir, Imran**, "*Mastering Blockchain: Deeper Insights Into Decentralization, Cryptography, Bitcoin, and Popular Blockchain Frameworks*", 2017.

Reference Books:

1. **Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder,** "*Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction*", Princeton University Press, 2016.
2. **D. Mohanty**, "*Blockchain - From Concept to Execution*", (2e) BPB Publications, 2018.
3. **Antonopoulos**, "*Mastering Bitcoin: Unlocking Digital Crypto currencies*".
4. **Satoshi Nakamoto**, "*Bitcoin: A Peer-to-Peer Electronic Cash System*".

E-References:

1. https://www.tutorialspoint.com/blockchain/index.htm
2. https://www.javatpoint.com/blockchain-tutorial
3. https://nptel.ac.in/courses/106/105/106105184/
4. https://onlinecourses.nptel.ac.in/noc20_cs01/preview

SIXTH SEMESTER

Course Title: CORE PRACTICAL IX – PHP & MySQL LAB

Course Code	**: 2307631**	**Credits**	**: 02**
L: T: P: S	**: 0:0:4:0**	**CIA Marks**	**: 50**
Exam Hours	**: 03**	**ESE Marks**	**: 50**

Course Objectives:

- *To explain basics PHP variables, constants and controls*
- *To demonstrate the use of String, math and date functions.*
- *To demonstrate the creation of arrays and type of arrays*
- *To explain user defined functions and the concepts of class.*
- *To demonstrate the creation cookies and sessions*
- *To facilitate the creation of Database and validate the user inputs*

Lab Exercises:

1. PHP Variables and constants
2. PHP IF Statement
3. PHP Switch-case statement
4. PHP looping statement
5. PHP String functions
6. PHP mathematical functions
7. PHP numeric array
8. PHP associative array
9. PHP Multidimensional array
10. Array with forms
11. PHP Date and time functions
12. PHP User-defined functions
13. PHP Scope of variables
14. PHP Classes and Objects
15. PHP Cookies
16. PHP Sessions
17. Insertion of records into database using form
18. Viewing of records from database using form
19. Validating user-input using application layer
20. Validating user-input using database layer

SIXTH SEMESTER

Course Title: CORE PRACTICAL X– ANDROID PROGRAMMING LAB

Course Code	**: 2307632**	**Credits**	**: 02**
L: T: P: S	**: 0:0:4:0**	**CIA Marks**	**: 50**
Exam Hours	**: 03**	**ESE Marks**	**: 50**

Course Objectives:

- *To explain user defined functions and the concepts of class.*
- *To demonstrate the creation cookies and sessions*
- *To facilitate the creation of Database and validate the user inputs*

Lab Exercises:

1. Develop an application for Simple Counter.
2. Develop an application to display your personal details using GUI Components.
3. Develop a Simple Calculator that uses radio buttons and text view.
4. Develop an application that uses Dialog Boxes.
5. Develop an application that uses Layout Managers.
6. Develop an application that uses different types of Menus.
7. Develop an application that uses to send messages from one mobile to another mobile.
8. Develop an application that uses to send E-mail.
9. Develop an application that plays Audio and Video.
10. Develop an application that uses Internal File Storage.
11. Develop an application that uses External File Storage.
12. Develop an application for Simple Animation.
13. Develop an application for Login Page using Sqlite.
14. Develop an application for Student Marksheet processing using Sqlite.

SIXTH SEMESTER

Course Title: CORE PRACTICAL XI - MINI PROJECT WORK

Course Code	**: 2307633**	**Credits**	**: 01**
L:T:P:S	**: 0:0:2:0**	**CIA Marks**	**: 50**
Exam Hours	**: 03**	**ESE Marks**	**: 50**

Course Objectives:

Students will be able to:

- *Implement the solution for the chosen problem using the concepts and the techniques learnt in the curriculum.*
- *Develop software applications*
- *Record the research results for a given problem*
- *Identify, formulate and implement computing solutions.*
- *Design and conduct experiments, analyze and interpret data.*
- *Analyze a system, component or process as per needs and specification.*
- *Work on multidisciplinary tasks and will be aware of the new and emerging disciplines.*
- *Demonstrate skills to use modern tools, software and equipment to analyze problems.*

Course Outcomes: At the end of the Course, the Student will be able to:

CO1	Demonstrate a sound technical knowledge, skills and attitude of their selected project topic.
CO2	Understand problem identification, formulation and solution.
CO3	Design solutions to complex problems utilizing a systems approach.
CO4	Communicate with engineers and the community at large in written and oral forms.

Mapping of Course Outcomes to Program Specific Outcomes:

	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	3	3	2	3	3	3
CO2	3	3	3	2	2	3
CO3	3	3	3	2	3	3
CO4	2	3	3	3	3	3

3-Strong 2-Medium 1-Low

Procedure:

- The Head of the Department will assign an Internal Guide for each student.
- During regular intervals, student should report about his/her progress of the project work.
- After the submission of the final report, an external examiner will evaluate the project document and conduct the viva voce examination.