

B.Sc. COMPUTER SCIENCE

Course Structure and Syllabus

(For the candidates admitted from the academic year 2024-2025 onwards)

CHOICE BASED CREDIT SYSTEM- LEARNING OUTCOMES BASED CURRICULUM FRAME WORK (CBCS-LOCF)



THANTHAI HANS ROEVER COLLEGE (AUTONOMOUS)



(Nationally Re-Accredited by NAAC with A)

(Affiliated to Bharathidasan University, Tiruchirappalli)



ELAMBALUR, PERAMBALUR – 621 220

VISION:

- To be a Centre of excellence in education and research in the frontier areas of Computer Science

MISSION:

- To facilitate quality transformative education in Computer Science
- To promote quality research and innovation in technology for meeting global challenges
- To transform students to competent professionals to cater to the needs of the society.

Programme Outcomes (POs):

- Students will acquire basic Practical skills & Technical knowledge along with domain knowledge of different subjects in the Computer Science & humanities stream.
- The skills and knowledge gained leads to proficiency in analytical reasoning, which can be utilized in modelling and solving real life problems.
- Utilize computer programming skills to solve theoretical and applied problems by critical understanding, analysis and synthesis.
- To recognize patterns and to identify essential and relevant aspects of problems.
- Mould the students into responsible citizens in a rapidly changing interdependent society.

Program Specific Outcomes (PSOs)

- Think in a critical and logical based manner
- Familiarize the students with suitable software tools of computer science and industrial applications to handle issues and solve problems in mathematics or statistics and realtime application related sciences.
- Acquire good knowledge and understanding to solve specific theoretical and applied problems in advanced areas of Computer science and Industrial statistics.
- Provide students/learners sufficient knowledge and skills enabling them to undertake further studies in Computer Science or Applications or Information Technology and its allied areas on multiple disciplines linked with Computer Science.
- Develop a range of generic skills helpful in employment, internships& societal activities.

Thanthai Hans Roever College (Autonomous), Elambalur, Perambalur - 621 220

B.Sc. COMPUTER SCIENCE

CHOICE BASED CREDIT SYSTEM–LEARNING OUTCOMES BASED CURRICULUM FRAME WORK (CBCS- LOCF)

(For the candidates admitted from the academic year 2024 - 2025 onwards)

Semester	Part	Course Code	Title of the Course	Ins. Hours/ Weeks	Credits	Exam Hours	CIA (Max)	ESE (Max)	Total (Max)
1	I	23UT1/H1/F1	Language	6	3	3	25	75	100
1	II	23UE1	English -1	6	3	3	25	75	100
1	III	23UCS1CC1	Python Programming	6	5	3	25	75	100
1	III	23UCS1CC2P	Python Programming Lab	5	5	3	40	60	100
1	III	23UMA1AC13	Numerical Methods and Statistics	5	3	3	25	75	100
I	IV	23UCS1SE1	Office Management Tools(NME-1)	2	2	3	25	75	100
			Value Added Course*		2*	2	50	50	100*
Total				30	21	-	-	-	600
2	I	23UT2/H2/F2	Language	6	3	3	25	75	100
2	II	23UE2	English -2	6	3	3	25	75	100
2	III	23UCS2CC3	Data Structure and Algorithms	5	5	3	25	75	100
2	III	23UCS2CC4P	Data Structure and Algorithms Lab	5	5	3	40	60	100
2	III	23UMA2AC2	Operations Research	4	3	3	25	75	100
2	IV	23UCS2SE2	Introduction to HTML (NME-2)	2	2	3	25	75	100
2	IV	23UCS2SE3	Programming in C	2	2	3	25	75	100
			Value Added Course*		2*	2	50	50	100*
Total				30	23	-	-	-	700
3	I	23UT3/H3/F3	Language	6	3	3	25	75	100
3	II	23UE3	English -3	6	3	3	25	75	100
3	III	23UCS3CC5	Microprocessor And Assembly Language Programming	5	5	3	25	75	100
3	III	23UCS3CC6P	Assembly Language Programming Lab	3	3	3	40	60	100
3	III	23UPH3AC3	Electricity and Digital Electronics	3	3	3	25	75	100
3	III	23UPH3AP	Applied Physics Lab-1	3	2	3	40	60	100
3	IV	23UWH	Health And Wealthness	1	1	-	-	-	100
3	IV	23UCS3SE4	Software Testing	2	2	3	25	75	100
3	IV	23UGS	Gender Studies	1	1	3	25	75	100
			Value Added Course*		2*	2	50	50	100*
Total				30	23	-	-	-	900

4	I	23UT4/H4/F4	Language	6	3	3	25	75	100
4	II	23UE4	English -4	6	3	3	25	75	100
4	III	23UCS4CC7	Java Programming	6	5	3	25	75	100
4	III	23UCS4CC8P	Java Programming Lab	4	4	3	40	60	100
4	III	23UPH4AC4	Analog and Opto Electronic	4	3	3	25	75	100
4	IV	23UCS4SE6	Soft Skills	2	2	3	25	75	100
4	IV	23UES	Environmental Studies	2	2	3	25	75	100
		23UVACS4	Value Added Course*		2*	2	50	50	100*
Total				30	22	-	-	-	700
5	III	23UCS5CC9	Software Engineering	6	5	3	25	75	100
5	III	23UCS5CC10	Database Management System	6	5	3	25	75	100
5	III	23UCS5CC11P	Database Management System Lab	4	4	3	40	60	100
5	III	23UCS5CC12	Computer Network	6	5	3	25	75	100
5	III	23UCS5DE11/ 23UCS5DE12	Cloud Computing / Introduction to Data Science	3	3	3	25	75	100
5	III	23UCS5DE21/ 23UCS5DE22	Robotics and its Applications/ Cryptography	3	3	3	25	75	100
5	IV	23UVE	Value Education	2	2	3	25	75	100
			Summer Internship**		2*				100*
			Value Added Course*		2*	2	50	50	100*
Total				30	27	-	-	-	700
6	III	23UCS6CC13PW	Project with Viva-Voce	6	3	3	20	80	100
6	III	23UCS6CC14	Web Application Development	6	5	3	25	75	100
6	III	23UCS6CC15P	Web Application Development Lab	3	2	3	40	60	100
6	III	23UCS6CC16	Internet of Things	6	6	3	25	75	100
6	III	23UCS6DE31 / 23UCS6DE32	Data Analytics using R/ Machine Learning	6	5	3	25	75	100
6	III	23UCS6DE41/ 23UCS6DE42	Data Analytics using R Lab / Machine Learning Lab	3	2	3	40	60	100
6	V		Extension Activity	-	1	-	-	-	-
			Value Added Course*		2*	2	50	50	100*
Total				30	24	-	-	-	600
Grand Total				180	140				4200

Credit Distribution for UG Computer Science

S.No	Part	Course Details	Credit
1	III	Core Course	70
2		Elective Generic/ Discipline Specific Elective	26
3	I& II	Language & English	24
4	IV	NME	4
5		EVS	2
6		Value Education	2
7		Extension Activity	1
8		<ul style="list-style-type: none"> • Skill Enhancement Course 	12
		<ul style="list-style-type: none"> • Summer internship 	2
		<ul style="list-style-type: none"> • Professional Competency Skill 	2

List of Core Courses

1. Python Programming
2. Python Programming Lab
3. Data Structure and Algorithms
4. Data Structure and Algorithms Lab
5. Microprocessor and Assembly Language Programming
6. Assembly Language Programming Lab
7. Java Programming
8. Java Programming Lab
9. Computer Networks
10. Advanced Database Management System
11. Advanced Database Management System Lab
12. Project with Viva-Voce
13. Software Engineering
14. Web Application Development
15. Web Application Development Lab
16. Internet of Things

List of Allied Courses

1. Numerical Methods
2. Statistical Methods
3. Electricity and Digital Electronics
4. Electronics Lab
5. Analog and Opto Electronic

List of Skill Enhancement Courses

1. Office Automation (NME-1)
2. Introduction to Internet (NME-2)
3. Programming in C
4. Essentials of Business
5. Cloud computing
6. PHP Programming
7. PHP Programming Lab

List of Elective Courses

1. Operating Systems
2. Data Mining and Ware Housing
3. Introduction to Data Science
4. Cyber Security

Note:

	Internal Marks	External Marks
1. Theory	25	75
2. Practical	40	60
3. Separate passing minimum is prescribed for Internal and External marks		

FOR THEORY

The passing minimum for CIA shall be 40% out of 25 marks [i.e. 10 marks]

The passing minimum for Semester Examinations shall be 40% out of 75 marks [i.e. 30 marks]

FOR PRACTICAL

The passing minimum for CIA shall be 40% out of 40 marks [i.e. 16 marks]

The passing minimum for Semester Examinations shall be 40% out of 60 marks [i.e. 24 marks]

- Project : 100 Marks (The Project will be evaluated by an Internal and an External Examiner)
- Dissertation- 80 Marks
- Viva Voce - 20 Marks

List of Value Added Courses

Course Code	Course Title
23UVACS1	Internet and its Technologies
23UVACS2	Ruby on Rails
23UVACS3	Open Broadcast Software
23UVACS4	Ethical Hacking
23UVACS5	Network Programming
23UVACS6	Mobile Repair and Trouble Shooting

Question Paper Pattern

UG Programme		
Maximum Marks : 75		Duration: 3 Hours
Section - A	i) a- (5 Questions for Multiple Choice) One question from each unit	5 x 1 = 5 Marks
	b- (5 Questions for Fill in the Blanks) One question from each unit	5 x 1 = 5 Marks
	ii) (5 short answer questions) One question from each unit	5 x 2 = 10 Marks
Section - B	5 Questions (Internal Choice: Either or) One set of questions from each unit	5 x 5 = 25 Marks
Section - C	3 Questions (Answer any 3 out of 5 Questions) One question from each unit	3 x 10 = 30 Marks

SEMESTER I

Course Code: 23UCS1CC1
Instruction Hours: 6
Credits: 5

Exam Hours: 3
Internal Marks: 25
External Marks: 75

CORE COURSE - I PYTHON PROGRAMMING

Learning Objectives (LO):

- LO1: To make students understand the concepts of Python programming.
- LO2: To apply the OOPs concept in PYTHON programming.
- LO3: To impart knowledge on demand and supply concepts
- LO4: To make the students learn best practices in PYTHON programming
- LO5: To know the costs and profit maximization.

Course Outcomes (CO):

On completion of this course, students will

- 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.

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.

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.

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.

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.

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 – with keyword – Splitting words – File methods - File Positions- Renaming and deleting files.

Text Book:

1. ReemaThareja, "Python Programming using problem solving approach", First Edition, 2017, Oxford University Press.
2. Dr.R.NageswaraRao, "Core Python Programming", First Edition, 2017, Dream tech Publishers.

Reference Books:

1. VamsiKurama, "Python Programming: A Modern Approach", Pearson Education.
2. Mark Lutz, "Learning Python", Orielly.
3. Adam Stewarts, "Python Programming", Online.
4. Fabio Nelli, "Python Data Analytics", APress.
5. Kenneth A. Lambert, "Fundamentals of Python – First Programs", CENGAGE Publication.

Web Resources:

<https://www.programiz.com/python-programming>
<https://www.guru99.com/python-tutorials.html>
https://www.w3schools.com/python/python_intro.asp
<https://www.geeksforgeeks.org/python-programming-language/>
[https://en.wikipedia.org/wiki/Python_\(programming_language\)](https://en.wikipedia.org/wiki/Python_(programming_language))

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits				
I	23UCS1CC1	PYTHON PROGRAMMING					6	5				
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓		
CO2		✓	✓	✓	✓	✓	✓		✓	✓		
CO3	✓	✓	✓	✓		✓	✓	✓				
CO4	✓		✓		✓	✓	✓	✓	✓	✓		
CO5	✓	✓	✓	✓	✓		✓	✓	✓			
Number of matches (✓) = 40, Relationship: High												

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

SEMESTER I

Course Code: 23UCS1CC2P
Instruction Hours: 5
Credits: 5

Exam Hours: 3
Internal Marks:40
External Marks:60

CORE COURSE - PYTHON PROGRAMMING LAB

Learning Objectives (LO):

- LO1: Be able to design and program Python applications.
- LO2: Be able to create loops and decision statements in Python.
- LO3: Be able to work with functions and pass arguments in Python.
- LO4: Be able to build and package Python modules for reusability.
- LO5: Be able to read and write files in Python.

Course Outcomes (CO):

On completion of this course, students will

- CO1: Demonstrate the understanding of syntax and semantics of PYTHON language
- CO2: Identify the problem and solve using PYTHON programming techniques.
- CO3: Identify suitable programming constructs for problem solving.
- CO4: Analyze various concepts of PYTHON language to solve the problem in an efficient way.
- CO5: Develop a PYTHON program for a given problem and test for its correctness.

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 Functions.
6. Program using Arrays.
7. Program using Strings.
8. Program using Lists.
9. Program using Tuples.
10. Program for File Handling.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits			
I	23UCS1CC2P	PYTHON PROGRAMMING LAB					5	5			
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓	
CO2		✓	✓	✓	✓	✓	✓		✓	✓	
CO3	✓	✓	✓	✓		✓	✓	✓			
CO4	✓		✓		✓	✓	✓	✓	✓	✓	
CO5	✓	✓	✓	✓	✓		✓	✓	✓		
Number of matches (✓) = 40, Relationship: High											

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

ALLIED MATHEMATICS
ALLIED COURSE - I - NUMERICAL METHODS AND STATISTICS

Course Code: 23UMA1AC13
Instruction Hours: 5
Credits: 3

Exam Hours: 3
Internal Marks: 25
External Marks: 75

OBJECTIVES:

- To apply the numerical problem in efficiency with various methods.
- To Derive numerical methods for various mathematical operations and tasks

COURSE OUTCOMES:

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

CLO 1: Compute the Solution of Algebraic and Transcendental equation using Bisection and Newton- Raphson Method.

CLO 2: Find the solution of linear system of equation by Gaussian Elimination, Gauss Jacobi, and Gauss Seidel Methods

CLO 3: Evaluate finite integrals using Trapezoidal and Simpsons rule and Solve differential equation and integration.

CLO 4: Categorize and evaluate various measures of central tendency.

CLO 5: Calculate correlation and regression.

UNIT – I

The Solution of Numerical Algebraic and Transcendental Equations: Bisection Method - Iteration Method – Regula Falsi Method - Newton Raphson Method – Simple Problems only.

UNIT – II

Solutions of Simultaneous Linear Algebraic Equations: Gauss Elimination Method– Gauss Jordan Method - Gauss Jacobi - Gauss Seidel Method.

UNIT – III

Numerical solution of ODE: Taylor Series Method - Euler’s Method - Runge– Kutta Second and Fourth order method

Numerical Integration: Trapezoidal Rule - Simpson’s Rule (Proof not needed).

UNIT – IV

Measures of Central Tendency: Arithmetic Mean – Median – Mode – Geometric Mean – Harmonic Mean.

Measures of Dispersion: Range– Quartile Deviation - Standard Deviation.

UNIT – V

Correlation and Regression: Introduction –Scatter Diagram -Karl Pearson Co-efficient of Correlation – Rank Correlation- Lines of Regression- Simple Problems only.

TEXT BOOK(S):

1. S.S.Sastry, “Introductory Methods of Numerical Analysis”, PHI Learning Pvt.Ltd, New Delhi 2010.
2. Gupta.S.C&Kapoor, V.K, “Fundamentals of Mathematical Statistics”, Sultan Chand & sons, New Delhi 1994.

UNIT – I	Chapter – 2	Sections 2.2, to 2.5 of [1]
UNIT – II	Chapters – 6 & 8	Sections 6.3.2 to 6.3.3& 8.3.1 to 8.3.2 of [1]
UNIT – III	Chapters – 7 & 5	Sections 7.2, 7.4, 7.5 & 5.4.1 to 5.4.3 of [1]
UNIT – IV	Chapters – 2 & 3	Sections 2.3 to 2.5.2, 2.6 to 2.9.1 & 3.3 – 3.5, 3.7 of [2]
UNIT – V	Chapter – 10	Sections 10.1 to10.3, 10.3.1, 10.6, 10.7 & 10.7.1 of [2]

REFERENCE(S):

1. M.K. Jain, S.R.K. Iyengar and R.K. Jain, “Numerical Methods for Scientific and Engineering Computation”, New Age International Private Limited, 1999.
3. C.E. Froberg, “Introduction to Numerical Analysis”, II Edn., Addison Wesley, 1979.
4. P. Kandasamy, K.Thilagavathy, Calculus of Finite Differences and Numerical Analysis (Allied Mathematics), S.Chand&Co.Ltd, New Delhi.

WEB LINK:

1. <https://www.youtube.com/watch?v=4cqdPHxWs9g>
2. <https://www.youtube.com/watch?v=82IDoaiYU0c>
3. <https://www.youtube.com/watch?v=nmIwSQJmX2M>

Semester	Code	Title of the Course				Hours	Credits			
I	23UMA1AC13	NUMERICAL METHODS & STATISTICS				5	3			
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO3		✓	✓	✓		✓		✓		
CO4		✓		✓			✓	✓		
CO5	✓	✓			✓	✓	✓		✓	✓
Number of Matches (✓) = 36					Relationship: HIGH					

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

SEMESTER I

Course Code: 23UCS1SE1
Instruction Hours: 2
Credits:2

Exam Hours: 3
Internal Marks:25
External Marks:75

NME1 -OFFICE MANAGEMENT TOOLS

Learning Objectives (LO):

- L01: Understand the basics of computer systems and its components.
- L02: Understand and apply the basic concepts of a word processing package.
- L03: Understand and apply the basic concepts of electronic spreadsheet software.
- L04: Understand and apply the basic concepts of database management system.
- L05: Understand and create a presentation using PowerPoint tool.

Course Outcomes: Programme Outcomes

- CO: On completion of this course, students will
- CO1: Possess the knowledge on the basics of computers and its components.
- CO2: Gain knowledge on Creating Documents, spreadsheet and presentation.
- CO3: Learn the concepts of Database and implement the Query in Database.
- CO4: Demonstrate the understanding of different automation tools.
- CO5: Utilize the automation tools for documentation, calculation and presentation purpose.

UNIT I

Introductory concepts: Memory unit- CPU-Input Devices: Key board, Mouse and Scanner.Outputdevices:Monitor,Printer.IntroductiontoOperatingsystems&itsfeatures:DOS- UNIX- Windows. IntroductiontoProgrammingLanguages.

UNIT II

Word Processing: Open, Save and close word document; Editing text – tools, formatting, bullets;SpellChecker - Document formatting – Paragraph alignment, indentation, headers and footers,numbering;printing-Preview,options,merge.

UNIT III

Spreadsheets:Excel-opening,enteringtextanddata,formatting,navigating;Formulas-entering,handlingand copying;Charts- creating, formatting and printing,analysistables,preparationoffinancialstatements,introductiontoanalytics.

UNIT IV

Database Concepts: The concept of data base management system; Data field, records, and files,Sorting and indexing data; Searching records. Designing queries, and reports; Linking of datafiles; Understanding Programming environment in DBMS; Developing menu drive applicationsinquerylanguage(MS-Access).

UNIT V

Power point: Introduction to Power point - Features – Understanding slide typecasting &viewingslides – creating slide shows. Applying special object – including objects & pictures – Slidetransition- Animationeffects,audioinclusion,timers.

TextBook:

1. PeterNorton, "IntroductiontoComputers" –TataMcGraw-Hill

Reference Book:

1. Jennifer Ackerman Kettel, Guy Hat-Davis, Curt Simmons, "Microsoft 2003", Tata McGrawHill.

Web Resources:

1. <https://www.udemy.com/course/office-automation-certificate-course/>.
2. <https://www.javatpoint.com/automation-tools>

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits			
I	23UCS1SE1	OFFICE AUTOMATION Tools(NME-1)					2	2			
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓	
CO2		✓	✓	✓	✓	✓	✓		✓	✓	
CO3	✓	✓	✓	✓		✓	✓	✓			
CO4	✓		✓		✓	✓	✓	✓	✓	✓	
CO5	✓	✓	✓	✓	✓		✓	✓	✓		
Number of matches (✓) = 40, Relationship: High											

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

SEMESTER I

INTERNET AND ITS TECHNOLOGIES

Course Code: 23VACS01
Instruction Hours : 2
Credits: 2

Exam Hours: 3
Internal Marks: 50
External Marks: 50

Course Objectives:

- Explain how the client-server model of Internet programming works.
- Design and develop interactive, client-side, executable web applications.
- Demonstrate how Internet programming tasks are accomplished.
- Build tools that assist in automating data transfer over the Internet.
- Compare the advantages and disadvantages of the core Internet protocols.

UNIT I:

Network technology: Introduction- Categories of networks: LAN-MAN-WAN-Transmission medium: Wired-Wireless-Protocols.

UNIT II:

Wireless technology: Introduction – IEEE 802.3- Ethernet- Copper Access- Coaxial and optical Fiber Access- PSTN.

UNIT III:

Telephony technology: Dial up access-DSL-ASDL-Telephone based digital circuits-Spectrum-frequency and bandwidth-Mobile telephony.

UNIT IV:

Core network technology- Telephone based digit circuit-Packet switching –Packet switching WAN-IP networks-Wireless networks.

UNIT V:

Virtual circuit packet switching: X.25-Frame relay-ATM.Datagram packet Switching-IP-Asynchronous transfer mode-Layers in packet switching technologies-satellite.

TEXT BOOK:

1. INTERNET AND ITS APPLICATIONS by “M. PRAKASH M.Sc., M.C.A., M.Phil., (Author), U. UDHAYA KUMAR M.Sc., M.Phil., SET., (Author), A. JESUDASAN M.C.A., M.Phil., (Author) “ Textbook Binding – 1 January 2019.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits			
II	23UVACS1	INTERNET AND ITS TECHNOLOGIES					2	2			
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓	
CO2		✓	✓	✓	✓	✓	✓		✓	✓	
CO3	✓	✓	✓	✓		✓	✓	✓			
CO4	✓		✓		✓	✓	✓	✓	✓	✓	
CO5	✓	✓	✓	✓	✓		✓	✓	✓		
Number of matches (✓) = 40, Relationship: High											

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

SEMESTER II

Course Code: 23UCS2CC3
Instruction Hours: 5
Credits: 5

Exam Hours: 3
Internal Marks:25
External Marks:75

CORE COURSE III - DATA STRUCTURE AND ALGORITHMS

Learning Objectives:

- L01: To understand the concepts of ADTs.
- L02: To learn linear data structures-lists, stacks, queues.
- L03: To learn Tree structures and application of trees.
- L04: To learn graph structures and application of graphs.
- L05: To understand various sorting and searching.

Course Outcomes :

- CO: On completion of this course, students will.
- CO1: Understand the concept of Dynamic memory management, data types, algorithms, Big O notation.
- CO2: Understand basic data structures such as arrays, linked lists, stacks and queues.
- CO3: Describe the hash function and concepts of collision and its resolution methods.
- CO4: Solve problem involving graphs, trees and heaps.
- CO5: Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data.

UNIT I: Arrays and sequential representations – ordered lists – Stacks and Queues – Evaluation of Expressions – Multiple Stacks and Queues – Singly Linked List – Linked Stacks and queues – Polynomial addition.

UNIT II: Trees – Binary tree representations – Tree Traversal – Threaded Binary Trees – Binary Tree Representation of Trees – Graphs and Representations – Traversals, Connected Components and Spanning Trees – Shortest Paths and Transitive closure – Activity Networks – Topological Sort and Critical Paths.

UNIT III: Algorithms – Pseudo code conventions - Sorting – Heap Sort – Merge Sort – Quick Sort – Binary Search – Finding the Maximum and Minimum.

UNIT IV: Greedy Method: The general method – optimal storage on tapes – Knapsack Problem – Job Sequencing with dead lines – Optimal Merge Patterns.

UNIT V:
Back tracking: The general method – The 8-Queens Problem – Sum of Subsets – Graph Coloring.

Text Book:

1. Fundamentals of Data Structure – Ellis Horowitz, Sartaj Sahni and Sanguthevar.
2. Fundamentals of Computer Algorithms – Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, Galgotia Publications, 2001.

Reference Books:

1. Data Structures – LIPSCHUTA, Tata Mcgraw Hill, Schaum"s Outline Series.
- Web Resources:

1. <https://www.programiz.com/dsa>.
2. <https://www.geeksforgeeks.org/learn-data-structures-and-algorithms-dsa-tutorial/>.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits			
II	23UCS2CC3	DATA STRUCTURE AND ALGORITHMS					5	5			
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓	
CO2		✓	✓	✓	✓	✓	✓		✓	✓	
CO3	✓	✓	✓	✓		✓	✓	✓			
CO4	✓		✓		✓	✓	✓	✓	✓	✓	
CO5	✓	✓	✓	✓	✓		✓	✓	✓		
Number of matches (✓) = 40, Relationship: High											

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

SEMESTER II

Course Code: 23UCS2CC4P
Instruction Hours: 5
Credits: 5

Exam Hours: 3
Internal Marks:40
External Marks:60

CORE COURSE - DATA STRUCTURES AND ALGORITHMS LAB

[Note: Practicals may be offered through C]

Learning Objectives:

- LO1: To learn linear data structures-lists, stacks, queues.
- LO2: To understand the concepts of Polynomial Addition.
- LO3: To learn Tree structures and application of trees.
- LO4: To learn graph structures and application of graphs.
- LO5: To understand various sorting and searching.

Course Outcomes:

Course Outcomes

- CO: On completion of this course, students will.
- CO 1: Understand the concept of Dynamic memory management, data types, algorithms, Big O notation.
- CO2: Understand basic data structures such as arrays, linked lists, stacks and queues.
- CO3. Describe the hash function and concepts of collision and its resolution methods.
- CO4: Solve problem involving graphs, trees and heaps.
- CO5: Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data.

Contents:

1. Write a program to perform the following Operations on Stack.
2. Write a program to perform the following Operations on Queue.
3. Write a program to perform the following Evaluation of Expression.
4. Write a program to perform the Operations on Stack Single Linked List.
5. Write a program to perform the Operations on Stack Double Linked List.
6. Write a program to Polynomial Addition.
7. Write a program to perform the Operations on Binary Tree and Traversals.
8. Write a program to perform the Operations on Linear Search
9. Write a program to perform the Operations on Binary Search
10. Dijkstra's Algorithms to find the Shortest Path.
11. Write a program to perform the Operations on Bubble Sort.
12. Write a program to perform the Operations on Quick Sort.

Text Book:

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Pearson Education 2014, 4th Edition.
2. ReemaThareja, "Data Structures Using C", Oxford Universities Press 2014, 2nd Edition.

Reference Books:

1. Thomas H.Cormen,ChalesE.Leiserson,RonaldL.Rivest, Clifford Stein, "Introduction to Algorithms", McGraw Hill 2009, 3rd Edition.
2. Aho, Hopcroft and Ullman, "Data Structures and Algorithms", Pearson Education 2003.

Web Resources:

1. <https://www.programiz.com/dsa>.
<https://www.geeksforgeeks.org/learn-data-structures-and-algorithms-dsa-tutorial/>.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits				
II	23UCS2CC4P	DATA STRUCTURES AND ALGORITHMS LAB					5	5				
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓		
CO2		✓	✓	✓	✓	✓	✓		✓	✓		
CO3	✓	✓	✓	✓		✓	✓	✓				
CO4	✓		✓		✓	✓	✓	✓	✓	✓		
CO5	✓	✓	✓	✓	✓		✓	✓	✓			
Number of matches (✓) = 40, Relationship: High												

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

SEMESTER II

Course Code: 23UMA2AC2
Instruction Hours: 4
Credits: 3

Exam Hours: 3
Internal Marks: 25
External Marks: 75

ALLIED COURSE - OPERATION RESEARCH

LEARNING OBJECTIVES:

- L01 : To study the methods used to solve assignment problems and transportation problems.
- L02 : To train the students in network problems.
- L03: To achieve the best performance under the given circumstances.
- L04: To apply the scientific method to the conditions under which the research is conducted.
- L05: To provide a more detailed and insightful analysis to decision-makers

COURSE OUTCOMES:

- CO 1: Recognize and relate LPP and solving LPP using graphical method.
- CO 2: Compute Simplex Algorithm, Two Phase Method and Big-M Method of LPP.
- CO 3: Explain Transportation problem and Evaluate its initial basic feasible solution.
- CO 4: Discuss and solve assignment problem using Hungarian algorithm.
- CO 5: Describe and Construct Network and compute PERT and CPM.

UNIT – I

Linear Programming Problem: Introduction - Graphical Solution Method - General Linear Programming Problem - Canonical and Standard forms of LPP.

UNIT – II

Linear Programming Problem (Continued): Introduction - Simplex Method for $<$, $=$, $>$ constraints - Big-M Method.

UNIT – III

Transportation Problem: Introduction - LP formulation of the Transportation Problem - Finding an Initial Basic Feasible Solution - Transportation Algorithm (Modi Method) - Unbalanced Transportation Problem.

UNIT – IV

Assignment Algorithm: Introduction- Mathematical Formulation of the Problem - Solution Methods of Assignment Problem - Special Cases in Assignment Problems - Travelling salesman Problem.

UNIT – V

Networks: Introduction - Network (Basic Components) - Logical Sequencing - Rules of Networking Construction - Concurrent Activities - CPM computation- PERT computation.

TEXT BOOK:

1. KantiSwarup, P.K.Gupta and Man Mohan, Operations Research, Sultan Chand & Co.Ltd.2012
 - UNIT – I Chapter – 3 Sections 3.1 to 3.5
 - UNIT – II Chapter – 4 Sections 4.1, 4.3 & 4.4
 - UNIT – III Chapter – 10 Sections 10.1, 10.2, 10.9 to 10.13 & 10.15
 - UNIT – IV Chapter – 11 Sections 11.1 to 11.4 & 11.7
 - UNIT – V Chapter – 25 Sections 25.1 to 25.7.

REFERENCE(S):

1. PremKumar, Gupta and D.S. Hira, "Operations Research", An Introduction, S. Chand and Co., Ltd. New Delhi,
2. Hamdy.A.Taha, "Operations Research", Seventh Edition, McMillan Publishing Company, New Delhi, 1982.

Relationship Matrix for COs, POs and PSOs

Semester	Code	Title of the Course					Hours	Credits			
II	22UMA2AC2	OPERATIONS RESEARCH					4	3			
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
C01	√		√	√		√	√	√	√		
C02	√		√	√	√	√		√	√		
C03		√	√		√	√		√	√	√	
C04		√			√		√	√		√	
C05	√	√		√	√		√			√	
Number of Matches (√) = 32					Relationship: MODERATE						

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

SEMESTER II

Course Code: 23UCS2SE2
Instruction Hours: 2
Credits: 2

Exam Hours: 3
Internal Marks:25
External Marks:75

INTRODUCTION TO HTML (NME-2)

Learning Objectives

- LO1: Insert a graphic within a web page.
- LO2: Create a link within a web page.
- LO3: Create a table within a web page.
- LO4: Insert heading levels within a web page.
- LO5: Create a table within a web page.

Course Outcomes:

- CO 1: Recognize and relate LPP and solving LPP using graphical method.
- CO 2: Compute Simplex Algorithm, Two Phase Method and Big-M Method of LPP.
- CO 3: Explain Transportation problem and evaluate its initial basic feasible solution.
- CO 4: Discuss and solve assignment problem using Hungarian algorithm.
- CO 5: Describe and Construct Network and compute PERT and CPM.

Unit I:

Introduction :Web Basics: What is Internet – Web browsers – What isWeb page – HTML Basics: Understanding tags.

UNIT II: Tags for Document structure(HTML, Head, Body Tag). Blocklevel text elements: Headings paragraph(<p> tag) – Font styleelements: (bold, italic, font, small, strong, strike, big tags)

UNIT III

Lists: Types of lists: Ordered, Unordered – Nesting Lists – Other 6tags: Marquee, HR, BR- Using Images – Creating Hyperlinks.

UNIT IV

Tables: Creating basic Table, Table elements, Caption – Table andcell alignment – Rowspan, Colspan – Cell padding.

UNIT V

Frames: Frameset – Targeted Links – No frame – Forms : Input,Textarea, Select, Option.

Textbooks:

1. “MasteringHTML5andCSS3MadeEasy”,TeachUCompInc.,2014.
2. Thomas Michaud, “Foundations of Web Design: Introduction to HTML & CSS”.

Web Resources

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

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits			
II	23UCS2SE2	INTRODUCTION TO HTML (NME-2)					2	2			
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓	
CO2		✓	✓	✓	✓	✓	✓		✓	✓	
CO3	✓	✓	✓	✓		✓	✓	✓			
CO4	✓		✓		✓	✓	✓	✓	✓	✓	
CO5	✓	✓	✓	✓	✓		✓	✓	✓		
Number of matches (✓) = 40, Relationship: High											

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

SEMESTER-II

Course Code: 23UCS2SE3

Exam Hours: 3

Instruction Hours: 2

Internal Marks: 25

Credits: 2

External Marks: 75

PROGRAMMING IN C (NME-3)

Learning Objectives

L01: A student will gain a thorough understanding of the fundamentals of C programming.

L02: A student will be able to code, compile and test C programs.

L03: To able to take up Systems program or Advanced C programming course.

L04: to learn basic principles of Problem solving.

L05: To learn the fundamental programming concepts and methodologies which are essential to building good C programs terminology.

Course Outcomes (COs):

On successful completion of the course the students will be able to:

CO1: Demonstrate an understanding of computer programming language concepts.

CO2: Able to define data types and use them in simple data processing applications

CO3: Able to use the concept of array of structures. Student must be able to define union and enumeration user defined data types.

CO4: Ability to design and develop Computer programs, analyzes, and interprets the concept of pointers, declarations, initialization, operations on pointers and their usage.

CO5: Develop confidence for self-education and ability for life-long learning needed for Computer language.

UNIT I

C Fundamentals Character Set – Identifier and Keywords – Data Types – Constants – Variables.

UNIT II

Expressions – Statements – Arithmetic – Unary – Relational and Logical – Assignment and Conditional Operators – Ternary Operators – Library Functions.

UNIT III

Data Input/Output Functions – Simple C Programs – if and if else – while, do while and for loop – Nested Control Structures – Switch – break and continue – go to statements.

UNIT IV

Functions – Definition – Proto Types – Passing Arguments – Recursion.

UNIT V

Arrays – Defining and Processing – Passing Arrays to functions – Multi Dimension Arrays – Arrays and String – String Handling Functions – Structure and Union.

Text Book(s):

1. E.Balagurusamy, "Programming in ANSI C", Fifth Edition, Tata McGraw Hill.

Reference Book(s):

1. B.W. Kernighan and D M.Ritchie, "The C Programming Language", 2nd Edition, PHI, 1988.
2. H. Schildt, "C: The Complete Reference", 4th Edition. TMH Edition, 2000.
3. Gottfried B.S, "Programming with C", Second Edition, TMH Pub. Co. Ltd., New Delhi 1996.

Web References:

1. https://www.vssut.ac.in/lecture_notes/lecture1424354156.pdf
2. <https://techniyojan.com/2019/12/c-programming-basics-notes.html>
3. <https://www.codewithharry.com/videos/c-tutorial-in-hindi-with-notes>

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits				
II	22UCS2SE3	PROGRAMMING IN C					2	2				
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓		
CO2		✓	✓	✓	✓	✓	✓		✓	✓		
CO3	✓	✓	✓	✓		✓	✓	✓				
CO4	✓		✓		✓	✓	✓	✓	✓	✓		
CO5	✓	✓	✓	✓	✓		✓	✓	✓			
Number of matches (✓) = 40, Relationship: High												

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

SEMESTER-II

RUBY AND RAILS

Course Code: 23UVACS2
Instruction Hours : 2
Credits: 2

Exam Hours: 3
Internal Marks: 50
External Marks: 50

COURSE OBJECTIVES:

- To learn the basic Concepts of the Ruby Language
- To use Ruby in developing Web based applications
- To apply the MVC architecture with Rails
- To Develop Applications using Ruby on Rails

UNIT I

INTRODUCTION TO RUBY: Introduction to Ruby: Data types - Simple input and output - Control statements - Fundamentals of arrays – Hashes – Methods – Classes - Code blocks and Iterations – Date and Time – File I/O

UNIT II

RUBY ADVANCED: Class – Objects – Inheritance – Polymorphism – Regular Expressions – Database Access – Web Applications – CGI – Form Processing – Session Management

UNIT III

INTRODUCTION TO RAILS: Introduction – MVC Architecture - Environmental Setup – Creating Rails Application – Database Setup – Active Records

UNIT IV

MODULES: Migrations - Creating – Editing – Running Migrations – Controllers - Implementing the methods – Additional Methods– Routes - Views – Layouts

UNIT V

APPLICATION DEVELOPMENT - Validation - Scaffolding – Working with AJAX – File Uploading – Sending E-mails – Creating a Sample Application

REFERENCE BOOKS:

1. Sam Ruby, Dave Thomas, David Heinemeier Hansson, "Agile Web Development with Rails", The Pragmatic Programmers, Fourth Edition, 2011
2. P.J.Deitel, H.M.Deitel, "Internet and World Wide Web – How to program", Pearson Education Publishers, Fifth Edition, 2009.
3. Robert. W. Sebesta, "Programming the World Wide Web", Pearson Education, Fourth Edition, 2007

WEB REFERENCES:

1. <http://guides.rubyonrails.org>
2. <http://www.tutorialspoint.com>

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits				
II	23UVACS2	RUBY AND RAILS					2	2				
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓		
CO2		✓	✓	✓	✓	✓	✓		✓	✓		
CO3	✓	✓	✓	✓		✓	✓	✓				
CO4	✓		✓		✓	✓	✓	✓	✓	✓		
CO5	✓	✓	✓	✓	✓		✓	✓	✓			
Number of matches (✓) = 40, Relationship: High												

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

SEMESTER-III

Course Code: 23UCS3CC5
Instruction Hours: 4
Credits: 4

Exam Hours: 3
Internal Marks:25
External Marks:75

CORE COURSE V : MICROPROCESSOR AND ASSEMBLY LANGUAGE PROGRAMMING

Objective:

1. To understand techniques for faster execution of instructions and improve speed of operation and performance of microprocessors.

Course Outcomes (CO):

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

CO1. Describe the general architecture of a microcomputer system and architecture & organization of 8085 & 8086 Microprocessor and understand the difference between 8085 and advanced microprocessor.

CO2. Discuss and write code using the seven basic programming modes in assembly language.

CO3. Understand and realize the Interfacing of memory & various I/O devices with 8085 microprocessor
Understand and classify the instruction set of 8085 microprocessor and distinguish the use of different instructions and apply it in assembly language programming.

CO4. Understand the architecture and operation of Programmable Interface Devices and

CO5. realize the programming & interfacing of it with 8085 microprocessor

Unit I

Evaluation of Microprocessors – Single Chip Microcomputer Microprocessor Applications – Programming – Digital Computers – Memory – Buses – Memory addressing capacity of CPU – Processor Architecture – Intel 8085.

Unit II

Instruction set of Intel 8085 – Instruction and Data Formats – Addressing Modes – Intel 8085 Instructions: Arithmetical group, Data transfer group, Logical group, and Branch group.

Unit III

Programming of Microprocessors – Machine language – Assembly language – High level language – Assemblers – Stacks and Subroutines – System Software – Assembly language Programming – MACRO and Microprogramming.

Unit IV

Assembly language Programming - Simple examples – Addition and Subtraction of Binary and Decimal Numbers – Complements – Shift – Masking – Finding the largest and smallest numbers in an Array – Sum of a series of Numbers.

Unit V

Peripheral Devices and Interfacing – Address Space Partitioning – Memory and I/O Interfacing – Data transfer schemes – Interrupts of Intel 8085 – Interfacing memory and I/O devices – I/O ports – Programmable peripheral Interface.

Text Book

1. R. S. Gaonkar- "Microprocessor Architecture- Programming and Applications with 8085"- 5th Edition- Penram International Publications,2009. [For unit I to unit IV].
2. Soumitra Kumar Mandal -"Microprocessors and Microcontrollers – Architectures, Programming and Interfacing using 8085, 8086, 8051", Tata McGraw Hill Education Private Limited. [for unit V].

Reference Books

1. Mathur- "Introduction to Microprocessor"- 3rd Edition- Tata McGraw-Hill -1993.
2. Raj Kamal - "Microcontrollers: Architecture, Programming, Interfacing and System Design", Pearson Education, 2005.
3. Krishna Kant, "Microprocessors and Microcontrollers – Architectures, Programming and System Design 8085, 8086, 8051, 8096", PHI, 2008

Web Resources

1. E-content from open source libraries.
2. <https://www.bing.com/>, <https://theopennotes.in/>

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits				
III	23UCS3CC5	MICROPROCESSOR AND ASSEMBLY LANGUAGE PROGRAMMING					4	4				
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓		
CO2		✓	✓	✓	✓	✓	✓		✓	✓		
CO3	✓	✓	✓	✓		✓	✓	✓				
CO4	✓		✓		✓	✓	✓	✓	✓	✓		
CO5	✓	✓	✓	✓	✓		✓	✓	✓			
Number of matches (✓) = 40, Relationship: High												

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

SEMESTER-III

Course Code: 23UCS3CC6P
Instruction Hours: 3
Credits: 3

Exam Hours: 3
Internal Marks:40
External Marks:60

CORE COURSE ASSEMBLY LANGUAGE PROGRAMMING LAB

Learning Objectives

LO1: To introduce the internal organization of Intel 8085 Microprocessor.

LO2: To know about various instruction sets and classifications.

LO3: To enable the students to write assembly language programs using 8085.

LO4: To interface the peripheral devices to 8085 using Interrupt controller and DMA interface.

LO5: To provide real-life applications using microcontroller.

Course Outcomes

CO1: Remember the Basic binary codes and their conversions. Binary concepts are used in Microprocessor programming and provide a good understanding of the architecture of 8085o introduce the internal organization of Intel 8085 Microprocessor.

CO2: Understanding the 8085 instruction set and their classifications, enables the students to write the programs easily on their own using different logic.

CO3: Applying different types of instructions to convert binary codes and analyzing the outcome. The instruction set is applied to develop programs on multibyte arithmetic operations.

CO4: Analyze how peripheral devices are connected to 8085 using Interrupts and DMA controller

CO5: An exposure to create real time applications using microcontroller.

List of Exercises:

1. Addition and Subtraction

1. 8 - bit addition
2. 8 - bit subtraction

2. Complements

1. 1's complement of 8 bit.
2. 2's complement of 8 bit

3. Multiplication and Division

1. 8 - bit multiplication
2. 8 - bit division

4. Code Conversion

1. BCD to Binary
2. Binary to BCD

5. Sum of series

6. Arrays

1. Largest number in an array
2. Smallest number in an array.

Semester	Code	Title of the Course					Hours	Credits			
III	23UCS3CC6P	ASSEMBLY LANGUAGE PROGRAMMING LAB					3	3			
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓	
CO2		✓	✓	✓	✓	✓	✓		✓	✓	
CO3	✓	✓	✓	✓		✓	✓	✓			
CO4	✓		✓		✓	✓	✓	✓	✓	✓	
CO5	✓	✓	✓	✓	✓		✓	✓	✓		
Number of matches (✓) = 40, Relationship: High											

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

SEMESTER-III

Course Code: 23UPH3AC3
Instruction Hours: 3
Credits: 2

Exam Hours: 3
Internal Marks:25
External Marks:75

ALLIED COURSE ELECTRICITY AND DIGITAL ELECTRONICS

Learning Objectives

- L01: To have a knowledge about the alternating current and its components
- L02: To know about the number systems and the semiconductor memories
- L03: To acquire knowledge about Boolean algebra, arithmetic and combinational logic circuits.

Course outcomes

After successfully completing this course the student will be able to

- C01 : Understand the electric fundamental laws.
- C02; Analyses the characteristics of alternating current and its applications.
- C03: Understand the fundamentals of codes and number system.
- C04: Understand the binary arithmetic, logic and Boolean functions.
- C05: Understand the applications of semiconductor memories.

Unit I: Current Electricity

Ohm's Law - Verification of Ohm's Law - Kirchoff's law - Applications of Kirchoff's law - Wheatstone's bridge - Metre bridge- Carey Foster's bridge- Potentiometer Measurement of Current and Resistance- Calibration of low range Voltmeter- High range Voltmeter.

Unit II: Alternating Current

AC circuits with double components – Measurement of current and voltage – Power in an AC circuit - Power factor (derivation) - Wattles current – Choke - Series and parallel resonant circuits – Impedance - Q factor - Selectivity and Sharpness of resonance.

Unit III: Number Systems, Codes and Logic gates

Number Systems - Conversions - Binary: Addition, Subtraction, Multiplication, Division-8421 Code - BCD Code - Excess 3 code - Gray code - Binary to Gray and Gray to Binary Conversion - ASCII code – Basic and Derivative Gates: AND, OR, NOT, NAND, NOR, EX-OR - NAND & NOR as Universal Gates.

Unit IV: Boolean algebra, Arithmetic and Combinational Logic Circuits

Basic laws of Boolean algebra - De Morgan's theorem - Verification of Boolean expression using Boolean laws - Half-adder - Full adder - Half-Subtractor - Full Subtractor (using basic gates) – Encoder - Decimal to BCD encoder- Decoder - BCD to decimal decoder.

Unit V: Semiconductor Memories

Introduction – ROM using diodes and transistors – ROM in terms of digital circuits – Building memory of larger capacity – PROM – EPROM – EEPROM – ROM as a unit in microcomputers – RAM – Static RAM – Flip Flop as a RAM cell – Memory expansion - Memory Parameters.

Text Books:

1. Brijlal& Subramanian, Electricity and Magnetism, RatanPrakashanMandir, 1995.(Unit I &II)
2. Puri V.K., Digital Electronics circuits and systems, Tata McGraw Hill publications, New Delhi, 2011. (Unit III, IV&V)

Reference Books:

1. Narayanamurthi and Nagarathinam, Electricity and Magnetism, The National Publishing Company, Madras, 1994.
2. Jacob Millman, Integrated Electronics, TataMcGraw Hill publications, New Delhi, 2003.
3. Murugesan.R, Electricity and Magnetism, S. Chand & Company Ltd., 2015.
4. Gothman W.H., Digital Electronics, Prentice Hall of India PVT., New Delhi, 1996.
5. Rajendran.V, Applied Physics, TATA McGraw hill publications, New Delhi, 2002.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits			
III	23UPH3AC3	ELECTRICITY AND DIGITAL ELECTRONICS					3	2			
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓	
CO2		✓	✓	✓	✓	✓	✓		✓	✓	
CO3	✓	✓	✓	✓		✓	✓	✓			
CO4	✓		✓		✓	✓	✓	✓	✓	✓	
CO5	✓	✓	✓	✓	✓		✓	✓	✓		
Number of matches (✓) = 40, Relationship: High											
Mapping	1-29%		30-59%		60-69%		70-89%		90-100%		
Matches	1-14		15-29		30-34		35-44		45-50		
Relationship	Very Poor		Poor		Moderate		High		Very High		

SEMESTER-III

Course Code: 23UPH3AP
 Instruction Hours: 3
 Credits: 2

Exam Hours: 3
 Internal Marks:40
 External Marks:60

ALLIED - ELECTRONICS LAB

Course outcomes:

After successfully completing this course the student will be able to

CO1: Study the characteristics of diode, transistor and FET.

CO2 : Using techniques in electrical circuits.

CO3 : Study the logic gates and their truth tables.

CO4 : Analyze the theorems

Any Twelve

1. SemiConductor diode - Characteristics.
2. Zener diode – Characteristics.
3. FET- Characteristics.
4. Transistor Characteristics - CE configuration.
5. Transistor Characteristics-CB Configuration.
6. Metre Bridge-Specific Resistance.
7. Potentiometer-Measurement of Current.
8. Potentiometer-Calibration of low range voltmeter.
9. LCR - Series resonance circuit.
10. LCR - Parallel resonance circuit
11. Mathematical Operator-Addition, Subtraction using OP-Amp.
12. Logic Gates (AND, OR, NOT) Using discrete components.
13. NAND and NOR as Universal Gates.
14. Verification of De-Morgan's Theorems.
15. Half Adder and Half Subtractor using logic gates.
16. Full Adder and Full Subtractor using logic gates.

Semester	Code	Title of the Course					Hours	Credits			
III	23UPH3AP	ELECTRONICS LAB					3	2			
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓	
CO2		✓	✓	✓	✓	✓	✓		✓	✓	
CO3	✓	✓	✓	✓		✓	✓	✓			
CO4	✓		✓		✓	✓	✓	✓	✓	✓	
CO5	✓	✓	✓	✓	✓		✓	✓	✓		
Number of matches (✓) = 40, Relationship: High											
Mapping	1-29%		30-59%		60-69%		70-89%		90-100%		
Matches	1-14		15-29		30-34		35-44		45-50		
Relationship	Very Poor		Poor		Moderate		High		Very High		

SEMESTER-III

Course Code: 23UCS3SE4
Instruction Hours: 2
Credits: 2

Exam Hours: 3
Internal Marks:25
External Marks:75

SOFTWARE TESTING

Learning Objectives:

- LO1: To study fundamental concepts in software testing
- LO2: To discuss various software testing issues and solutions.
- LO3: To study the basic concept of Data flow testing and Domain testing.
- LO4: To Acquire knowledge on path products and path expressions.
- LO5: To learn about Logic based testing and decision tables.

Course Outcomes:

- CO1- Students learn to apply software testing knowledge and engineering methods.
- CO2: Have an ability to identify the needs of software test automation
- CO3: Have an ability understand and identify various software testing problems
- CO4: Have basic understanding and knowledge of contemporary issues in software testing, CO5: Have an ability to use software testing methods and modern software testing tools for their testing projects.

UNIT I

Software testing Fundamentals Purpose of Software testing - Some Dichotomies - a model for testing - Playing pool and consulting oracles

UNIT II

Complete testing potential - The Consequence of bugs - Taxonomy of Bugs - Test case Design

UNIT III

Introduction of Black Box Testing and White Box testing - Flow Graphs and Path testing – Path testing Basics

UNIT IV

Predicates, Path Predicates and Achievable Paths – Path Sensitizing - Path Instrumentation - Implementation and Application of Path Testing.

UNIT V

Transaction Flow testing - Transaction Flows - techniques – Implementation Comments - Data Flow Testing - Basics - Strategies - Applications, Tools and Effectiveness

Text Book:

1. B.Beizer,“SoftwareTestingTechniques”,IIEdn.,DreamTechIndia,NewDelhi,2003.
2. K.V.K.Prasad,“SoftwareTestingTools”,DreamTech.India,NewDelhi,2005

Reference Books:

1. I.Burnstein,2003,“PracticalSoftwareTesting”,SpringerInternationalEdn
2. E. Kit, 1995, “Software Testing in the Real World: Improving the Process”, PearsonEducation,Delhi.
3. R. Rajani,andP.P.Oak,2004,“SoftwareTesting”,TataMcgrawHill,New Delhi.

Web Resources:1. <https://www.javatpoint.com/software-testing-tutorial>2. <https://www.guru99.com/software-testing.html>

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits				
III	23UCS3SE4	SOFTWARE TESTING					2	2				
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓		
CO2		✓	✓	✓	✓	✓	✓		✓	✓		
CO3	✓	✓	✓	✓		✓	✓	✓				
CO4	✓		✓		✓	✓	✓	✓	✓	✓		
CO5	✓	✓	✓	✓	✓		✓	✓	✓			
Number of matches (✓) = 40, Relationship: High												

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

SEMESTER- III

Course Code: 23UGS
Instruction Hours: 1
Credits: 1

Exam Hours: 3
Internal Marks:25
External Marks:75

GENDER STUDIES

Objective:

- To make students to aware of Gender constructions and gendering Process and explore existing gender biases in the society and to understand the need to work towards the inclusive society.

Course Outcomes (COs):

CO1: Students would have gained a perspective and understood the social reality of gender society understood the differences of gender and sex and may resort to building alternative

perspectives and critical thinking.

CO2: Gained knowledge on the various social institutions governing gender and the intersectionality.

CO3: Exposed to the kind of initiatives of the State towards gender equality.

CO4: To inculcate sensitivity and build gender perspectives.

CO5: To use the course to bring attitudinal cum behavioral changes towards gender neutral ambience and promote the humanistic values.

UNIT I

Introduction to Gender Studies Concepts: Gender Spectrum.-Sex – Gender distinction – Biological Determinism – Patriarchy – Feminism – Gender Socialization and Stereotyping - Gender Discrimination – Gender Division of Labour and Roles – Gender Sensitivity and Awareness – Gender Equity – Equality – Gender Main Streaming and Gender Analysis.

UNIT II

UGC Initiatives On Women's Studie: Definition of Women's Studies –Gender Studies –UGC Initiatives and guidelines on Women's Studies - Beijing Conference, UN Initiatives – Convention on Elimination of All forms of Discrimination Against W o m e n (CEDAW)- Sustainable Development Goals on Gender Equality (SDG 5) and targets.

UNIT III

Areas of Gender Discrimination: Gender Socialization- Sex Ratio – Health and Nutrition- Literacy and Education - Employment- Governance – participation in decision making- politics- property rights and access to credit- gender based violence- Social institutions –Family, Caste, Class, religion, gender, State. Market – Media – Politics – Judiciary

UNIT IV

Women Development and Gender Empowerment: Towards Equality Report of Status of Women in India 1974 – International Women's Decade – International Women's Year – National Policy for Empowerment of Women 2001

UNIT V

WOMEN'S MOVEMENTS AND SAFEGUARDING MECHANISM: In India National/State Commission for Women(NCW) – All Women Police Station – Family Court Legislations safeguarding women –Transgender Policy— Constitutional amendments for women's Political Participation.

Current Contours: Tamil Nadu State Policy for Women 2021- National Policy for Women 2015 – Prevention of Sexual Harassment at Work places Act 2013-Protection of Children from Sexual Offences Act, 2012 - Analysis of R egressive and Progressive High Court and Supreme Court Judgments - Women Proactive Policies, Programmes, Interventions.

Reference Book(s):

1. Bhasin Kamala, Understanding Gender : Gender Basics, New Delhi: Women Unlimited, 2004.
2. Bhasin Kamala, Exploring Masculinity: Gender Basics, New Delhi: Women Unlimited, 2004.
3. Bhasin Kamala, What is Patriarchy? Gender Basics, New Delhi: Women Unlimited, 1993.
4. Arya Sadhna Women ,Gender Equality and the State ,New Delhi: Deep &Deep Publication, 2000.
5. Mishra .O.P, Law Relating to Women & Child, Allahabad: Central Law Agency, 2001.
6. Uma Chakravarti, Gendering Caste Through a Feminist Lens, Sage Publication, 2003.
7. Bhattacharya Malini , Sexual Violence and Law, Kolkata; West Bengala Commission for Women, 2002.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits				
III	23UGS	GENDER STUDIES					1	1				
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓		
CO2		✓	✓	✓	✓	✓	✓		✓	✓		
CO3	✓	✓	✓	✓		✓	✓	✓				
CO4	✓		✓		✓	✓	✓	✓	✓	✓		
CO5	✓	✓	✓	✓	✓		✓	✓	✓			
Number of matches (✓) = 40, Relationship: High												

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

SEMESTER-II

Course Code: 23UVACS3
Instruction Hours: 2
Credits: 2

Exam Hours: 3
Internal Marks:50
External Marks:50

OPEN BROADCAST SOFTWARE

OBJECTIVES:

To learn how to use Open Broadcaster Software to create professional live streams and video recordings.

COURSE OUTCOME:

- On the successful completion of this course the students will be able to
- Identify technologies behind broadcasting
- Improves creativity in subject matters
- Explain and express views and opinions in broadcasting software
- Prepare and practice live stream techniques
- Create live streams to Facebook or YouTube

UNIT I

Introduction :Introduction of broadcasting software-About Open Broadcaster Software-Downloading & installing OBS-OBS Interface Overview.

UNIT II

OBS instruments: OBS Sources-Scenes-Audio and Video Bitrates-OBS Basic Settings.

UNIT III

Effects & additional Tools : Tools-Filters-Managing layers-Adding overlay.

UNIT IV

Video Recording: Optimizing OBS for Recording-Video recording and editing of live event-Recording virtual platform event.

UNIT V

Streaming: Optimizing OBS for Streaming-Live Streaming Techniques-Streaming in YouTube and Facebook.

REFERENCE BOOKS:

1. Paul William Richards, "The Unofficial Guide to Open Broadcaster Software", Independently Published, 2019.
2. Walt Roberts, "Live Streaming Kit: How to Live Stream Online for Beginners & Gamers", One Jacked Monkey, LLC, 2019.
work –Tools: War Dialers, Ping Utilities –Port Scanning – Tool: ipEye, IPsecScan, NetScan Tools Pro 2003, SuperScan 3.0, NMap(NetworkMapper) – Active Stack Fingerprinting – Passive Fingerprinting - Proxy Servers – Anonymizers.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits		
III	23UVACS3	OPEN BROADCAST SOFTWARE					2	2		
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓
CO2		✓	✓	✓	✓	✓	✓		✓	✓
CO3	✓	✓	✓	✓		✓	✓	✓		
CO4	✓		✓		✓	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓		✓	✓	✓	
Number of matches (✓) = 40, Relationship: High										

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

SEMESTER- IV

Course Code: 23UCS4CC7
Instruction Hours: 6
Credits: 5

Exam Hours: 3
Internal Marks:25
External Marks:75

CORE COURSE VII - JAVA PROGRAMMING

Learning Objectives:

- L01: To provide fundamental knowledge of object-oriented programming.
- L02: To equip the student with programming knowledge in Core Java from the basics up.
- L03: To enable the students to use AWT controls, Event Handling and Swing for GUI.
- L04: To provide fundamental knowledge of object-oriented programming.
- L05: To equip the student with programming knowledge in Core Java from the basics up.

Course Outcomes:

- C 0: On completion of this course, students will;
- C01: Understand the basic Object-oriented concepts. Implement the basic constructs of Core Java.
- C02: Implement inheritance, packages, interfaces and exception handling of Core Java.
- C03: Implement multi-threading and I/O Streams of Core Java.
- C04: Implement AWT and Event handling.
- C05: Use Swing to create GUI. Content.

UNIT I

Introduction : Review of Object Oriented concepts - History of Java - Java buzzwords - JVM Architecture - Datatypes - Variables - Scope and life time of variables - arrays - operators - control statements - type conversion and casting - simple java program - constructors - methods

UNIT II

Inheritance: Basic concepts - Types of inheritance - Member access rules - Usage of this and Super keyword - Method Overloading - Method overriding - Abstract classes - Dynamic method dispatch - Usage of final keyword.

UNIT III

Packages: Definition - Access Protection - Importing Packages. Interfaces: Definition - Implementation - Extending Interfaces. Exception Handling: try - catch - throw - throws - finally - Built-in exceptions.

UNIT IV

Multithreaded Programming: Thread Class - Runnable interface - Synchronization - Using synchronized methods - Using synchronized statement - Interthread Communication - Deadlock. I/O Streams: Concepts of streams - Stream classes - Byte and Character stream - Reading console Input and Writing Console output - File Handling

UNIT V

AWT Controls: The AWT class hierarchy - user interface components- Labels - Button - Text Components - Check Box - Check Box Group - Choice - List Box - Panels – Scroll Pane - Menu - Scroll Bar. Working with Frame class - Colour - Fonts and layout managers.

Text Books:

1. Herbert Schildt, The Complete Reference, Tata McGraw Hill, New Delhi, 7th Edition, 2010.
2. Gary Cornell, *Core Java 2 Volume I – Fundamentals*, Addison Wesley, 1999.

References Books:

1. Head First Java, O’Rielly Publications.
2. Y. Daniel Liang, *Introduction to Java Programming*, 7th Edition, Pearson Education India, 2010.

Web Resources

1. <https://javabeginnertutorial.com/core-java-tutorial/>
2. <http://docs.oracle.com/javase/tutorial/>.
3. <https://www.coursera.org/>

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits				
IV	23UCS4CC7	JAVA PROGRAMMING					6	5				
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓		
CO2		✓	✓	✓	✓	✓	✓		✓	✓		
CO3	✓	✓	✓	✓		✓	✓	✓				
CO4	✓		✓		✓	✓	✓	✓	✓	✓		
CO5	✓	✓	✓	✓	✓		✓	✓	✓			
Number of matches (✓) = 40, Relationship: High												
Mapping	1-29%	30-59%	60-69%	70-89%	90-100%							
Matches	1-14	15-29	30-34	35-44	45-50							
Relationship	Very Poor	Poor	Moderate	High	Very High							

SEMESTER- IV

Course Code: 23UCS4CC8P

Instruction Hours: 4

Credits: 4

Exam Hours: 3

Internal Marks:40

External Marks:60

CORE COURSE- JAVA PROGRAMMING LAB

Learning Objectives:

L01: To provide fundamental knowledge of object-oriented programming.

L02: To equip the student with programming knowledge in Core Java from the basics up.

L03: To enable the students to know about Event Handling.

L04: To enable the students to use String Concepts.

L05: To equip the student with programming knowledge in to creat GUI using AWT controls.

Course Outcomes:

CO1:On completion of this course, students will Understand the basic Object-oriented concepts.

Implement the basic constructs of Core Java.

CO2:Implement inheritance, packages, interfaces and exception handling of Core Java.

CO3.Implement multi-threading and I/O Streams of Core Java.

CO4.Implement AWT and Event handling.

CO5. Use Swing to create GUI.

EXCERCISE:

1. Write a Java program to print prime numbers for the given integer.
2. Write a Java program for addition of two given matrices.
3. Write a Java program that displays the number of characters, lines and words in a text .
4. Write a program to do String Manipulation using Character Array and perform the following string operations:
 - a) String length.
 - b.) Concatenating two strings.
 - c. Search a substring
 - d. Length of a string.
 - e. Reverse a string.
5. Write a threading program which uses the same method asynchronously to print the numbers 1to10 using Thread1 and to print 90 to100 using Thread.
6. Write a program to demonstrate the use of following exceptions.
 - a.Arithmetic Exception.
 - b.Number Format Exception.
 - c.ArrayIndexOutOfBoundsException.
 - d.NegativeArraySizeException.

7. Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired. (Use adapter classes).
8. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and symbols like +, -, *, % operations. Handle any possible exceptions like divide by zero in the calculator.
9. Write a program to accept a text and change font size, bold italic options. Use frames and controls.
10. Write a program to demonstrate frames and controls.

Text Books:

1. Herbert Schildt, *The Complete Reference*, Tata McGraw Hill, New Delhi, 7th Edition, 2010.
2. Gary Cornell, *Core Java 2 Volume I – Fundamentals*, Addison Wesley, 1999.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits			
IV	23UCS4CC8P	JAVA PROGRAMMING LAB					4	4			
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓	
CO2		✓	✓	✓	✓	✓	✓		✓	✓	
CO3	✓	✓	✓	✓		✓	✓	✓			
CO4	✓		✓		✓	✓	✓	✓	✓	✓	
CO5	✓	✓	✓	✓	✓		✓	✓	✓		
Number of matches (✓) = 40, Relationship: High											

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

SEMESTER- IV

Course Code: 23UPH4AC4
Instruction Hours: 4
Credits: 3

Exam Hours: 3
Internal Marks:25
External Marks:75

ALLIED COURSE

ANALOG AND OPTO ELECTRONIC

Learning Objectives:

L01: To know about the difference between conductors, insulators and semiconductors

L02: To have a basic idea about the lasers and optoelectronic devices

L03: To learn about the operational amplifier and transistor

Course outcomes

After successfully completing this course the student will be able to

C01: Study the characteristics of diodes and FET

C02: Perform the procedures for the transistor working and biasing circuits.

C03: Understand the basic principle of laser and types.

C04: Perform the procedures into applications of Opto electronic devices.

C05: Study the Op-amps and its applications.

Unit I: Semiconductor Physics

Theory of energy bands in crystals- Distinction between conductors, Insulators and Semiconductors – Intrinsic and Extrinsic semiconductors – Hall effect in semiconductor– Zener diode –Tunnel diode - Backward diode - Breakdown voltage - Avalanche Breakdown.

Unit II: Transistors

Transistors - PNP and NPN transistors - DC Characteristics of CE and CB configuration-Hybrid parameters- Functions of Transistor as an amplifier and oscillator – FET - N-channel FET - Performance characteristics - FET amplifier

Unit III: Lasers

Laser and Maser - Basic concepts of stimulated emission – Spontaneous emission - Population inversion and Meta stable state-He-Ne laser-Ruby laser - Co₂-Laser Disadvantages – Applications.

Unit IV: Opto-Electronic Devices

LED Radiation transition - Emission spectra –Luminescent efficiency-Method of Excitation-Visible LED- Materials for LED - LED configuration and performance - Photo conduction –Photo diode-Photo transistor- Electronic watches- Seven segment display -LCD.

Unit V: Operational Amplifier

The basic operational amplifier– Inverting and non- inverting operational Amplifier – Differential operational amplifier – CMRR-Basic uses of operational amplifier as sign and scale changer and phase shifter - Adder – Subtractor – Comparator - Differentiator .

Book for study:

1. Theraja B.L., The fundamentals of solid state physics, Sultan Chand & Co., Delhi, 2002 (Unit I).
2. Ramaswami.V, Engineering Physics, D.Prentice Hall of India, New Delhi, 1953(Unit III).
3. V.K.Metha,RohitMetha,Basic Electronics,S. Chand & Co., New Delhi,2015. (Unit II, IV &V).

References

1. Jacob Millman, Microelectronics, McGraw Hill publications, New Delhi, 1985.
2. Mithal G.K. and Vanvasi, Pulse and Digital electronics, Khanna publication, New Delhi, 2006.
3. Ramanan, Function Electronics, TMH, New Delhi, 1994.
4. Millman & Halkias, Electronics Devices and Circuits, McGraw-Hill, 1967.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits				
IV	23UPH4AC4	ANALOG AND OPTO ELECTRONIC					4	3				
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓		
CO2		✓	✓	✓	✓	✓	✓		✓	✓		
CO3	✓	✓	✓	✓		✓	✓	✓				
CO4	✓		✓		✓	✓	✓	✓	✓	✓		
CO5	✓	✓	✓	✓	✓		✓	✓	✓			
Number of matches (✓) = 40, Relationship: High												

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

SEMESTER-IV

Course Code: 23UVACS4
Instruction Hours: 2
Credits: 2

Exam Hours: 3
Internal Marks:50
External Marks:50

ETHICAL HACKING

Course Objectives:

- CO1 : Upon completion of the course students will be able to Identify the risk factors in hacking.
CO 2 : Work with foot printing and scanning.
CO 3 : Hack the system.
CO 4 : Work with Trojan and Backdoor tools
CO 5 : Prevent Systems from attacks

UNIT I

INTRODUCTION: Introduction Ethical Hacking: Problem Definition – Need for Security – Essential Terminology – Elements of Security – Phases – Activism – Modes of Ethical Hacking – Security Testing – Computer Crimes and Implications – Perspective (US Federal Law).

UNIT II

FOOTPRINTING AND SCANNING: Defining Footprinting: Information Gathering Methodology – Unearthing Initial Information -Tool: Sam spade – Locate the Network Range – Tool: NeoTrace , VisualRoute –Scanning: Detecting ‘Live’ Systems On Target. Network –Tools: War Dialers, Ping Utilities –Port Scanning – Tool: ipEye, IPsecScan, NetScan Tools Pro 2003,SuperScan 3.0,NMap(NetworkMapper) – Active Stack Fingerprinting – Passive Fingerprinting - Proxy Servers – Anonymizers.

UNIT III

ENUMERATION AND SYSTEM HACKING: Introduction to Enumeration – Net Bios Null Sessions – NetBIOS Enumeration – Hacking Tool: DumpSec, NAT, - SNMP Enumeration- Hacking Tool: GetAcct -Active Directory Enumeration - AD Enumeration countermeasures – System Hacking: Administrator, Password Guessing – Performing automated password guessing – Tool: Legion, NTInfoScan – Password Sniffing-Privilege Escalation Manual Password Cracking Algorithm - Automatic Password CrackingAlgorithm - Password Types - Types of Password Attacks.

UNIT IV

TROJANS AND BACKDOORS: Trojans and Backdoors: Working of Trojans - Various Trojan Genre – Modes of Transmission – Tools: Donald Dick, SubSeven, Back Oriffice 2000, NetBus, Beast.

UNIT V

SNIFFER AND DOS ATTACKS: Introduction to sniffers - Security Concern- Tool: Ethereal, Snort,Windump, Etherpeek – Passive Sniffing - Active Sniffing - EtherFloodsniff - ARP Spoofing – Sniffing HTTPS and SSH – Man in the Middle Attack - Macof, MailSnarf, URLSnarf, WebSpy - Mac Changer-Iris – NetIntercept – DNS Sniffing and Spoofing – Denial Of Service Attack - Types of denial of service

attacks - Distributed Denial of Service Attacks – Ping of Death –Hacking Tool: SSPing, Land Exploit,Smurf – DDOS Attack Sequence - Preventing DoS Attacks.

REFERENCE BOOKS:

1. Kimberly Graves, Certified Ethical Hacker STUDY GUIDE, Wiley publication, 2010.
2. Michael Gregg, Certified Ethical Hacker, Pearson publication, 2014.
3. Matt Walker, All-in-one Certified Ethical Hacker Exam Guide, McGraw Hill Edition, 2012.

WEB REFERENCES:

1. http://index-of.es/Hacking-Webserver/Certified_Ethical_Hacker_3.0_Official_Course.pdf
2. <http://ptgmedia.pearsoncmg.com/images/9780789751270/samplepages/9780789751270.pdf>
3. <https://cert.eccouncil.org/images/doc/CEH-Handbook-v2.0.pdf>

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits				
III	23UVACS4	ETHICAL HACKING					2	2				
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓		
CO2		✓	✓	✓	✓	✓	✓		✓	✓		
CO3	✓	✓	✓	✓		✓	✓	✓				
CO4	✓		✓		✓	✓	✓	✓	✓	✓		
CO5	✓	✓	✓	✓	✓		✓	✓	✓			
Number of matches (✓) = 40, Relationship: High												

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

SEMESTER V

Course Code: 23UCS5CC9
Instruction Hours: 6
Credits: 5

Exam Hours: 3
Internal Marks:25
External Marks:75

CORE COURSE – IX SOFTWARE ENGINEERING

Learning Objectives (LO):

- L01: Gain basic knowledge of analysis and design of systems
- L02: Ability to apply software engineering principles and techniques
- L03: Model a reliable and cost-effective software system
- L04: Ability to design an effective model of the system
- L05: Perform Testing at various levels and produce an efficient system.

Course Outcomes (CO):

On completion of this course, students will;

- CO1: Gain basic knowledge of analysis and design of systems
- CO2: Ability to apply software engineering principles and techniques
- CO3: Model a reliable and cost-effective software system
- CO4: Ability to design an effective model of the system
- CO5: Perform Testing at various levels and produce an efficient system.

Unit I

Introduction: The software engineering discipline, programs vs. software products, why study software engineering, emergence of software engineering, Notable changes in software development practices, computer systems engineering.

Software Life Cycle Models: Why use a life cycle model, Classical waterfall model, iterative waterfall model, prototyping model, evolutionary model, spiral model, comparison of different life cycle models.

Unit II

Requirements Analysis and Specification: Requirements gathering and analysis, Software requirements specification (SRS)**Software Design:** Good software design, cohesion and coupling, neat arrangement, software design approaches, object- oriented vs function-oriented design

Unit III

Function-Oriented Software Design: Overview of SA/SD methodology, structured analysis, data flow diagrams (DFD's), structured design, detailed design.**User-Interface design:** Characteristics of a good interface; basic concepts; types of user interfaces; component based GUI development, a user interface methodology.

Unit IV

Computer Aided Software Engineering: CASE and its scope; CASE environment; CASE support in software life cycle; other characteristics of CASE tools; towards second generation CASE tool; architecture of a CASE environment.

Unit V

Software Maintenance: Characteristic of software maintenance; software reverseengineering; software maintenance process models; estimation of maintenance cost

Text Book:

1. Rajib Mall, Fundamentals of Software Engineering, Fifth Edition, Prentice-Hall of India, 2018

Reference Books:

1. Richard Fairley, Software Engineering Concepts, Tata McGraw-Hill publishing company Ltd, Edition 1997
2. Roger S. Pressman, Software Engineering, Seventh Edition, McGraw-Hill
3. James A. Senn, Analysis & Design of Information Systems, Second Edition, McGraw-Hill International Editions.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits				
V	23UCS5CC9	SOFTWARE ENGINEERING					6	5				
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓		
CO2		✓	✓	✓	✓	✓	✓		✓	✓		
CO3	✓	✓	✓	✓		✓	✓	✓				
CO4	✓		✓		✓	✓	✓	✓	✓	✓		
CO5	✓	✓	✓	✓	✓		✓	✓	✓			
Number of matches (✓) = 40, Relationship: High												

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

SEMESTER V

Course Code: 23UCS5CC10
Instruction Hours: 6
Credits: 5

Exam Hours: 3
Internal Marks:25
External Marks:75

CORE COURSE X- DATABASE MANAGEMENT SYSTEM

Learning Objectives (LO):

- LO1: To enable the students to learn the designing of data base systems, foundation on the relational model of data and normal forms.
- LO2: To understand the concepts of data base management system, design simple Database models LO3: To learn and understand to write queries using SQL, PL/SQL.
- LO4: To enable the students to learn the designing of data base systems, foundation on the relational Model of data and normal forms.
- LO5: To understand the concepts of data base management system, design simple Database models.

Course Outcomes (CO):

On completion of this course, students will

- CO1: Understand the various basic concepts of Data Base System. Difference between file system and DBMS and compare various data models.
- CO2: Define the integrity constraints. Understand the basic concepts of Relational Data Model, Entity-Relationship Model.
- CO3: Design database schema considering normalization and relationships within database. Understand and construct database using Structured Query Language.
- CO4: Classify the different functions and various join operations and enhance the knowledge of handling multiple tables.
- CO5: Learn to design Data base operations and implement using PL/SQL programs. Learn basics Of PL/SQL and develop programs using Cursors, Exceptions

Unit I

Database Concepts: Database Systems - Data vs Information - Introducing the database -File system - Problems with file system – Database systems. Data models - Importance - Basic Building Blocks - Business rules - Evolution of Data models - Degrees of Data Abstraction

Unit II

Design Concepts: Relational database model - logical view of data-keys -Integrity rules - relational set operators - data dictionary and the system catalog - relationships -data redundancy revisited -indexes - codd's rules. Entity relationship model - ER diagram

Unit III

Normalization of Database Tables: Database tables and Normalization – The Need for Normalization – The Normalization Process – Higher level Normal Form. **Introduction to SQL:** Data Definition Commands – Data Manipulation Commands – SELECT Queries – Additional Data Definition Commands – Additional SELECT Query Keywords – Joining Database Tables

Unit IV

Advanced SQL: Relational SET Operators: UNION – UNION ALL – INTERSECT - MINUS. SQL Join Operators: Cross Join – Natural Join – Join USING Clause – JOIN ON Clause – Outer Join.

Unit V

PL/SQL: A Programming Language: History – Fundamentals – Block Structure – Comments – Data Types – Other Data Types – Variable Declaration – Assignment operation – Arithmetic operators. **Control Structures and Embedded SQL:** Control Structures – Nested Blocks – SQL in PL/SQL – Data Manipulation – Transaction Control statements.

Text Book:

1. , Morris, Rob, "Database Systems, Design, Implementation and Management", Ninth Edition Coronel
2. Shah, "Database Systems Using Oracle", 2nd edition, Pearson Education India, 2016 Nilesh

Reference Books:

1. Abraham Silberschatz, Henry F.Korth and S.Sudarshan, "Database System Concepts", McGraw Hill International Publication, VI Edition
2. Shio Kumar Singh, "Database Systems", Pearson publications, II Edition

WebResources

Web resources from NDL Library, E-content from open-source libraries

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits				
V	23UCS5CC10	DATABASE MANAGEMENT SYSTEM					6	5				
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓		
CO2		✓	✓	✓	✓	✓	✓		✓	✓		
CO3	✓	✓	✓	✓		✓	✓	✓				
CO4	✓		✓		✓	✓	✓	✓	✓	✓		
CO5	✓	✓	✓	✓	✓		✓	✓	✓			
Number of matches (✓) = 40, Relationship: High												

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

SEMESTER V

Course Code: 23UCS5CC11P
Instruction Hours: 4
Credits: 4

Exam Hours: 3
Internal Marks:40
External Marks:60

CORE COURSE - DATA BASE MANAGEMENT SYSTEM LAB

Learning Objectives (LO):

- LO1: To enable the students to learn the designing of data base systems, foundation on the relational model of data and normal forms.
- LO2: To understood the concepts of data base management system, design simple Database models
- LO3: To learn and understand to write queries using SQL, PL/SQL.
- LO4: To enable the students to learn the designing of data base systems, foundation on the relational model of data and normal forms.
- LO5: To understood the concepts of data base management system, design simple Database models

Course Outcomes (CO):

On completion of this course, students will;

- CO1: Understand the various basic concepts of Data Base System. Difference between file system and DBMS and compare various data models.
- CO2: Define the integrity constraints. Understand the basic concepts of Relational Data Model, Entity-Relationship Model
- CO3: Design database schema considering normalization and relationships within database. Understand and construct database using Structured Query Language. Attain a good practical skill of managing and retrieving of data using Data Manipulation Language (DML)
- CO4: Classify the different functions and various join operations and enhance the knowledge of handling multiple tables.
- CO5: Learn to design Data base operations and implement using PL/SQL programs. Learn basics Of PL/SQL and develop programs using Cursors, Exceptions

List of Exercises:

I. SQL

1. DDLCOMMANDS
2. DMLCOMMANDS
3. TCLCOMMANDS

II. PL/SQL

4. FIBONACCI SERIES
5. FACTORIAL
6. TRING REVERSE

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits				
V	23UCS5CC11P	DATABASE MANAGEMENT SYSTEM LAB					4	4				
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓		
CO2		✓	✓	✓	✓	✓	✓		✓	✓		
CO3	✓	✓	✓	✓		✓	✓	✓				
CO4	✓		✓		✓	✓	✓	✓	✓	✓		
CO5	✓	✓	✓	✓	✓		✓	✓	✓			
Number of matches (✓) = 40, Relationship: High												

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

SEMESTER V

Course Code: 23UCS5CC12

Instruction Hours:6

Credits:5

Exam Hours: 3

Internal Marks:25

External Marks:75

CORE COURSE - XII COMPUTER NETWORKS

Learning Objectives (LO):

L01 : To learn the basic concepts of Data communication and Computer network

L02 : To learn about wireless Transmission

L03 : To learn about networking and data link layer.

L04 : To study about Network communication.

L05 : To learn the concept of Transport layer

Course Outcomes (CO):

On completion of this course, students will;

CO1 : To Understand the basics of Computer Network architecture, OSI and TCP/IP reference models

CO2 : To gain knowledge on Telephone systems using wireless network

CO3 : To understand the concept of MAC

CO4 : To analyze the characteristics of Routing and Congestion control algorithms

CO5 : To understand network security and define various protocols such as FTP, HTTP, Telnet, DNS

Unit I

Introduction – Network Hardware – Software – Reference Models – OSI and TCP/IP Models – Example Networks: Internet, ATM, Ethernet and Wireless LANs - Physical Layer – Theoretical Basis for Data Communication - Guided Transmission Media.

Unit II

Wireless Transmission - Communication Satellites – Telephone System: Structure, Local Loop, Trunks and Multiplexing and Switching. Data Link Layer: Design Issues – Error Detection and Correction

Unit III

Elementary Data Link Protocols - Sliding Window Protocols – Data Link Layer in the Internet - Medium Access Layer – Channel Allocation Problem – Multiple Access Protocols – Bluetooth.

Unit IV

Network Layer - Design Issues - Routing Algorithms - Congestion Control Algorithms – IP Protocol – IP Addresses–InternetControlProtocols.

Unit V

Transport Layer - Services - Connection Management - Addressing, Establishing and Releasing a Connection – Simple Transport Protocol – Internet Transport Protocols (ITP) - Network Security: Cryptography

Text Book:

1. A. S. Tanenbaum, "Computer Networks", 4th Edition, Prentice-Hall of India, 2008

Reference Books:

1. B. A. Forouzan, "Data Communications and Networking", Tata McGraw Hill, 4th Edition, 2017
2. F. Halsall, "Data Communications, Computer Networks and Open Systems", Pearson Education, 2008
3. D. Bertsekas and R. Gallager, "Data Networks", 2nd Edition, PHI, 2008.
4. Lamarca, "Communication Networks", Tata McGraw- Hill, 2002

Web Resources

1. https://en.wikipedia.org/wiki/Computer_network
2. <https://citationsy.com/styles/computer-networks>.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits				
VI	23UCS5CC12	COMPUTER NETWORKS					6	5				
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓		
CO2		✓	✓	✓	✓	✓	✓		✓	✓		
CO3	✓	✓	✓	✓		✓	✓	✓				
CO4	✓		✓		✓	✓	✓	✓	✓	✓		
CO5	✓	✓	✓	✓	✓		✓	✓	✓			
Number of matches (✓) = 40, Relationship: High												

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

SEMESTER V

Course Code: 23UCS5DE11
Instruction Hours: 3
Credits: 3

Exam Hours: 3
Internal Marks:25
External Marks:75

CLLOUD COMPUTING

Learning Objectives (LO):

L01: Learning fundamental concepts and Technologies of Cloud Computing.

L02: Learning various cloud service types and their uses and pitfalls.

L03: To learn about Cloud Architecture and Application design

L04: To know the various aspects of application design, benchmarking and security on the Cloud.

L05:To learn the various Case Studies in Cloud Computing..

Course Outcomes (CO):

On completion of this course, students will

CO1: Understand the fundamental concepts and Technologies in Cloud Computing.

CO2: Able to understand various cloud service types and their uses and pitfalls..

CO3: Able to understand Cloud Architecture and Application design

CO4: Understand the various aspects of application design, benchmarking and security in the Cloud.

CO5: Understand various Case Studies in Cloud Computing

Unit I

Introduction to Cloud Computing: Definition of Cloud Computing – Characteristics of Cloud Computing – Cloud Models – Cloud Service Examples – Cloud-based Services and Applications.

Cloud Concepts and Technologies: Virtualization – Load balancing – Scalability and Elasticity – Deployment – Replication – Monitoring – Software Defined Networking – Network Function Virtualization – Map Reduce – Identity and Access Management – Service Level Agreements – Billing.

Unit II

Cloud Services Compute Services: Amazon Elastic Computer Cloud - Google Compute Engine - Windows Azure Virtual Machines Storage Services: Amazon Simple Storage Service - Google Cloud Storage - Windows Azure Storage Database Services: Amazon Relational Data Store - Amazon Dynamo DB - Google Cloud SQL - Google Cloud Data Store - Windows Azure SQL Database - Windows Azure Table Service Application Services: Application Runtimes and Frameworks - Queuing Services - Email Services - Notification Services - Media Services Content Delivery Services: Amazon Cloud Front - Windows Azure Content Delivery Network Analytics Services: Amazon Elastic Map Reduce - Google Map Reduce Service - Google Big Query - Windows Azure HDInsight Deployment and Management Services: Amazon Elastic Bean stack - Amazon Cloud Formation Identity and Access Management Services: Amazon Identify and Access Management - Windows Azure Active Directory Open Source Private Cloud Software: Cloud Stack

- Eucalyptus – OpenStack

Unit III

Cloud Application Design: Introduction – Design Consideration for Cloud Applications – Scalability – Reliability and Availability – Security – Maintenance and Upgradation – Performance – Reference Architectures for Cloud Applications – Cloud Application Design Methodologies: Service Oriented Architecture (SOA), Cloud Component Model, IaaS, PaaS and SaaS Services for Cloud Applications, Model View Controller (MVC), RESTful Web Services – Data Storage Approaches: Relational Approach (SQL), Non-Relational Approach (NoSQL).

Unit IV

Cloud Application Benchmarking and Tuning: Introduction to Benchmarking – Steps in Benchmarking – Workload Characteristics – Application Performance Metrics – Design Consideration for Benchmarking Methodology – Benchmarking Tools and Types of Tests – Deployment Prototyping.

Cloud Security: Introduction – CSA Cloud Security Architecture – Authentication (SSO) – Authorization – Identity and Access Management – Data Security : Securing data at rest, securing data in motion – Key Management – Auditing.

Unit V

Case Studies: Cloud Computing for Healthcare – Cloud Computing for Energy Systems - Cloud Computing for Transportation Systems - Cloud Computing for Manufacturing Industry - Cloud Computing for Education.

Text Book:

1. Arshdeep Bahga, Vijay Madiseti, Cloud Computing – A Hands On Approach, Universities Press (India) Pvt. Ltd., 2018

Reference Books:

1. Anthony T Velte, Toby J Velte, Robert Elsenpeter, Cloud Computing: A Practical Approach, Tata McGraw-Hill, 2013.
2. Barrie Sosinsky, Cloud Computing Bible, Wiley India Pvt. Ltd., 2013.
3. David Crookes, Cloud Computing in Easy Steps, Tata McGraw Hill, 2015.
4. Dr. Kumar Saurabh, Cloud Computing, Wiley India, Second Edition 2012.

Web Resources

Web resources from NDL Library, E-content from open-source libraries

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits			
V	23UCS5DE11	CLOUD COMPUTING					3	3			
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓	
CO2		✓	✓	✓	✓	✓	✓		✓	✓	
CO3	✓	✓	✓	✓		✓	✓	✓			
CO4	✓		✓		✓	✓	✓	✓	✓	✓	
CO5	✓	✓	✓	✓	✓		✓	✓	✓		
Number of matches (✓) = 40, Relationship: High											

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

SEMESTER V

Course Code: 23UCS5DE12
Instruction Hours: 3
Credits: 3

Exam Hours: 3
Internal Marks:25
External Marks:75

INTRODUCTION TO DATA SCIENCE

Learning Objectives (LO):

- LO1: To learn about basics of Data Science and Big data.
- LO2: To learn about overview and building process of Data Science.
- LO3: To learn about various Algorithms in Data Science.
- LO4: To learn about Hadoop Framework..
- LO5: To learn about case study about Data Science.

Course Outcomes (CO):

On completion of this course, students will

- CO1: Understand the basics in Data Science and Big data.
- CO2: Understand overview and building process in Data Science.
- CO3: Understand various Algorithms in Data Science.
- CO4 :Understand Hadoop Framework in Data Science.
- CO5 Case study in Data Science.

Unit I

Introduction: Benefits and uses – Facts of data – Data science process – Big data ecosystem and data science

Unit II

The Data science process: Overview – research goals - retrieving data - transformation – Exploratory Data Analysis – Model building

Unit III

Algorithms : Machine learning algorithms – Modeling process – Types – Supervised – Unsupervised - Semi-supervised

Unit IV

Introduction to Hadoop : Hadoop framework – Spark – replacing MapReduce– NoSQL – ACID – CAP – BASE – types

Unit V

Case Study: Prediction of Disease - Setting research goals - Data retrieval – preparation - exploration - Disease profiling - presentation and automation

Text Book:

Davy

1. Cielen, Arno D. B. Meysman, Mohamed Ali, "Introducing Data Science", manning publications 2016

Reference Books:

1. Roger Peng, "The Art of Data Science", lulu.com 2016
2. MurtazaHaider, "Getting Started with Data Science – Making Sense of Data with Analytics", IBM press, E-book
3. Davy Cielen, Arno D.B. Meysman, Mohamed Ali, "Introducing Data Science: Big Data, Machine Learning, and More, Using Python Tools", Dreamtech Press 2016
4. Annalyn Ng, Kenneth Soo, "Numsense! Data Science for the Layman: No Math Added", 2017, 1st Edition
5. Cathy O'Neil, Rachel Schutt, "Doing Data Science Straight Talk from the Frontline", O'Reilly Media 2013.
6. Lillian Pierson, "Data Science for Dummies", 2017 II Edition

Web Resources

1. <https://www.w3schools.com/datascience/>
2. https://en.wikipedia.org/wiki/Data_science
3. <http://www.cmap.polytechnique.fr/~lepenec/en/post/references/refs/>
4. Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits				
V	23UCS5DE12	Introduction to Data Science					3	3				
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓		
CO2		✓	✓	✓	✓	✓	✓		✓	✓		
CO3	✓	✓	✓	✓		✓	✓	✓				
CO4	✓		✓		✓	✓	✓	✓	✓	✓		
CO5	✓	✓	✓	✓	✓		✓	✓	✓			
Number of matches (✓) = 40, Relationship: High												

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

SEMESTER V

Course Code: 23UCS5DE21
Instruction Hours: 3
Credits: 3

Exam Hours: 3
Internal Marks:25
External Marks:75

ROBOTICS AND ITS APPLICATIONS

Learning Objectives (LO):

- L01 : To understand the robotics fundamentals
- L02 : Understand the sensors and matrix methods
- L03 : Understand the Localization: Self-localizations and mapping
- L04 : To study about the concept of Path Planning, Vision system
- L05 : To learn about the concept of robot artificial intelligence

Course Outcomes (CO):

On completion of this course, students will;

- CO1: Describe the different physical forms of robot architectures.
- CO2: Kinematically model simple manipulator and mobile robots.
- CO3: Mathematically describe a kinematic robot system
- CO4: Analyze manipulation and navigation problems using knowledge of coordinate frames, kinematics, optimization, control, and uncertainty
- CO5: Program robotics algorithms related to kinematics, control, optimization, and uncertainty.

Unit I

Introduction: Introduction, brief history, components of robotics, classification, workspace, work-envelop, motion of robotic arm, end-effectors and its types, service robot and its application, Artificial Intelligence in Robotics.

Unit II

Actuators and sensors :Types of actuators, stepper-DC-servo-and brushless motors- model of a DC servo motor-types of transmissions-purpose of sensor-internal and external sensor-common sensors-encoders tachometers-strain gauge based force torque sensor-proximity and distance measuring sensors
Kinematics of robots: Representation of joints and frames, frames transformation, homogeneous matrix, D-H matrix, Forward and inverse kinematics: two link planar (RR) and spherical robot (RRP). Mobile robot
Kinematics: Differential wheel mobile robot

Unit III

Localization: Self-localizations and mapping - Challenges in localizations – IR based localizations – vision based localizations – Ultrasonic based localizations - GPS localization systems.

Unit IV

Path Planning: Introduction, path planning-overview-road map path planning-cell decomposition path planning potential field path planning-obstacle avoidance-case studies
Vision system: Robotic vision systems-image representation-object recognition-and categorization-depth measurement- image data compression-visual inspection-software considerations

Unit V

Application: Ariel robots-collision avoidance robots for agriculture-mining-exploration-underwater-civilian-and military applications-nuclear applications-space Applications-Industrial robots-artificial intelligence in robots-application of robots in material handling-continuous arc welding-spot welding-spray painting-assembly operation-cleaning-etc.

Text Book:

1. Richard D. Klafter, Thomas Achmielewski and Mickael Negin, Robotic Engineering and Integrated Approach, Prentice Hall India-New Delhi-2001
2. Saeed B. Nikku, Introduction to robotics, analysis, control and applications, Wiley-India, 2nd edition 2011

Reference Books:

1. Industrial robotic technology-programming and application by M.P. Groover et al, McGraw Hill 2008
2. Robotics technology and flexible automation by S.R. Deb, THH-2009

Web Resources

1. https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_robotics.htm
2. <https://www.geeksforgeeks.org/robotics-introduction/>

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits				
V	23UCS5DE21	ROBOTICS AND ITS APPLICATIONS					3	3				
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓		
CO2		✓	✓	✓	✓	✓	✓		✓	✓		
CO3	✓	✓	✓	✓		✓	✓	✓				
CO4	✓		✓		✓	✓	✓	✓	✓	✓		
CO5	✓	✓	✓	✓	✓		✓	✓	✓			
Number of matches (✓) = 40, Relationship: High												

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

SEMESTER V

Course Code: 23UCS5DE22
Instruction Hours: 3
Credits: 3

Exam Hours: 3
Internal Marks:25
External Marks:75

CRYPTOGRAPHY

Learning Objectives (LO):

LO1: To understand the fundamentals of Cryptography

LO2: To acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity

LO3: To understand the various key distribution and management schemes.

LO4: To understand how to deploy encryption techniques to secure data in transit across data networks.

LO5: To design security applications in the field of Information technology

Course Outcomes (CO):

On completion of this course, students will;

CO1: Analyze the vulnerabilities in any computing system and hence be able to design a security solution.

CO2: Apply the different cryptographic operations of symmetric cryptographic algorithms

CO3: Apply the different cryptographic operations of public key cryptography

CO4: Apply the various Authentication schemes to simulate different applications.

CO5: Understand various Security practices and System security standards

Unit I

Introduction: The OSI security Architecture – Security Attacks – Security Mechanisms – Security Services – A model for network Security.

Unit II

Classical Encryption Techniques: Symmetric cipher model – **Substitution Techniques:** Caesar Cipher – Monoalphabetic cipher – Play fair cipher – Poly Alphabetic Cipher – Transposition techniques – Stenography

Unit III

Block Cipher and DES: Block Cipher Principles – DES – The Strength of DES –**RSA:** The RSA algorithm.

Unit IV

Network Security Practices: IP Security overview - IP Security architecture – Authentication Header. **Web Security:** SecureSocketLayer and Transport Layer Security – Secure Electronic Transaction.

Unit V

Intruders – Malicious software – Firewalls.

Text Book:

1. William Stallings, "Cryptography and Network Security Principles and Practices"

Reference Books:

1. Behrouz A. Foruzan, "Cryptography and Network Security", Tata McGraw-Hill, 2007.
2. AtulKahate, "Cryptography and Network Security", Second Edition, 2003, TMH.
3. M.V. Arun Kumar, "Network Security", 2011, First Edition, USP.

Web Resources

1. <https://www.tutorialspoint.com/cryptography/>
2. <https://gpgtools.tenderapp.com/kb/how-to/introduction-to-cryptography>

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits				
V	23UCS5DE22	CRYPTOGRAPHY					3	3				
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓		
CO2		✓	✓	✓	✓	✓	✓		✓	✓		
CO3	✓	✓	✓	✓		✓	✓	✓				
CO4	✓		✓		✓	✓	✓	✓	✓	✓		
CO5	✓	✓	✓	✓	✓		✓	✓	✓			
Number of matches (✓) = 40, Relationship: High												

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

SEMESTER V

NETWORK PROGRAMMING

Course Code: 23UVACS5
Instruction Hours : 2
Credits: 2

Exam Hours: 3
Internal Marks: 50
External Marks: 50

Objective:

- This course highlights the basic concepts of networking
- This helps the student to gain knowledge of various networking protocols.
- The network security is also been focused.

Unit I:

Introduction: Components of Computer (Motherboard, System Memory, Bios, Keyboard, Monitor, Serial Port, Parallel Port, Hard disk drive Modem, CDROM Drive).-Introduction to Networking-Types of Network (WAN, LAN, MAN)Peer to Peer & Client Server model- Network Topologies (BUS, STAR, Ring)- Network devices(Hub/Switch/Repeaters/Bridge/Router) - Network Cabling(Twisted Pair, Coaxial, Fiber Optic) - NIC Card.

Unit II:

Network Reference Model: ISO-OSI Model (application, presentation Session, Transport, Network Data link, Physical) -TCP/IP Model (Application, Transport, internet work, Network interface). - Basic Concept of IP Address/MAC Address/Subnet mask-PING/TRACERT.

Unit III:

Networking Protocols: Address Resolution Protocol (ARP) - Reverse Address Resolution Protocol (RARP).

Unit IV:

Transport Layer-User datagram protocol (UDP)-Transmission Control Protocol –Congestion Control – Queuing Disciplines-Congestion Avoidance mechanism (DECBit Random Early Detection (RED) Source-Based Congestion Avoidance)

Unit V:

Domain Name System (DNS) –E-mail (SMTP)-World Wide Web (HTTP)-Simple Network management protocol (SNMP)-File Transfer Protocol (FTP)-Network Security: Firewall-Encryption and Decryption.

BOOK FOR STUDY:

1. Wendell Odom, "Introduction to CISCO Networking Technologies", Dorling Kindersley Publishing Inc., and Pearson Education, Inc., 2006
2. Larry L. Peterson, Bruce S. Davie, "Computer Networks: A System Approach", Third Edition, Morgan Kaufman Publishers Inc., 2003.
3. Andrew S. Tanenbum, "Computer Networks", Fourth Edition, 2003

REFERENCES

1. James F. Kuross, Keith W. Boss, "Computer Networking, A Top down Approach Featuring the internet", Third Edition, Addison Wesley, may13 2004.
2. Jain S, "Data Communication and Networking", BPB Publications .Second Edition.
3. Benhrom Frouzan, "Introduction to Data Communication", Fourth edition 2005

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits				
V	23UVACS5	NETWORK PROGRAMMING					2	2				
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓		
CO2		✓	✓	✓	✓	✓	✓		✓	✓		
CO3	✓	✓	✓	✓		✓	✓	✓				
CO4	✓		✓		✓	✓	✓	✓	✓	✓		
CO5	✓	✓	✓	✓	✓		✓	✓	✓			
Number of matches (✓) = 40, Relationship: High												

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

SEMESTER-VI

Course Code: 23UCS613PW
Instruction Hours: 6
Credits: 3

Exam Hours: 3
Internal Marks:40
External Marks:60

CORE COURSE - PROJECT WITH VIVA-VOCE

- ☒ Objective: Mini project is to let the students apply the programming knowledge into a real- world situation/problem.

Course Outcomes (COs):

On successful completion of the course the students will be able to:

- ☒ Identify the requirements for the real world problems.
 - ☒ Conduct a survey of several available literatures in the preferred field of study.
 - ☒ Study and enhance software/ hardware skills
 - ☒ Demonstrate and build the project successfully by hardware requirements, coding, emulating and testing.
 - ☒ To report and present the findings of the study conducted in the preferred domain
-
- Students do Mini Project in their respective Colleges.
 - The objective of the Mini Project is to enable the students to work in convenient groups of not more than four members on a project with a Latest Software.

SEMESTER VI

Course Code: 23UCS6CC14

Exam Hours: 3

Instruction Hours: 6

Internal Marks:25

Credits: 5

External Marks:75

CORE COURSE XIII - WEB APPLICATION DEVELOPMENT

Course Objective:

- The course focuses on designing and developing Web-based applications using a variety of programming languages and tools.

Course Outcomes:

- CO1: Ability to install Operating Systems and able to run open-source operating systems
- CO2: Ability to gather information about Free and Open Source Software projects from software
- CO3: Releases and from sites on the internet
- CO4: Ability to build software
- CO5: Ability to modify Open Source Software packages.

Unit I

Installing LAMP stack (Linux, Apache, MySQL, PHP suite)- Configuring installation – Creating PHP pages – ingenerating MySQL with PHP.

Unit II

Web forms and user data manipulation – Basic data manipulation using PHP/MySQL forms

Unit III

Validating user inputs – Handling errors in form.

Unit IV

Case study: Building content management system using LAMP stack

Unit V

Configuring log files to improve LAMP stack based web site – Troubleshooting web site.

Text Books:

1. Naramore Elizabeth, Gerner Jason, et aln., Beginning PHP5, Apache, MySQL web development, Wrox press/Wiley Dreamtech press, 2005 edition. (ISBN 81-265-0581-8) [Unit-1 :(Chapters 1,2); Unit-2 : (Chapters 3,4,5,6); Unit-3 (Chapters 8,9); Unit-4 (Chapters 13), Unit-5 (Chapters 17,18)]

Reference Books:

1. Bayross Ivan, Web enabled commercial application development using HTML,DHTML,JavaScript, Perl CGI., BPB publications, 2nd revised edition, 2002.

Web Reference:

<https://www.pdfdrive.com/beginning-php-and-mysql-e16617132.html>

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits			
VI	23UCS6CC14	WEB APPLICATION DEVELOPMENT					6	5			
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓	✓	✓	✓		✓		✓			
CO2	✓	✓				✓	✓	✓	✓		
CO3	✓		✓	✓		✓	✓	✓	✓		
CO4	✓	✓	✓		✓		✓	✓	✓	✓	
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Number of matches (✓) = 37, Relationship: High											

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

SEMESTER VI

Course Code: 23UCS6CC15P

Exam Hours: 3

Instruction Hours: 3

Internal Marks:40

Credits: 2

External Marks:60

CORE COURSE - WEB APPLICATION DEVELOPMENT LAB

Learning Objectives (LO):

L01: To teach students the basics of server side scripting using PHP

L02: To explain web application development procedures

L03: To impart servlet technology for writing business logic

L04: To facilitate students to connect to databases using JDBC

L05: To familiarize various concepts of application development using JSP

COURSE OUTCOMES:

Upon completion of this course- students will be able to:

C01: Create web pages using PHP

C02: Identify the difference between the HTML PHP and XML documents.

C03: Identify the engineering structural design of XML and parse tree

C04 : Analyze the difference between and PHP and XML.

C05. Understand the concept of JAVA SCRIPTS.

Syllabus

1. Write a server side PHP program that displays marks, total, grade of a student in tabular format by accepting user inputs for name, number and marks from a HTML form.
2. Write a PHP program that adds products that are selected from a web page to a shopping cart.
3. Write a PHP program to access the data stored in a my sql table.
4. Write a PHP program interface to create a database and to insert a table into it.
5. Write a PHP program using classes to create a table.
6. Write a PHP program to upload a file to the server.
7. Write a PHP program to create a directory, and to read contents from the directory.
8. Write a shell program to find the details of an user session.
9. Write a shell program to change the extension of a given file.
10. Create a mysql table and execute queries to read, add, remove and modify a record from that table.

Relationship Matrix for Course Outcomes- Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits		
VI	23UCS6CC15P	WEB APPLICATION DEVELOPMENT LAB					3	2		
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓
CO2		✓	✓	✓	✓	✓	✓		✓	✓
CO3	✓	✓	✓	✓		✓	✓	✓		
CO4	✓		✓		✓	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓		✓	✓	✓	
Number of matches (✓) = 40- Relationship: High										

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

SEMESTER VI

Course Code: 23UCS6CC16
Instruction Hours: 6
Credits: 6

Exam Hours: 3
Internal Marks: 25
External Marks: 75

INTERNET OF THINGS

Learning Objectives (LO):

- LO1: Understand IoT fundamentals, design, and domain-specific applications.
- LO2: Learn the differences between IoT and M2M, and IoT systems Management.
- LO3: Understand IoT platform design and specification methodology.
- LO4: Learn Python programming for IoT and work with Raspberry Pi.
- LO5: Explore IoT integration with cloud computing and web services.

Course Outcomes (CO):

- On completion of this course, students will;
- CO1: Define IoT and understand its domain-specific applications.
- CO2: Differentiate between IoT and M2M, and apply IoT systems management tools.
- CO3: Design IoT platforms and specifications for various use cases.
- CO4: Program IoT devices using Python and integrate with Raspberry Pi.
- CO5: Integrate IoT with cloud computing and web services for application deployment.

Unit I

INTRODUCTION – Definition & characteristics of IoT - physical design of IoT - logical design of IoT - IoT enabling Technologies - IoT levels & Deployment templates. Domain specific IoT : Home Automation - cities - Environment-Energy - retail - logistics - Agriculture - Industry Health and life style.

Unit II

IOT and M2M-Deference between Iot and M2M-SDN and NFV for lot-IoT systems management - SNMP - YANG – NETOPEER.

Unit III

IOT SPECIFICATION IoT platforms design Methodology - purpose and specification - process specification - Domain model specification - Information model specification - Service specification - IoT level specification - functional view specification - operational view specification - Device and component Integrators - Application Development.

Unit IV

Logical design using python-Installing python - type conversions - control flow - functions - modules - File handling -classes. IoT physical devices and End points, building blocks of IoT device-Raspberry Pi-Linux on Raspberry Pi-Raspberry Pi interfaces.

Unit V

Iot and Cloud Computing-IoT physical servers & cloud computing - WAMP – Xively cloud for IoT-python Web application framework-Amazon webservices for IoT.

Text Book:

1. Arshdeep Bahga, Vijay Madi setti, Internet of Things - A hands on Approach, Universities Press, 2015.

Reference Books:

1. B.K. Tripathy, J. Anuradha, "Internet of Things: Technologies, publications, Challenges, and Solutions", I ST Edition, CRC Press,2017.
2. Samuel Greengard, The Internet of Things, MITPress,2015.
3. Srinivasa K.G., Siddesh G.M. HanumanthaRaju R, Internet of Things, Cengage Learning India pvt.Ltd.2018

Web Resources

1. <https://netopeer.cesnet.cz/>
2. <https://www.ibm.com/internet-of-things>

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits				
VI	23UCS6CC16	INTERNET OF THINGS					6	6				
Course Outcomes (Cos)	Programme Outcomes(POs)					Programme Specific Outcomes(PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
CO2	✓	✓	✓	✓	✓	✓	✓	✓	✓			
CO3	✓	✓	✓	✓		✓	✓	✓				
CO4	✓		✓	✓	✓	✓	✓	✓	✓			
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓			
Number of matches(✓)=40,Relationship:High												

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

SEMESTER VI

Course Code: 23UCS6DE31

Exam Hours: 3

Instruction Hours: 6

Internal Marks:25

Credits: 5

External Marks:75

DATA ANALYTICS USING R

Learning Objectives (LO):

L01: To learn the basic concepts of Data communication and Computer network

L02: To learn the basic programming constructs in R Programming

L03: To practice various computing strategies for R Programming -based solutions to real world problems

L04: To use R Programming data structures - lists- tuples- and dictionaries.

L05: To do input/output with files in R Programming.

Course Outcomes (CO):

On completion of this course- students will;

CO1: Work with big data tools and its analysis techniques.

CO2: Analyze data by utilizing clustering and classification algorithms.

CO3: Learn and apply different mining algorithms and recommendation systems for large Colum's of data.

CO4: Perform analytics on data streams.

CO5: Learn NoSQL databases and management.

Unit I

Evolution of Big data — Best Practices for Big data Analytics — Big data characteristics — Validating — The Promotion of the Value of Big Data — Big Data Use Cases- Characteristics of Big Data Applications — Perception and Quantification of Value -Understanding Big Data Storage — A General Overview of High-Performance Architecture — HDFS — Map Reduce and YARN — Map Reduce Programming Model

Unit II

CONTROL STRUCTURES AND VECTORS -Control structures- functions- scoping rules- dates and times- Introduction to Functions- preview of Some Important R Data Structures- Vectors- Character Strings- Matrices- Lists- Data Frames- Classes Vectors: Generating sequences- Vectors and subscripts- Extracting elements of a vector using subscripts- Working with logical subscripts- Scalars- Vectors- Arrays- and Matrices- Adding and Deleting Vector Elements- Obtaining the Length of a Vector- Matrices and Arrays as Vectors Vector Arithmetic and Logical Operations- Vector Indexing- Common Vector Operations

Unit III

LISTS- Lists: Creating Lists- General List Operations- List Indexing Adding and Deleting List Elements- Getting the Size of a List- Extended Example: Text Concordance Accessing List Components and Values Applying Functions to Lists- Data Frames- Creating Data Frames- Accessing Data Frames- Other Matrix-Like Operations

Unit IV

FACTORS AND TABLES - Factors and Levels- Common Functions Used with Factors- Working with Tables- Matrix/Array-Like Operations on Tables - Extracting a Sub table- Finding the Largest Cells in a Table- Math Functions- Calculating a Probability- Cumulative Sums and Products- Minima and Maxima- Calculus- Functions for Statistical Distributions R PROGRAMMING .

Unit V

OBJECT-ORIENTED PROGRAMMING S Classes- S Generic Functions- Writing S Classes- Using Inheritance- S Classes- Writing S Classes- Implementing a Generic Function on an S Class- visualization- Simulation- code profiling- Statistical Analysis with R- data manipulation

Text Book:

1. Roger D. Peng-”R Programming for Data Science “- 2012
2. Norman Matloff-”The Art of R Programming- A Tour of Statistical Software Design”- 2011

Reference Books:

1. Garrett Grolemond- Hadley Wickham-”Hands-On Programming with R: Write Your Own Functions and Simulations” - 1st Edition- 2014
2. Venables -W.N.-andRipley-”S programming“- Springer- 2000.

Web Resources

1. <https://www.simplilearn.com> Relationship Matrix for Course Outcomes- Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits				
VI	23UCS6DE31	DATA ANALYTICS USING R					6	5				
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓		
CO2		✓	✓	✓	✓	✓	✓		✓	✓		
CO3	✓	✓	✓	✓		✓	✓	✓				
CO4	✓		✓		✓	✓	✓	✓	✓	✓		
CO5	✓	✓	✓	✓	✓		✓	✓	✓			
Number of matches (✓) = 40- Relationship: High												

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

SEMESTER VI

Course Code: 23UCS6DE32

Exam Hours: 3

Instruction Hours: 6

Internal Marks:25

Credits: 5

External Marks:75

MACHINE LEARNING

Learning Objectives (LO):

L01: To Learn about Machine Intelligence and Machine Learning applications

L02: To implement and apply machine learning algorithms to real-world applications

L03: To identify and apply the appropriate machine learning technique to classification-
pattern recognition- optimization and decision problems.

L04: To create instant based learning.

L05: To apply advanced learning.

Course Outcomes (CO):

On completion of this course- students will;

CO1: Appreciate the importance of visualization in the data analytics solution

CO2: Apply structured thinking to unstructured problems

CO3: Understand a very broad collection of machine learning algorithms and problems

CO4: Learn algorithmic topics of machine learning and mathematically deep enough to introduce
the required the or

CO5: Develop an appreciation for what is involved in learning from data.

Unit I

Introduction Machine Learning - Difference between AI- Machine Learning and Big data. Supervised and unsupervised learning- parametric vs non-parametric models

Unit II

Neural networks and genetic algorithms Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms.

Unit III

Bayesian and computational learning Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm.

Unit IV

. **Instant based learning** K- Nearest Neighbour Learning – Locally weighted Regression – Radial Basis Functions–CaseBasedLearning.

Unit V

Advanced learning Recommendation systems – opinion mining- sentiment analysis. Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules – Sets of First Order Rules – Reinforcement Learning – Task – Q-Learning – Temporal Difference Learning.

Text Book:

1. Tom M. Mitchell- –Machine Learning- McGraw-Hill Education (India) Private Limited- 2013.
2. Bengio- Yoshua- Ian J. Goodfellow- and Aaron Courville. "Deep learning" 2015- MIT Press

Reference Books:

1. EthemAlpaydin- –Introduction to Machine Learning (Adaptive Computation and Machine Learning)- The MIT Press 2004.
2. Stephen Marsland- –Machine Learning: An Algorithmic Perspective- CRC Press- 2009.

Relationship Matrix for Course Outcomes- Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits				
VI	23UCS6DE32	MACHINE LEARNING					6	5				
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓		
CO2		✓	✓	✓	✓	✓	✓		✓	✓		
CO3	✓	✓	✓	✓		✓	✓	✓				
CO4	✓		✓		✓	✓	✓	✓	✓	✓		
CO5	✓	✓	✓	✓	✓		✓	✓	✓			
Number of matches (✓) = 40- Relationship: High												

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

SEMESTER VI

Course Code: 23UCS6DE41

Instruction Hours: 3

Credits: 2

Exam Hours: 3

Internal Marks:40

External Marks:60

DATA ANALYTICS USING R LAB

Learning Objectives (LO):

L01: To understand the problem solving approaches

L02: To learn the basic programming constructs in R Programming

L03: To practice various computing strategies for R Programming -based solutions to real world problems

L04: To use R Programming data structures - lists- tuples- and dictionaries.

L05: To do input/output with files in R Programming.

Course Outcomes (CO):

On completion of this course- students will;

CO1: Acquire programming skills in core R Programming.

CO2: Acquire Object-oriented programming skills in R Programming.

CO3: Develop the skill of designing graphical-user interfaces (GUI) in R Programming

CO4: Acquire R Programming skills to move into specific branches

SNO Contents

1. Program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.
2. Program- to find the area of rectangle- square- circle and triangle by accepting suitable input parameters from user. Write a program to find list of even numbers from 1 to n using R-Loops.
3. Create a function to print squares of numbers in sequence.
4. Write a program to join columns and rows in a data frame using `cbind()` and `rbind()` in R.
5. Implement different String Manipulation functions in R.
6. Implement different data structures in R (Vectors- Lists- Data Frames)
7. Write a program to read a csv file and analyze the data in the file in R.
8. Create pie chart and bar chart using R.
9. Create a data set and do statistical analysis on the data using R.
10. Program to find factorial of the given number using recursive function
11. Write a R program to count the number of even and odd numbers from array of N numbers.

Text Book:

1. Roger D. Peng-” R Programming for Data Science “- 2012
2. Norman Matloff-”The Art of R Programming- A Tour of Statistical Software Design”- 2011

Reference Books:

1. Garrett Golemund- Hadley Wickham-”Hands-On Programming with R: Write Your Own Functions and Simulations” - 1st Edition- 2014
2. Venables -W.N.-andRipley-”S programming“- Springer- 2000.

Web Resources

1. <https://www.simplilearn.com>

Relationship Matrix for Course Outcomes- Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits				
VI	23UCS6DE41	DATA ANALYTICS USING R LAB					3	2				
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)						
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓		
CO2		✓	✓	✓	✓	✓	✓		✓	✓		
CO3	✓	✓	✓	✓		✓	✓	✓				
CO4	✓		✓		✓	✓	✓	✓	✓	✓		
CO5	✓	✓	✓	✓	✓		✓	✓	✓			
Number of matches (✓) = 40- Relationship: High												

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

SEMESTER VI

Course Code: 23UCS6DE42

Exam Hours: 3

Instruction Hours: 3

Internal Marks:40

Credits: 2

External Marks:60

CORE COURSE - I MACHINE LEARNING LAB

Learning Objectives (LO):

To apply the concepts of Machine Learning to solve real-world problems and to implement basic algorithms in clustering & classification applied to text & numeric data.

Course Outcomes (CO):

On completion of this course- students will;

CO1: Effectively use the various machine learning tools

CO2: Understand and implement the procedures for machine learning algorithms

CO3: Design Python programs for various machine learning algorithms

CO4: Apply appropriate datasets to the Machine Learning algorithms

CO5: Analyze the graphical outcomes of learning algorithms with specific datasets

LAB EXERCISES

1. Solving Classification using Decision Trees
2. Pattern Recognition Application using Bayesian Inference
3. Bagging in Classification
4. Bagging- Boosting applications using Regression Trees
5. Data & Text Classification using Neural Networks
6. Using Weka tool for SVM classification for chosen domain application
7. Data & Text Clustering using K-means algorithm
8. Data & Text Clustering using Gaussian Mixture Models

Relationship Matrix for Course Outcomes- Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits			
VI	23UCS6DE42	MACHINE LEARNING LAB					3	2			
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓	
CO2		✓	✓	✓	✓	✓	✓		✓	✓	
CO3	✓	✓	✓	✓		✓	✓	✓			
CO4	✓		✓		✓	✓	✓	✓	✓	✓	
CO5	✓	✓	✓	✓	✓		✓	✓	✓		
Number of matches (✓) = 40- Relationship: High											

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

SEMESTER VI

Course Code: 23UVACS6

Exam Hours: 3

Instruction Hours: 2

Internal Marks:50

Credits: 2

External Marks:50

VALUE ADDED COURSE

MOBILE REPAIR AND TROUBLE SHOOTING

OBJECTIVES:

- To understand the Concepts & Structure of Mobile Hardware
 - To learn the capabilities and limitations of mobile devices.
 - Identify the components of mobile
 - Illustrate installation of operating systems
- Apply mobile trouble shooting and change the screen and battery of the mobile

UNIT I:

Introduction to mobile phones- Generations of mobile phones- FHSS networks- GSM- Spread spectrum- CDMA- TDMA & Basic electronics components.

UNIT II:

Handset Specific operating systems- Handset features & applications- working principle of mobile handset & Components used in mobile handsets.

UNIT III:

Tools & equipment used for repairing & maintenance of mobile handsets- types of power supply & batteries- boosting a battery- Troubleshooting basics.

UNIT IV:

Network problems- Power failure (dead)- Mobile phone hardware troubleshooting (water damage- hanging- charging & keypad problems)- Handsets assembly& disassembly- Soldering & desoldering & SMD rework station.

UNIT V:

Mobile softwares- Data cable- Card reader- Mobile display- Remove/replace Component & Mobile phone hardware troubleshooting.

REFERENCE BOOKS:

1. Muhammad Asif Azeemi- "Learn Cell Phone Repair: A Do-It-Yourself Guide To Troubleshooting and Repairing Cell phones"- Kindle Edition- 2019.
2. J. F. DiMarzio- "Beginning Android Programming with Android Studio"- John Wiley &

Relationship Matrix for Course Outcomes- Programme Outcomes and Programme Specific Outcomes:

Semester	Code	Title of the Course					Hours	Credits			
VI	23UVACS6	MOBILE REPAIR AND TROUBLE SHOOTING					2	2			
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓	
CO2		✓	✓	✓	✓	✓	✓		✓	✓	
CO3	✓	✓	✓	✓		✓	✓	✓			
CO4	✓		✓		✓	✓	✓	✓	✓	✓	
CO5	✓	✓	✓	✓	✓		✓	✓	✓		
Number of matches (✓) = 40- Relationship: High											

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High