

**Kunthavai Naacchiyaar Govt. Arts College  
for Women (Autonomous), Thanjavur  
Department of Computer Science**



**M.Sc., Computer Science  
Syllabus 2022-23 (onwards)**

**KUNTHAVAI NAACCHIYAAR GOVERNMENT ARTS COLLEGE FOR WOMEN**

An Autonomous College Affiliated to Bharathidasan University

Re-Accredited by NAAC with 'B' Grade

Thanjavur -613 007, Tamil Nadu, India.



**CBCS & OBE**

Scheme of Instruction and Syllabus for

**M.Sc., Computer Science**

**(I to IV Semester)**

**Effective from 2022 - 2023 and onwards**



**PG DEPARTMENT OF COMPUTER SCIENCE**

## PG DEPARTMENT OF COMPUTER SCIENCE

### I. VISION

The department of Computer Science envisions a skill based technical education that empowers the student's through necessary domain knowledge and prepares them to meet the dynamic challenge in order to deliver high quality.

### II. MISSION

To provide quality education to produce competent graduates with skills required for a professional career in ICT.

To train the student for career in research and in the software industry.

To develop problem solving skills.

To encourage students to communicate effectively.

To analyze and investigate the requirements of a problem and find a solution using data analytics tools.



### III. PROGRAM OUTCOME (PO)

After completing the M.Sc., Programme the Students will be able to:

PO	FOCUS OF PO	PROGRAM OUTCOMES
1	Structure Optimization Algorithm	Express the Principles and structure of compiler design and various grammars, parsers, and optimization techniques, constituent parts, algorithms and data structures.
2	Mathematical Concepts Optimization	Understand and apply mathematical background for carry out the optimization associated with neural network.
3	Protocols Communications	Determine the most appropriate setup and protocol for communications between devices.
4	Real Time Problem Novel Solution	Analyze real-time problems and prepare novel solutions to solve it.
5	Problem Identification Solution	Infer the skills of problem identification in research and data analysis, generations of alternate solution
6	Computation Techniques Computational Technology	Analyze and apply computation techniques and computing technologies.
7	Security Principles Security Practices	Organize security principles and practices to the environment, hardware and software and human aspect of the systems.
8	Competitive Exam	Focus students in preparing NET/SET Exams etc.
9	Architecture Program Design	Produce the knowledge of architecture, programming and design used in advanced hardware and software.
10	Solved Practical Problems	Create an ability to independently carryout research/investigation and development work to solve practical problems.
11	Job Opportunities	Enhance employability skills to expand advanced programming language.
12	Analytical Tool	Collaborate an object-oriented concepts, event-driven programming and data analytics tools.





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M.Sc., Computer Science Course Structure under CBCS

(For the candidates admitted from the academic year 2022 - 2023 onwards)

Se me	Course	Subject Code	Title of the Paper	Inst. Hrs.	Credit	Exam. Hrs.	Marks		Total
							Int.	Ext.	
I	CC 1	22KP1CS01	Net Framework	6	5	3	25	75	100
	CC 2	22KP1CS02	Compiler Design	6	5	3	25	75	100
	CC 3	22KP1CS03	Data Science	6	5	3	25	75	100
	CC 4 (P)	22KP1CS04P	Java and .Net Lab	6	4	3	40	60	100
	MBE 1:1	22KP1CSELCS1:1	Network and Cyber Security	6	4	3	25	75	100
	MBE 1:2	22KP1CSELCS1:2	Computational Intelligence						
					30	23		140	360
II	CC 5	22KP2CS05	Trends in Computing	7	5	3	25	75	100
	CC 6	22KP2CS06	Operations Research	7	5	3	25	75	100
	CC 7	22KP2CS07	Python and PHP	6	5	3	25	75	100
	CC 8 (P)	22KP2CS08P	Python and PHP Lab	6	4	3	40	60	100
	NME1	22KP2CSEL01	Network Communication	4	3	3	25	75	100
	ECC1	22KP2ECCCS1 : 1	Cognitive Ability	-	3	3	-	100	100
		22KP2ECCCS1 : 2	MOOC (Value Added)						
	ECC2	22KP2ECCCS2	Add -on Course	-	4	-	-	-	-
				30	22		140	360	500



Se me	Course	Subject Code	Title of the Paper	Inst. Hrs.	Credit	Exam. Hrs.	Marks		Total
							Int.	Ext.	
III	CC 9	22KP3CS09	Soft Computing	7	6	3	25	75	100
	CC 10	22KP3CS10	Internet of Things	7	5	3	25	75	100
	CC 11 (P)	22KP3CS11P	Intenet of Things Lab	6	4	3	40	60	100
	MBE 2:1	22KP3CSELCS2:1	Digital Image Processing	6	4	3	25	75	100
	MBE 2:2	22KP3CSELCS2:2	Human-Computer Interaction						
	NME2	22KP3CSEL02	Desktop Publishing	4	3	3	25	75	100
	ECC3	22KP3ECCCS3 : 1	Core Competence	-	3	3	-	100	100
22KP3ECCCS3 : 2		MOOC (Value Added)							
				30	22		140	360	500
IV	CC 12	22KP4CS12	Embedded System	6	5	3	25	75	100
	CC 13	22KP4CS13	Deep Learning	6	5	3	25	75	100
	CC14 (P)	22KP4CS14P	Data Analytics using R Lab	6	4	3	40	60	100
	MBE 3:1	22KP4CSELCS3:1	Wireless Sensor Network	6	4	3	25	75	100
	MBE 3:2	22KP4CSELCS3:2	Mobile Communication						
	Project Work	22KP4CS15PW	Project Work	6	5		-	100 (80+20)	100
					30	23		115	385
				120	90		550	1465	2000



## Major Based Electives:

MBE 1:1 Network and Cyber Security

MBE 1:2 Computational Intelligence

MBE 2:1 Digital Image Processing

MBE 2:2 Human Computer Interaction

MBE 3:1 Wireless Sensor Network

MBE 3:2 Mobile Communication

## NonMajor Elective Courses:

Semester	Course	Subject Code	Title of the Paper	Inst. Hrs.	Credit	Exam. Hrs.	Marks		Total
							Int.	Ext.	
II	NME1	22KP2CSEL01	Network Communication	4	3	3	25	75	100
III	NME2	22KP3CSEL02	Desktop Publishing	4	3	3	25	75	100



#### IV. Electives

##### M. Sc Computer Science –List of Elective Courses 2022-2023

<i>Semester I</i>	<b>Major Based Elective I</b>	<b>Code</b>
MBE1:1	Network and Cyber Security	22KP1CSELCS1:1
MBE1:2	Computational Intelligence	22KP1CSELCS1:2
<i>Semester II</i>	<b>Major Based Elective II</b>	
NME 1	Network Communication	22KP2CSEL01
<i>Semester III</i>	<b>Major Based Elective III</b>	
MBE2:1	Digital Image Processing	22KP3CSELCS2:1
MBE2:2	Human Computer Interaction	22KP3CSELCS2:2
NME2	Desktop Publishing	22KP3CSEL02
<i>Semester IV</i>	<b>Major Based Elective IV</b>	
MBE3:1	Wireless Sensor Network	22KP4CSELCS3:1
MBE3:2	Mobile Communication	22KP4CSELCS3:2





### V. Details on the number of Courses, Instruction Hours and Credits

Course	Course Title	No. of Courses	Instruction Hours	Credits
CC	Core Course (Theory10&Practical4, Project 1)	15	94	72
MBE	Discipline Specific Elective	3	18	12
NME	Non Major Elective	2	8	6
	Total	20	120	90
ECC	ECC1,2,3	2+1	-	6+4

### VI. Semester-Wise Course Structure

Semester	Course	Total Courses	Ins. Hr/week	Credit
I	CC1, CC2, CC3, CC4P, MBE1	5	30	23
II	CC5, CC6, CC7, CC8P, NME1, ECC1, ECC2 ( Add-on course)	5+1+1	30	22+3+4
III	CC9, CC10, CC11P, MBE2, NME2, ECC3	5+1	30	22+3
IV	CC12, CC13, CC14P, MBE3, Project Work	5	30	23
	<b>TOTAL</b>	<b>20 +2+1</b>	<b>120</b>	<b>90+6+4</b>

### VII. Continuous Internal Assessment System

	Maximum	Components			Passing Minimum
		Attendance	CIA	Seminar/Assignment	
Theory	25	05	15	05	10
Practical*	40	-	20	20 (Skill +Record)	16

\* Department specific

### VIII. Question Pattern

	Part A	Part B	Part C
Semester Exam: Theory (75)	20X1=20 (Answer All)	5X5=25 (Internal choice)	3X10=30 (Open choice)
Semester Exam: Practical (60)	1X50=50 +10 (Record)	-	-
CIA Exam: Theory (50)	10X1=10 ( Answer All)	4X5=20 (Internal choice)	2X10=20 (Open choice)
Model Exam Theory (75)	20X1=20 (Answer All)	5X5=25 (Internal choice)	3X10=30 (Open choice)
Model Exam: Practical(50)*	50X1 =40+10 (Observation)	-	-

\* Department specific



### IX. Question Allocation and Blooms Taxonomy for (Direct) Assessment

Unit	Section & Marks	Question Number	Bloom sLevel	Action Verbs
I	A (1 mark)	1-4	I / II	<i>Level I: Choose, Define, Find, How, Label, List, Match, Name, Select, Show, Tell, What, When, Where, Which, Who, Why</i>
	B (5 mark)	21 (a) and (b)	I / II	
	C (10 mark)	26	I / II	
II	A (1 mark)	5-8	I / II	<i>Level II: Classify, Compare, Contrast, Demonstrate, Explain, Extend, Illustrate, Infer, Interpret, Outline, Relate, Show, Summarize, Translate</i>
	B (5 mark)	22 (a) and (b)	I / II	
	C (10 mark)	27	I / II	
III	A (1 mark)	9-12	I / II	<i>Level III: Apply, Build, Choose, Construct, Develop, Experiment with, Identify, Interview, Make use of, Model, Organize, Plan, Select, Solve, Utilize</i>
	B (5 mark)	23 (a) and (b)	III / IV	
	C (10 mark)	28	III / IV	
IV	A (1 mark)	13-16	I / II	<i>Level IV: Analyze, Assume, Categorize, Discover, Dissect, Distinguish, Divide, Examine, Function, Inference, Inspect, Motive, Relationships, Simplify, Survey, Take part in, Test for, Theme</i>
	B (5 mark)	24 (a) and (b)	III / IV	
	C (10 mark)	29	V / VI	
V	A (1 mark)	17-20	I / II	<i>Level V: Agree, Appraise, Assess, Award, Conclude, Criteria, Criticize, Decide, Deduct, Defend, Determine, Disprove, Estimate, Evaluate, Importance, Influence, Interpret, Judge, Justify, Mark, Measure, Opinion, Perceive, Prioritize, Prove, Rate, Recommend, Rule on, Select, Support, Value</i>
	B (5 mark)	25 (a) and (b)	V / VI	
	C (10 mark)	30	V / VI	
				<i>Level VI: Adapt, Combine, Compile, Compose, Construct, Create, Delete, Design, Develop, Discuss, Elaborate, Estimate, Formulate, Happen, Imagine, Improve, Invent, Make up, Maximize, Minimize, Modify, Original, Originate, Plan, Predict, Propose, Solution, Solve, Suppose, Test, Theory</i>

BLOOM LEVEL	No. Of Questions (Sections)			Total Marks	% of Marks
	A	B	C		
I. Remembering	12	4	2	20	50
II. Understanding	08				
III. Applying	-	4	2	20	33
IV. Analyzing	-				
V. Evaluating	-	2	1	10	17
VI. Creating	-				
<b>Total Questions</b>	<b>20</b>	<b>10</b>	<b>5</b>	<b>120</b>	<b>100</b>



**X. Teaching Methodology Adopted:** (Department specific) Department may adopted at least a 20 %of ICT enabled classes out of total hours of each coursework and proper documents (*Date, Hour, Course and unit, name of the faculty and sign of the representative student*) to be maintained for the same.

**XI. Outline of Learning Outcomes-based Curriculum Framework (LOCF)**  
(All the following categories of courses will be given with definition, procedure and system of implementation)

1. **CC:** Core Course : Theory - 10 , Practical – 4, Project work -1
  2. **MBE:** Discipline Specific Elective: 3
  3. **NME:** Non Major Elective: 2
  4. **ECC-Extra Credit Course:**
    - (A) **SS-SelfStudy:**2
    - (B) **AddonCourse:**1
- Add-on Certificate Courses with 10-30 contact hours conducting by Course Coordinator of the Department /College



**QUESTION BLUE PRINT (75 Marks)**

<i>Q.No</i>	<i>Unit</i>	<i>Blooms Level</i>
<b>Part A</b>		
1	I	Remembering I / Understanding II
2	I	Remembering I / Understanding II
3	I	Remembering I / Understanding II
4	I	Remembering I / Understanding II
5	II	Remembering I / Understanding II
6	II	Remembering I / Understanding II
7	II	Remembering I / Understanding II
8	II	Remembering I / Understanding II
9	III	Remembering I / Understanding II
10	III	Remembering I / Understanding II
11	III	Remembering I / Understanding II
12	III	Remembering I / Understanding II
13	IV	Remembering I / Understanding II
14	IV	Remembering I / Understanding II
15	IV	Remembering I / Understanding II
16	IV	Remembering I / Understanding II
17	V	Remembering I / Understanding II
18	V	Remembering I / Understanding II
19	V	Remembering I / Understanding II
20	V	Remembering I / Understanding II
<b>Part B</b>		
21 (a)	I	Remembering I / Understanding II
(b)	I	Remembering I / Understanding II
22 (a)	II	Remembering I / Understanding II
(b)	II	Remembering I / Understanding II
23 (a)	III	Applying III / Analyzing IV
(b)	III	Applying III / Analyzing IV
24 (a)	IV	Applying III / Analyzing IV
(b)	IV	Applying III / Analyzing IV
25 (a)	V	Creating V / Evaluating V I
(b)	V	Creating V / Evaluating V I
<b>Part C</b>		
26	I	Remembering I / Understanding II
27	II	Remembering I / Understanding II
28	III	Applying III / Analyzing IV
29	IV	Applying III / Analyzing IV
30	V	Creating V / Evaluating V I





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	CC 3	22KP1CS03	Data Science	6	5	3	25	75	100
	CC 4 (P)	22KP1CS04P	Java and .Net Lab	6	4	3	40	60	100
	MBE 1:1	22KP1CSELCS1:1	Network and Cyber Security	6	4	3	25	75	100
	MBE 1:2	22KP1CSELCS1:2	Computational Intelligence						
					30	23		140	360
II	CC 5	22KP2CS05	Trends in Computing	7	5	3	25	75	100
	CC 6	22KP2CS06	Operations Research	7	5	3	25	75	100
	CC 7	22KP2CS07	Python and PHP	6	5	3	25	75	100
	CC 8 (P)	22KP2CS08P	Python and PHP Lab	6	4	3	40	60	100
	NME1	22KP2CSEL01	Network Communication	4	3	3	25	75	100
	ECC1	22KP2ECCCS1 : 1	Cognitive Ability	-	3	3	-	100	100
		22KP2ECCCS1 : 2	MOOC (Value Added)						
	ECC2	22KP2ECCCS2	Add -on Course	-	4	-	-	-	-
				30	22		140	360	500

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Se me	Course	Subject Code	Title of the Paper	Inst. Hrs.	Credit	Exam. Hrs.	Marks		Total
							Int.	Ext.	
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	CC 10	22KP3CS10	Internet of Things	7	5	3	25	75	100
	CC 11 (P)	22KP3CS11P	Internet of Things Lab	6	4	3	40	60	100
	MBE 2:1	22KP3CSELCS2:1	Digital Image Processing	6	4	3	25	75	100
	MBE 2:2	22KP3CSELCS2:2	Human-Computer Interaction						
	NME2	22KP3CSEL02	Desktop Publishing	4	3	3	25	75	100
	ECC3	22KP3ECCCS3 : 1	Core Competence	-	3	3	-	100	100
		22KP3ECCCS3 : 2	MOOC (Value Added)						
				30	22		140	360	500
IV	CC 12	22KP4CS12	Embedded System	6	5	3	25	75	100
	CC 13	22KP4CS13	Deep Learning	6	5	3	25	75	100
	CC14 (P)	22KP4CS14P	Data Analytics using R Lab	6	4	3	40	60	100
	MBE 3:1	22KP4CSELCS3:1	Wireless Sensor Network	6	4	3	25	75	100
	MBE 3:2	22KP4CSELCS3:2	Mobile Communication						
	Project Work	22KP4CS15PW	Project Work	6	5		-	100 (80+20)	100
					30	23		115	385
				120	90		550	1465	2000

  
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**.Net Framework (22KP1CS01)**

**Objective: To impart knowledge in .NET programming oriented software design.**

Unit - I: Preface: Introduction to Programming: Converting Source Code to Machine Language Code - Explaining Program Development Cycle. Visual Basic : Getting Started with Visual Basic 2012 - New Features - keywords - Operator Precedence - Data types in Visual Basic 2012 - Windows Forms: Introducing the Form Class - Performing Common Form Operations - Creating Input boxes, Dialog boxes.

Unit - II: Windows Forms Controls – I : Using the Label , Text Box , Button , Radio Button, Check Box, Combo Box, List Box, Group Box. Windows Forms Controls – II: Using the Tool Strip, Menu Strip, Status Strip controls – Working with Dialog Boxes. Windows Presentation Foundation: Exploring the Improvements in WPF 4.5 - Describing types of WPF applications – Exploring WPF 4.5 Designer – Working with WPF Controls – Working with Resources and Styles.

Unit - III: Windows Workflow Foundation: Exploring the Improvements in WF – Explaining WF Architecture – Developing a Sample Workflow Application. LINQ in Visual Basic 2012: Creating a simple LINQ Query – Working with Standard Query Operators – Implementing LINQ to ADO.NET – Using Anonymous Types in Queries.

Unit - IV: C#: Getting Started with C# 2012: Exploring New Features – Introducing Keywords and Identifiers – Describing Operators and Operator Precedence– Describing Variables and Constants – Exploring Control Flow Statements. Object Oriented Programming: Exploring Basic Principles of OOP – Working with Classes and Objects – Implementing an Inheritance - Using Structures. Errors and Exception Handling: Exploring Types of Errors – Handling Exceptions.

Unit - V: ASP.NET 4.5: Navigation Controls: Working with the Site Map Path Control – Working with the Menu Control – Tree View Control. Validation Controls: Base Validate Class, RequiredField Validator, RangeValidator, RegularExpresionValidator, CompareValidator, CustomValidator, Validation Summary Control. Login Controls: Creating a User Account in ASP.NET 4.5 – Login control, LoginName control, LoginView control, LoginStatus control, Password Recovery Control.

Unit - VI: (for Internal Exam only) Master Pages and Theams: Creating Master Pages – Simple Master Page – Nested Master Page – Themes – Creating Theams – Applying Themes on Controls at Run time – using the Stylesheet Theme Attribute.

**Text:**

**Unit - I to V : (Both Internal and External Exam)**

**“.NET 4.5 Progamming Course Kit” - Vikas Gupta, DreamTech Press – Edition 2014.**

Unit - I to V: Chapters: VB.Net:- Chapters: 1 - 7, C#:- 1, 2, 7, ASP.NET: 3 - 5.

Unit VI: Chapter: 8 (For Internal Exam only)

Reference:

1. "Comdex .Net 4.0 programming course kit", DreamTech Press - 2010.
2. "Microsoft Visual Basic.NET", Garry B. Shelly, Thomas J. Cashman – Cengage Learning India - 2013.
3. "Introducing .NET 4.5", Alex Mackey, Willam Stewart Tulloch & Mahesh Krishnan, APress.

Course Outcome:

COs	Statements	Bloom's Level
CO1	Extend the fundamental concepts of Integrated Development Environment and performing Form operations.	L2
CO2	Observe the VB.Net solutions using basic and advanced controls of forms.	L2
CO3	Infer standard query operators and working with ADO.Net.	L2
CO4	Apply the concepts of OOPs and Exception handling in C#.	L2
CO5	Distinguish various Navigation controls, Validation controls, login control in ASP.Net.	L4

CO-PO Mapping:

COs	POs											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	-	-	-	1	3	1	-	-
CO2	2	-	-	2	-	-	-	-	2	2	-	-
CO3	-	1	1	-	-	1	-	3	3	3	2	-
CO4	-	1	-	3	-	2	2	-	3	2	2	1
CO5	-	-	-	-	-	-	1	3	-	3	-	-

Question Pattern:

Section A: MCQ Questions: (20 x 1 = 20 marks)

Section B: Answer ALL the Questions: (5 x 5 = 25 marks) EITHER OR (a or b) Pattern.

Section C: Answer ANY THREE Questions: (3 x 10 = 30 marks)

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**Compiler Design (22KP1CS02)**

*Objective: To provide basic concepts on the construction of debugging software tools.*

Unit - I: Introduction To Compilers : Compilers and translators – Structure of a compiler – Lexical analysis - Syntax analysis - Intermediate code generation – Optimization – Code generation - Bookkeeping – Error Handling – Compiler-Writing Tools. Finite Automata & Lexical Analysis: Role of Lexical Analyzer – Regular Expressions – Finite Automata – Implementation of Lexical Analyzer.

Unit - II: Syntactic Specification of Programming Languages: Context-free grammars – Derivations and parse trees – Capabilities of Context-free grammars. Basic Parsing Techniques: Parsers – Shift-reduce Parsing – Operator - precedence parsing – Top-down parsing – Predictive parsers,

Unit - III: Automatic Construction of Efficient Parsers: LR parsers – Constructing SLR parsing tables – Constructing Canonical LR parsing tables – Constructing LALR parsing tables – Using ambiguous grammars.

Unit - IV: Syntax-Directed Translation: Schemes – Implementation of syntax-directed translators : Intermediate code – Postfix notation – Parse trees And Syntax trees – Three-address code, quadruples and triples – Translation of assignment statements – Boolean expressions – Postfix translations.

Unit - V: Symbol Tables: The contents of a symbol table – Data structures for symbol tables – Representing scope information – Error Detection and Recovery: Errors – Lexical-phase Errors – Syntactic-phase Errors – Semantic errors. Introduction to Code Optimization: The principal sources of optimization – Loop optimization - DAG Representation of basic blocks.

Unit - VI: (for Internal Exam only) More About Loop Optimization: Dominators – Reducible flow graphs – Depth-first search – Loop- invariant computations – Induction variable elimination.

**Text:**

**Unit I – V ( Both Internal & External Exam)**

“Principles of Compiler Design”, Alfred V. Aho and Jeffery D. Ullman – Narosa Publishing House – TwentyFifth Reprint 2002.

**Unit I – V : Chapters: 1, 3.1, 3.3 – 3.5, 3.8, 4, 5, 6.1, 6.3 – 6.6, 7, 9, 11, 12.1 – 12.3.**

**Unit VI : Chapter : 13 (for Internal Exam only)**



*W. Jey*

Reference:

1. "Introduction to Compiler Design", Torber, Egidius Mogensen - Springer International Publishing – Second Edition 2017.
2. "Compiler: Principles, Techniques and Tools", Jeffrey D.Ullman, Ravi Sethi, Monical S.Lam , Alfred V.Aho, Monica S.Lam – Pearson – Second Edition 2014.
3. "Principles of Compiler Design", D. Thenmozhi, Bharathi Ashok – Sree Magnue Publications – Revised Edition – 2012.

Course Outcome:

CO's	Statements	Bloom's Level
CO1	Identify the structure of a compiler and Analyze the Lexical Phase of Compiler.	L2, L4
CO2	Prepare the Context-Free Grammar and Categorize the various types of Parsers.	L6, L4
CO3	Construct the various types of LR parsers.	L4
CO4	Predict the syntax-directed translation schemes and evaluate various Intermediate code Form.	L5
CO5	Discriminate the various code optimization techniques.	L4

CO-PO Mapping:

COs	POs											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	-	2	-	3	-	-	-	-
CO2	3	-	-	-	-	2	-	3	-	-	-	-
CO3	2	-	-	-	-	2	-	3	-	-	-	-
CO4	3	-	-	-	-	2	-	3	-	-	-	-
CO5	3	-	-	-	-	3	-	3	-	-	-	-

Question Pattern:

Section A: MCQ Questions: (20 x 1 =20 marks)

Section B: Answer ALL the Questions: (5 x 5 = 25 marks) EITHER OR (a or b) Pattern.

Section C: Answer ANY THREE Questions: (3 x 10 = 30 marks)

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**Data Science (22KP1CS03)**

**Objective:** To acquire knowledge of fundamental concepts in data science.

**Unit - I:** Defining Data Science and Big Data - Benefits and uses of data science and Big data - Facets of Data - The Data Science Process - The Big Data Ecosystem and Data Science. The Data Science Process: Overview of the Data Science Process - Defining Research Goals and Creating a Project Charter - Retrieving Data - Cleansing, Integrating, and Transforming Data - Exploratory Data Analysis - Build the Models - Presenting Findings and Building Applications on top of them.

**Unit - II:** Machine Learning - The Modeling Process - Types of Machine Learning - Semi-Supervised Learning - Handling large data on a Single Computer: General Techniques For Handling Large Volumes of Data - General Programming Tips for Dealing with Large Data Sets - Case study 1: Predicting malicious URLs - Case study 2: Building A Recommender System Inside a Database.

**Unit- III:** Join the NoSQL movement - Introduction to NoSQL - The Rise Of Graph Databases - Introducing Connected Data And Graph Databases - Introducing Neo4j: A Graph Database - Connected Data Example: A Recipe Recommendation Engine

**Unit-IV:** Logistic Regression - Thought Experiments - Classifiers - Runtime - Interpretability - Scalability - M6D Logistic Regression Case Study - Click Models - The Underlying Math - Estimating  $\alpha$  and  $\beta$  - Newton's Method - Stochastic Gradient Descent - Evaluation - Time Stamps and Financial Modeling - Kyle Teague and GetGlue - Timestamps- Financial Modeling

**Unit-V:** Extracting Meaning from Data Background: Data Science Competitions, Crowdsourcing - The Kaggle Model - Feature Selection - Example: User Retention - Filters - Wrappers - Embedded Methods: Decision Trees - Entropy - The Decision Tree Algorithm - Handling Continuous Variables in Decision Trees - Random Forests .

**Unit-VI:** (for Internal Exam Only) Data Visualization and Fraud Detection - Data Visualization History - A Sample of Data Visualization Projects - Data Science and Risk - Data Visualization at Square - Data Visualization for the Rest of Us .

**Text :**

**Unit I - V: (Both Internal & External Exam)**

1. "Introducing Data Science", Davy Cielen, Arno D. B. Meysman, Mohamed Ali, Manning Publications Co., First Edition, 2016.

Unit I - III : Chapter : 1, 2, 3, 4, 6, 7

2. "Doing Data Science", "Cathy O'Neil and Rachel Schutt, Straight Talk from the Frontline O'Reilly Edition, 2014.

Unit IV - V: Chapter : 5, 6, 7, 8

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## Unit VI: Chapter : 9 , 10 (for Internal Exam Only)

### Reference:

1. "Data Science and Big Data Analytics Discovering Analyzing, Visualizing and Presenting Data", David Dietrich, Heller and Beibei Yang , EMC Education Services, Reprint 2015, Wiely.
2. "Big Data-Principles and best practise of scalable real-time data system", Nathan Marz, James Warren, Dream Tech Press Edition 2015.
3. "An Alogrithmic Perspective", Taylor& Francis Group, Stephen Marsland, Machine Learning Second Edition 2015, Chapman & Hall / CRC Press ISBN:9781466583283.

### Course Outcome:

COs	POs											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	1	-	1	-	1	-	-	-	-	-	1
CO2	-	3	-	-	3	1	-	1	1	1	-	3
CO3	-	1	1	-	1	1	-	-	-	-	-	-
CO4	-	-	-	2	3	1	-	-	1	-	1	-
CO5	-	-	-	1	-	1	-	1	3	1	1	1
PO Attainment												

### CO-PO Mapping:

COs	Statements	Level
1	<b>Define</b> Data Science Model.	L1
2	<b>Discuss</b> a various Machine Learning Techniques in Data Science.	L2
3.	<b>Connect</b> a data to graph databases using tool.	L4
4.	<b>Examine</b> a Logistics Regression and time stamp and Financial Mode.	L3
5.	<b>Infer</b> the knowledge of Feature extraction and selection.	L6

### Question Pattern:

Section A: MCQ Questions: (20 x 1 = 20 marks)

Section B: Answer ALL the Questions: (5 x 5 = 25 marks) EITHER OR (a or b) Pattern.

Section C: Answer ANY THREE Questions: (3 x 10 = 30 marks)

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Java and .Net Lab (22KP1CS04P)

JAVA

1. Create a program using Function overloading.
2. Create a program using Inheritance.
3. Create a program using Exception Handling mechanism.
4. Create a program using AWT.
5. Create a program on Swing.
6. Create a program using JDBC.

.NET Programming

VB.NET

1. Create a MDI Application.
2. Create menu and submenus.

ASP.NET

1. Create a program using Custom, Range and Compare Validators.
2. Create Student Database program using ADO.NET.

C#

1. Create a program for operator overloading.
2. Create calculator using function.

Course Outcome:

CO'S	Statements	Bloom's Level
CO1	Develop a Java program to handle inheritance, function overloading and exception handling mechanisms.	L6
CO2	Integrate Java environment to create AWT and Applet application using ADO.NET.	L6
CO3	Compose the multiple form, modules, menus and submenus in VB.NET.	L6
CO4	Construct ASP.NET program using custom range and compare validators.	L6
CO5	Formulate a C# program for operator overloading and function.	L6

CO-PO Mapping:

COs	POs											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	3	2	-	-	2	-	3	2	2
CO2	-	-	-	3	2	-	-	2	-	3	2	3
CO3	-	-	-	3	2	-	-	2	-	3	2	3
CO4	-	-	-	3	2	-	-	2	-	3	2	3
CO5	-	-	-	3	2	-	-	2	-	3	3	3



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Semester – I  
MBE – 1:1

Hours - 6  
Credit - 4

**Network and Cyber Security (22KP1CSELCS1:1)**

**Objective: To provide application level knowledge in security concepts.**

Unit - I : Introduction: The OSI Security Architecture – Security Attacks – Security Services – Security Mechanisms – A Model for Network Security. Classical Encryption Techniques: Symmetric Cipher Model – Steganography. Block Ciphers and the Data Encryption Standard: The Data Encryption Standard. Finite Fields: The Euclidean Algorithm.

Unit - II: Introduction to Number Theory: Prime Numbers – Fermat’s and Euler’s Theorems. Public Key Cryptography and RSA: Principles of Public-Key Cryptosystems – The RSA Algorithm. Key Management; Others Public-Key Cryptosystems: Key Management – Diffie-Hellman key Exchange.

Unit - III: Message Authentication and Hash Functions: Authentication Requirements – Authentication Functions – Message Authentication Codes – Hash Functions. Digital Signatures and Authentication Protocols: Digital Signatures.

Unit - IV: IP Security: IP Security Overview – IP Security Architecture – Authentication Header. Intruders: Intrusion Detection – Password Management – Password Protection – Malicious Software - Viruses and related threats.

Unit - V: Cyber Security: Cyber Crime: Introduction to Cyber Crime – Malware and its type – Kinds of Cyber crime – Cyber security Trends and Development in India – IT Act: Introduction – IT Act Amendment 2008.

Unit - VI: ( for Internal Exam only) Malicious Software: Viruses Countermeasures – Distributed Denial of Service Attacks. Firewalls: Firewall Design Principles – Trusted Systems – Common Criteria for Information Technology Security Evaluation.

**Text :**

**Unit I - IV (Both Internal & External Exam)**

“Cryptography and Network Security”, Principles and Practices - William Stallings - Pearson Education – Fourth Edition, Seventh Impression 2009.

Chapters : 1, 2.1, 2.5, 3.2, 4.3, 8.1 - 8.2, 9, 10.1 - 10.2, 11.1-11.4 , 13.1 , 16.1 - 16.3, 18, 19.1. (Algorithms only. Problems should not be given from these topics).

**Unit V:**

1.“Cyber Security” – Course Material Compiled by Dr. P.Cynthia Selvi, Principal, Kunthavai Naacchiyar Government Arts College for Women (Autonomous), Thanjavur.

2. "Introduction to Cyber Security", Jeetendra Pande,

Unit VI: Chapter: 19.2, 19.3, 20. (For Internal Exam Only)

Reference :

1. "Introduction to Cryptography and Network Security" – Behrouz A. Forouzan – McGraw Hill Higher Education – Special Indian Edition – 2008.
2. "Cryptography and Network Security" – Atul Kahate - Tata McGraw Hill – 2008.
3. "Cryptography: Origin to Recent Advancement" – Lambert Academic Publishing – 2011.

Course Outcome :

CO's	Statements	Bloom's Level
CO1	Identify the OSI security architecture and security services.	L2
CO2	Analyze Fermat's and Euler's Theorems and principles of cryptosystems.	L4
CO3	Discuss and realized message authentication and hash function.	L2
CO4	Infer knowledge of IP security architecture and malicious software, intruders.	L6
CO5	Observe various cyber security polices and trends development in IT Act.	L2

CO-PO Mapping:

COs	POs											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	2	2	-	3	-	3	2	1	-
CO2	-	-	-	2	2	2	3	2	-	3	1	-
CO3	-	-	3	2	2	2	3	-	-	3	2	-
CO4	-	-	3	2	2	-	3	-	-	-	2	-
CO5	-	-	-	3	3	-	3	-	-	-	2	-

Question Pattern:

Section A: MCQ Questions: (20 x 1 = 20 marks)

Section B: Answer ALL the Questions: (5 x 5 = 25 marks) EITHER OR (a or b) Pattern.

Section C: Answer ANY THREE Questions: (3 x 10 = 30 marks)

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**Computational Intelligence (22KP1CSELCS1:2)**

**Objective: To acquire knowledge about the Intelligence.**

Unit I: Computational Intelligence and Knowledge: Computational Intelligence – Agents – Representation and Reasoning – Applications. A Representation and Reasoning System : Introduction – Representation and Reasoning Systems – Simplifying Assumptions of the Initial RRS – Datalog – Semantics – Proofs.

Unit II: Using Definite Knowledge: Introduction – Databases and Recursion – Verification and Limitations – Case Study: Representing Abstract Concepts & Representing Regulatory Knowledge – Applications in Natural Language Processing.

Unit III: Searching: Need of Search – Graph Searching – A Generic Searching Algorithm – Blind Search Strategies – Heuristic Search – Refinements to Search Strategies – Constraint Satisfaction Problems.

Unit IV: Representing Knowledge : Introduction – Defining a Solution – Choosing a Representation Language – Mapping from Problem to Representation – Choosing an Inference Procedure.

Unit V: Knowledge Engineering: Introduction – Knowledge-Based System Architecture – Meta-Interpreters – Querying the User – Explanation – Debugging Knowledge Bases – A Meta-Interpreters with Search – Unification.

Unit VI: (for Internal Exam only) The Prolog Programming Language: Introduction - Interacting with Prolog – Syntax – Arithmetic – Database Relations – Returning All Answers – Input and Output – Controlling Search.

**Text :**

**Unit I – V: (Both Internal & External Exam)**

**“Computational Intelligence – A logical approach” David Poole, Alan Mackworth , Randy Goebel - Oxford University Press, Second Impression 2008**

**Unit I – V: Chapters: 1, 2.1-2.7, 3, 4, 5, 6.**

**Unit – VI: Appendix B Pages( 477 - 488 ) (for Internal Exam Only)**

**Reference:**

1. “Computational Intelligence” , Methods and Techniques”, Leszek Rutkowski – Springer – First Edition – 2010.
2. “Computational Intelligence: Collaboration, Fusion and Emergence” , Christine Mumford, Lakshmi C. Jain –Springer – Verlag Berlin Heideberg - First Edition – 2009.
3. “Computational Intelligence An Introduction” , P.Andries P.Engelbrecht – Wiley -2007

**Course Outcome:**

CO'S	Statements	Bloom's Level
CO1	<b>Understand</b> the basic concepts of Computational Intelligence, Representaion and Reasoning.	L2
CO2	<b>Examine</b> the knowledge from database and recursion and Interpret the application of NLP.	L3
CO3	<b>Analyze</b> the various searchning techniques for real problems.	L4
CO4	<b>Choose</b> an inference procedure.	L3
CO5	<b>Intervene</b> the knowledge-based Architecture and Produce Meta Interpreters.	L6

**CO-PO Mapping:**

COs	POs											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	-	-	2	-	-	-	-	-	-
CO2	1	-	-	-	-	2	-	-	-	-	-	-
CO3	1	-	-	-	-	3	-	-	-	-	-	-
CO4	2	-	-	-	-	2	-	-	-	-	2	-
CO5	2	-	-	-	-	-	1	1	1	-	2	-

**Question Pattern:**

Section A: MCQ Questions: (20 x 1 =20 marks)

Section B: Answer ALL the Questions: (5 x 5 = 25 marks) EITHER OR (a or b) Pattern.

Section C: Answer ANY THREE Questions: (3 x 10 = 30 marks)



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### Trends in Computing (22KP2CS05)

**Objective:** To acquire knowledge of Recent Trends in Computing Environment.

Unit - I : Defining Cloud Computing: - Defining Cloud Computing - Cloud Types - The NIST model - The Cloud Cube Model - Deployment Models - Service Models - Examining the Characteristics of Cloud Computing – Paradigm Shift - Benefits of Cloud Computing - Disadvantages of Cloud Computing - Assessing the Role of Open Standards. Assessing the Value Proposition: Measuring the Cloud's Value

Unit - II: Understanding the Cloud Architecture : Exploring the Cloud Computing Stack - Connecting to the Cloud - Understanding Services and Application By Type: Defining Infrastructure as a Service (IaaS) - Defining Platform as a Service (PaaS) - Defining Software as a Service (SaaS) - Defining Identity as a Service (IDaaS) - Defining Compliance as a Service (CaaS)

Unit - III: Internet of Things (IoT) and New Computing Paradigms : Introduction - Relevant Technologies - Fog and Edge Computing Completing the Cloud - Hierarchy of Fog and Edge Computing - Business Models - Opportunities and Challenges - The Networking Challenge - The Management Challenge - Miscellaneous Challenges

Unit - IV: Middleware for Fog and Edge Computing :Design Issues - Need for Fog and Edge Computing Middleware - Fog and Edge Computing Middleware - Design Goals - Ad-Hoc Device Discovery - State-of-the-Art Middleware Infrastructures - System Model - Proposed Architecture - Lightweight Container Middleware for Edge Cloud Architectures: Edge Cloud Architectures - Clusters for Lightweight Edge Clouds - Architecture Management – Storage and Orchestration - IoT Integration - Security Management for Edge Cloud Architectures .

Unit - V: Data Management in Fog Computing – Background - Fog Data Management - Future Research and Direction - Machine Learning for Protecting the Security and Privacy of Internet of Things (IoT) Systems: Background - Survey of ML Techniques for Defending IoT Devices - Machine Learning in Fog Computing.

Unit - VI: (For Internal Exam only) Testing Perspectives of Fog-Based IoT Applications Testing Perspectives: Background - Future Research Directions - Legal Aspects of Operating IoT Applications in the Fog - Restrictions of the GDPR Affecting Cloud, Fog, and IoT Applications - Data Protection by Design Principles - Testing Perspectives - Future Research Directions.

**Text:**

**Unit I – V: (Both Internal & External Exam only)**

1.Barrie Sosinsky, Cloud Computing Bible, 2011, Wiley Publishing Inc., 2011.

Chapter: 1, 2

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2. "Fog and Edge Computing Principles and Paradigms", Rajkumar Buyya, Satish Narayana Srirama, First Edition 2019, Wisely.

Chapter: 1, 2, 6, 7, 8, 10

Unit V: Chapter: 15, 16 (For Internal Exam Only)

Reference:

1. "Cloud Computing", Michael Miller, Pearson Education Inc., 7th Edition, 2012.
2. "Fog Computing: Theory and Practice", Assad Abbas, Samee U. Khan, Albert Y. Zomaya, First Edition April 2020, Wisely Publication.
3. "Edge & Fog Analytics: The New Analytics Interface", Abdallah Bari, September 2018 Independently Published.

Course Outcome:

CO'S	Statements	Bloom's Level
1	Define Cloud Computing Model.	L1
2	Understanding the Cloud Architecture.	L2
3.	Examine a Fog and Edge Middleware Architecture.	L3
4.	Analyze the Fog Application Development.	L4
5.	Evaluate the Data Analytics in the Fog.	L5

CO-PO Mapping:

COs	POs											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	-	-	1	-	1	1	1	1	-
CO2	1	-	-	-	1	1	-	1	3	1	3	-
CO3	1	2	1	1	1	2	-	1	-	3	3	-
CO4	1	1	1	1	1	-	-	1	1	3	1	-
CO5	-	1	3		1	1	1	-	1	3	2	-

Question Pattern:

Section A: MCQ Questions: (20 x 1 = 20 marks)

Section B: Answer ALL the Questions: (5 x 5 = 25 marks) EITHER OR (a or b) Pattern.

Section C: Answer ANY THREE Questions: (3 x 10 = 30 marks)

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**Operations Research (22KP2CS06)**

**Objective: To impart knowledge in fundamental mathematical concepts.**

**Unit - I: Operations Research : Origin and Development of O.R – Nature and Features of O.R – Scientific Method in O.R – Methodology of Operations Research – Operations Research and Decision Making – Applications of Operation Research. Linear Programming Problem: Linear Programming Problem – Mathematical Formulation of the Problem. Linear Programming Problem: The Graphical Solution Method – Some Exceptional Cases – General Linear Programming Problem – Canonical and Standard Forms of LPP.**

**Unit - II: Linear Programming Problem – Simplex Method: Introduction – The Computational Procedure – Use of Artificial Variables – Two-Phase Method – Big-M Method – Degeneracy in Linear Programming – Applications of Simplex Method.**

**Unit - III: The Transportation Problem: Introduction – LP Formulation of the Transportation Problem – Existence of Solution in T.P - Duality in Transportation Problem – The Transportation Table – Loops in Transportation Tables - Triangular Basis in a T.P. – Solution of a Transportation Problem – Finding an Initial Basic Feasible Solution – Test for Optimality – Economic Interpretation of  $u_j$ 's and  $v_j$ 's – Degeneracy in Transportation Problem –Transportation Algorithm – Some Exceptional Cases – Transshipment Problems.**

**Unit - IV: Assignment Problem: Introduction – Mathematical formulation of the Problem – Solution Methods of Assignment Problem – Special Cases in Assignment Problem – A Typical Assignment Problem - The Travelling Salesman Problem. Games and Strategies : Introduction – Two-Person Zero-Sum Games – Some Basic Terms – The Maximin – Minimax Principle – Games without Saddle Point – Mixed Strategies – Graphics Solution of  $2 \times n$  and  $m \times 2$  Games.**

**Unit - V: Network Scheduling by PERT/CPM: Introduction – Network: Basic Components – Logical Sequencing - Rules of Network Construction – Concurrent Activities – Critical Path Analysis – Probability Considerations in PERT – Distinction between PERT and CPM – Applications of Network Techniques – Advantages of Network Techniques.**

**Unit - VI: (for Internal Exam only) Queuing Theory : Introduction – Queueing System – Elements of a Queueing System – Operating Characteristics of Queueing System – Deterministic Queueing System – Probability Distributions in Queueing System – Classification of Queueing Models – Definition of Transient and Steady States.**

**Text:**

**Unit: I – V : (Both Internal and External Exam)**

**“Operations Research” – Kanti Swarup, P.K.Gupta, Man Mohan – Sultan Chand & Sons, New Delhi – Nineteenth Edition – 2017.**

**Chapters: 1, 2.1-2.3, 3.1 – 3.5, 4.1, 4.2 – 4.5, 4.8, 10.1 – 10.13, 10.15, 10.17, 11.1 – 11.5, 11.7, 17.1 – 17.6, 25.**

**Unit: VI : Chapter: 21.1 – 21.8 (for Internal Exam Only)**

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Reference:

1. "An Introduction to Operation Research " ,Veerabhadrappa Havinal – New Age International(P) Ltd Publishers – First Edition – 2012.
2. " Operation Research An Introduction" , Handy A Taha – Pearson India – 10<sup>th</sup> Edition – 2018.
3. " Operations Research" , M. Sreenivasa Reddy – Cengage Learning India – Fourth Edition -2019.

Course Outcome:

CO's	Statements	Bloom's Level
CO1	<b>Review</b> the methods, models and applications of Operation Research and <b>formulate</b> the Linear Programming Problem.	L2, L6
CO2	<b>Analyze</b> the mathematical models that are needed to optimize the Operation Research Problem.	L4
CO3	<b>Estimate</b> and Solve the Transportation Problem and <b>Experiment</b> the Initial Feasible Solution.	L4 , L6
CO4	<b>Construct</b> and <b>formulate</b> the solution for Routing Problem using Assignment method.	L5, L6
CO5	<b>Plan</b> and <b>Conclude</b> the Network Scheduling by PERT/CPM Problems	L4, L5

CO-PO Mapping:

COs	POs											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	2	-	-	-	3	-	-	-	-
CO2	-	-	-	2	3	-	-	2	-	-	-	-
CO3	-	-	-	3	-	-	-	3	-	-	-	-
CO4	-	-	-	3	3	-	-	-	-	-	-	-
CO5	-	-	-	3	-	-	-	-	-	-	-	-

Question Pattern:

Section A: MCQ Questions: (20 x 1 =20 marks)

Section B: Answer ALL the Questions: (5 x 5 = 25 marks) EITHER OR (a or b) Pattern.

Section C: Answer ANY THREE Questions: (3 x 10 = 30 marks)

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Python and PHP (22KP2CS07)

**Objective: To acquire knowledge of developing Python and PHP programming.**

Unit - I: Python Fundamentals: Executing Python Programs. Components of a Python Program - Built-in Object Types - Statements: Statement Format - Comments - Assignments - Print - Control Statement - Common Traps . Functions: Function Definition and Execution - Scoping - Arguments - Return Values - Advanced Function Calling.

Unit - II: Modules: Importing a Module - Tricks for Importing Modules - Packages - Creating module. Object Orientation : Creating a Class - Class Methods - Class Inheritance. Exceptions and Error Trapping - Exception Handling - try.. except..else - try.. finally - Exceptions Nest - Raising Exception - The assert Statement - Built-In Exceptions.

Unit - III: Applying the Python Libraries: Python's Built-In Functions: Executing Arbitrary Statements - exec statement - execfile() Function - eval() Function. Interfacing to the OS : Working with the System (sys Module) - Working with the Operating System (os Module) - Manipulating Environment Variables - Line Termination - Process Environment - Process Execution and Management - User/Group Information - Multithreading.

Unit - IV: Processing Information - Manipulating Numbers - Text Manipulation: Basic String Manipulation - Regular Expressions - Time - Data Types and Operators - Unicode Strings. Working with Files: File Processing: Reading - Writing to a File - Changing Position - Controlling File I/O - Getting File Lists - Access and Ownership. Data Management and Storage: Managing Internal Structures - Object Persistence.

Unit - V: PHP: Strings and Arrays: The String Functions - Converting to and from Strings - Handling Arrays with Loops - The PHP Array Functions. Creating Functions: Creating Functions in PHP - Passing Functions some Data - Passing Arrays to Functions - Passing by reference - Returning Data from Functions - PHP Conditional Functions - Returning Errors from Functions - Reading Data in Web Pages : Setting Up Web Pages to communicate with PHP - Handling Text Fields - Handling Check Boxes - Handling Buttons.

Unit VI: (for Internal Exam Only): Web Development: Web Development Basics: Writing HTML - Uniform Resource Locators - Dynamic Websites Using CGI - Security.

**Text:**

**Unit I - V : ( Both Internal and External Exam)**

1. "The Complete Reference Python", Martin C. Brown - McGraw Hill Education - Third Reprint, 2019.

Unit I – IV : Chapters: 2 – 12

2. "The Complete Reference PHP" - Steven Holzner, McGraw Hill Education - Indian Edition, 21<sup>st</sup> reprint 2016.

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Unit V: Chapters: 3, 4, 5

Unit VI: Chapter: 19 ( for Internal Exam only)

Reference:

1. "Programming and Problem Solving with PYTHON"- Ashok Namdev Kamthane, Amit Ashok Kamthane, McGrawHill Education(India), Private Limited , 2018 copy right.
2. "Learning Python Powerful Object Oriented Programming", O'reilly Media, Fifth Edition, 2018.
3. "Learn PHP in one day and Learn it well", Jamie Chan, LCF Publishing,2020.

Course Outcome:

CO's	Statements	Bloom's Level
CO1	Identify the fundamental concepts and functions in Python Programming.	L2
CO2	Design and analyze the different types of Exception Handling.	L6
CO3	Apply the Python libraries and correlate interface Operating System.	L3, L4
CO4	Discuss the file operations and adapt the knowledge of text processing ,process management.	L2, L6
CO5	Determine the commonly used PHP functions and Develop web sites.	L3, L6

CO-PO Mapping:

COs	POs											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	2	3	-	-	-	-	3	2	3
CO2	-	-	-	2	3	-	-	-	-	3	2	3
CO3	-	-	-	3	3	-	-	-	-	3	2	3
CO4	-	-	-	3	-	-	-	-	-	-	2	3
CO5	-	-	-	2	-	-	-	-	-	-	2	3

Question Pattern:

Section A: MCQ Questions: (20 x 1 =20 marks)

Section B: Answer ALL the Questions: (5 x 5 = 25 marks) EITHER OR (a or b) Pattern.

Section C: Answer ANY THREE Questions: (3 x 10 = 30 marks)

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Python and PHP Lab (22KP2CS08P)

1. Develop a Python program to perform Recursive Function for Fibonacci Number and Prime Number generation.
2. Write a Python program to explore various String Operation ( upper( ), lower( ), etc.,
3. Develop a Python program to perform Matrix Multiplication.
4. Demonstrate Exceptions in Python.
5. Develop a Python program for File copy from one file to another file.
6. Write a program in PHP to display multiplication table using nested for loop.
7. Write a program in PHP to sort an array using function.
8. Design a login form and validate that form using PHP.
9. Design a personnel information form then submit and retrieve the form data using \$\_GET ( ), \$\_POST ( ) and \$\_REQUEST ( ) variable in PHP.
10. Create admin login,logout form using session variable in PHP.

Course Outcome:

CO's	Statements	Bloom's Level
CO1	<b>Develop</b> a program and to perform to perform recursion function and string operations.	L6
CO2	<b>Develop</b> a program to solve matrix multiplication problem and handle	L6
CO3	<b>Demonstrate</b> Exception handling and File Operations	L6
CO4	<b>Create</b> PHP program to display multiplication table and sort an array using function.	L6
CO5	<b>Construct</b> a form in PHP for personal information and session details.	L6



CO-PO Mapping:

COs	POs											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-		2	3	-	-	-	-	3	2	3
CO2	-	-		2	3	-	-	-	-	3	2	3
CO3	-	-		3	3	-	-	-	-	3	2	3
CO4	-	-		-	-	-	-	-	-	-	2	3
CO5	-	-		-	-	-	-	-	-	-	2	3



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Semester – II

NME 1

Hours - 4

Credit - 3

**Network Communication (22KP2CSEL01)**

**Objective: To transport information exchanged between end systems.**

Unit I : Data Communications: Components – Data Representation – Data flow – Networks: Network Criteria – Physical Structure – Network Types: Local Area Network – Wide Area Network – Switching the Internet – Accessing the Internet. Network Models : Protocol Layering – Scenarios – Principle of Protocol layering – Logical Connections – TCP/IP Protocol Suite – OSI Model.

Unit II : Introduction to Physical layer: Data and Signals – Analog and Digital Data - Analog and Digital Signal – Periodic and Non-periodic – Periodic Analog Signals: Sine wave – Phase – Wave length – Time and frequency domain – Composite signals – Bandwidth – Digital Signals: Bit Rate – Bit length – Transmission Impairment: Attenuation – Distortion – Noise.

Unit III: Switching: Introduction – Three method of Switching – Switching and TCP/IP layers – Circuit Switched Networks: Three Phases – Efficiency – Delay – Packet Switching: Datagram Networks – Virtual Circuit Networks.

Unit IV: Other Wireless Networks: WiMAX: Services – IEEE project 802.16 – Layers in project 802.16 – Cellular Telephony: Operation – First Generation – Second Generation – Third Generation – Forth Generation – Satellite Networks: Operations – GEO Satellites – MEO Satellites – LEO Satellites.

Unit V: Standard Client-Server Protocols: World Wide Web and Http – World Wide Web – HTTP – FTP: Two connections – Control connection – Data connection – Security for FTP – Electronic Mail: Architecture – Web based Mail – E-mail Security – TELNET: Local versus Remote Login.

Unit VI: (for Internal Exam only) Multimedia: Compression – Lossless compression – Lossy compression – Multimedia Data: Text – Image – Video – Audio – Multimedia in the Internet: Streaming Stored Audio/Video – Streaming Live Audio/Video – Real time interactive Audio/Video.

**Text:**

**Unit I – V (Both Internal & External Exam)**

**(For Both Internal and External Exam)**

“Data Communications and Networking 5E”, Behrouz A. Forouzan, McGraw Hill Education (India) Pvt. Ltd., Fifth Edition, Fourth Reprint 2014.

Unit I-V: Chapters: 1.1 – 1.3, 2.1 -2.3, 3.1 -3.4, 8.1 – 8.3, 16.1 – 16.3, 26.1-26.4

Unit VI: 28.1-28.3 (For Internal Exam only)

**Reference:**

1. “Modern digital and Analog Communications Systems”, Ding, Zhi, Lathi, Bhagwandas and Pannalal, Oxford University Press, USA, Fifth Edition, 2018.
2. “Fundamentals of Data Communication Networks”, Oliver C.Ibe, Wiley, First Edition, 2017.
3. “Business Data Communications and Networking”, Jerry Fitz Gerald, Alan Dennis, Alexandra Durcikova, Wiley, 13th Edition, 2017.



**Course Outcome:**

COs	Statements	Bloom's Level
CO1	Understand the physical structure and protocol layering.	L2
CO2	Discuss Analog and Digital signal.	L2
CO3	Infer the knowledge of switching methods.	L6
CO4	Identify the wireless network and its service.	L2
CO5	Observe the standard Client Server Protocol.	L2

**CO-PO Mapping:**

COs	POs											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	1	1	-	-	-	-	1	-	2	-
CO2	-	-	-	1	-	-	-	-	-	-	2	-
CO3	-	-	-	1	-	-	-	-	-	-	2	-
CO4	-	-	-	1	-	-	-	-	-	-	2	-
CO5	5	-	-	1	-	-	1	-	1	-	2	-

**Question Pattern:**

Section A: MCQ Questions: (20 x 1 = 20 marks)

Section B: Answer ALL the Questions: (5 x 5 = 25 marks) EITHER OR (a or b) Pattern.

Section C: Answer ANY THREE Questions: (3 x 10 = 30 marks)



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Semester – III

CC – IX

Hours – 7

Credit - 6

**Soft Computing (22KP3CS09)**

**Objective: To apply Soft computing based techniques in research.**

Unit - I: Artificial Intelligence – The AI problems – The Underlying Assumption – AI Techniques – The Level of Models - Criteria of Success - Heuristic Search Techniques: Generate-and-test – Hill climbing – Best-first search – Problem Reduction – Constraint satisfaction - Means-ends Analysis.

Unit – II : Introduction to Artificial Intelligence(AI) Systems – Neural Networks(NN) – Fuzzy Logic(FL)– Genetic Algorithms(GA) – Fundamentals of NN: Basic Concepts – Human Brain – Model of an Artificial Neuron – NN Architectures – Characteristics of NN – Learning Methods – Taxonomy of NN Architectures – History of NN Research – Early NN Architectures – Application Domains.

Unit – III : BackPropagation Networks(BPN): Architecture of BPN – BackPropagation Learning – Applications – Effect of Tuning Parameters in BPN – Selection of Various Parameters in BPN – Variations of Standard Backpropagation Algorithm – Research Directions.

Unit – IV : Fuzzy Logic(FL): Fuzzy Set Theory – Crisp Sets – Fuzzy Sets – Crisp Relations – Fuzzy Relations – Fuzzy Systems: Crisp Logic – Predicate Logic – Fuzzy Logic – Fuzzy Rule based Systems – Defuzzification Methods – Applications.

Unit – V : Genetic Algorithms(GA): Fundamentals – Basic Concepts – Creation of Offsprings – Working Principle – Encoding – Fitness Function – Reproduction – Genetic Modelling: Inheritance Operators – Cross Over – Inversion and Deletion – Mutation Operator – Bit-wise Operators – Generational Cycle – Convergence of GA – Applications.

Unit - VI : (for Internal Exam only) Natural Language Processing : Introduction – Syntactic Processing – Semantic Analysis – Discourse and Pragmatic Processing . Perception and Action : Real-time Search – Perception – Action – Robot Architecture.

**Text:**

**Unit I –V : (Both Internal and External Exam)**

1. “Artificial Intelligence” – Elaine Rich, Kevin Knight – McGraw Hill Education Private Ltd – Third Edition.

Unit I: Chapters : 1, 3.

Unit II – V: Chapters: 1, 2, 3.1 – 3.2, 3.4 – 3.8, 6, 7, 8, 9.1 – 9.9.

2. “Neural Networks, Fuzzy Logic and Genetic Algorithms Synthesis and Applications” , Rajasekaran, G.A.Vijayalakshmi Pai , PHI Learning Pvt. Ltd.. Seventeenth Printing 2014.

Unit VI : Chapters : 15, 21 (For Internal Exam Only)



Reference:

1. "Soft Computing and Intelligent Systems", Theory and Application", Naresh K. Sinha and Madan M. Gupta, Academic Press, 2000.
2. "Soft Computing and Intelligent Systems Design Theory", Tools and Applications", Fakhreddine karray and Clarence de Silva, Addison Wesley, 2004.
3. "Soft Computing : Integrating Evolutionary, Neural, and Fuzzy Systems", Tettamanzi, Andrea, Tomassini, and Marco, Springer, 2001.

Course Outcome:

COs	Statements	Bloom's Level
CO1	Understand the Techniques of Artificial Intelligence.	L2
CO2	Assemble Various fundamentals of Neural Networks.	L6
CO3	Apply Various Network Architecture and Learning algorithms of Neural Network	L4
CO4	Analyze data sets like Fuzzy and Crisp.	L6
CO5	Examine the functions and modeling of Genetic Algorithms.	L4

CO-PO Mapping:

COs	POs											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	1	-	-	1	-	-	-
CO2	-	-	1	-	-	2	-	-	-	-	-	-
CO3	-	1	1	1	-	2	-	-	-	-	-	-
CO4	-	-	1	1	-	3	-	-	2	-	-	-
CO5	-	-	2	-	-	-	-	-	1	-	-	-

Question Pattern:

Section A: MCQ Questions: (20 x 1 = 20 marks)

Section B: Answer ALL the Questions: (5 x 5 = 25 marks) EITHER OR (a or b) Pattern.

Section C: Answer ANY THREE Questions: (3 x 10 = 30 marks)

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Internet of Things (22KP3CS10)

*Objectives: To understand about the fundamentals of Internet of Things and its building blocks along with their characteristics.*

Unit - I : Introduction to Internet of Things: Introduction – Physical Design of IoT – Logical Design of IoT: Functional Blocks – Communication Models – Communication APIs - IoT Enabling Technologies – IoT Levels & Development Templates: IoT Level-1 - IoT Level-2 - IoT Level-3 - IoT Level-4 - IoT Level-5 - IoT Level-6.

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

Unit - III : IoT System Management with NETCONF - YANG: Network Operator Requirements –IoT Platforms Design Methodology: Introduction – IoT Design Methodology - Case Study on IoT System for Weather Monitoring – Motivation for Using Python.

Unit - IV: IoT Physical Devices & Endpoints: Basics building blocks of an IoT Devices – Raspberry Pi – Board – Linux on Raspberry Pi – Raspberry Pi Interfaces – Programming Raspberry Pi with Python: Controlling LED with Raspberry Pi – Interfacing an LED and Switch with Raspberry Pi – Interfacing a light Sensor (LDR) with Raspberry Pi.

Unit - V : Data Analytics for IoT: An Introduction to Data Analytics for IoT – Machine Learning – Big Data Analytics tools and Technology – Edge streaming Analytics – Network Analytics. Security IoT: History – Common Challenges in OT Security – IT and OT Security Practices - Formal Risk Analysis Structures – Application of Security in an Operational Environment.

Unit - VI: (for Internal Exam only) Sensors, Endpoints, and Power System: Sensing devices: Thermocouples and Temperature Sensing – Hall effect Sensors and Current Sensors PIR Sensor – MEMS Sensors. Smart IoT endpoints – Sensor fusion – Input devices – Functional examples – Energy sources and power management. Energy harvesting – Energy storage.

**Text:**

**Unit I - V ( Both Internal & External Exam )**

1. "Internet of Things A Hands – on Approach ", Arshdeep Bahga , Vijay Madiseti , Universities Press(India) Private Limited , Reprint 2015.

Unit I – IV: Chapters:1, 2, 3, 4.3, 5, 7.1 – 7.6.

2. "IoT Fundamentals Networking Technologies, Protocols, and Use Cases for the Internet of Things", David Hanes, Gonzalo Salguero Patrick Grossete, Rob Barton , Jerome Henry, Cisco Press (USA), First Printing June 2017.

Unit V: Chapters: 7, 8.

" Internet of Things for Architects ", Perry Lea , Packet Publishing Ltd., 2018.

## Unit VI: Chapters: 3. ( For Internal Exam Only)

Reference :

1. "Rethinking the Internet of Things – A Scalable approach to Connecting everthing", Francis DaCosta , Apress open Publication , 2013.
2. "Learning Internet of Things", PACKT Publishing, Birmingham , umbai -2015
3. "Getting Started with Internet of Things", Cuno Pfister , O'Rielly PublicATIOn.

Course outcome:

CO's	Statements	Bloom's Level
CO1	<b>Understand</b> the different Levels of IOT and deployment Templates.	L2
CO2	<b>Construct</b> Domain Specific IoTs, Summarize Network function Virtualization.	L4, L2
CO3	<b>Analyze</b> the domain Specification of the IoT, Collaborate IoT Design Methodology..	L6
CO4	<b>Focus</b> Basics building blocks of an IoT Devices, develop prototype systems using Rasberry Pi.	L4, L6
CO5	<b>Correlate</b> the Data Analytics for IoT.	L4

CO- PO Mapping:

Cos	POs											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	1	1		-	-	-	1	-	-	-
CO2	-	-	1	2	1	2	1	-	3	1	-	-
CO3	1	-	3	3	3	3	-	-	3	3	3	3
CO4	-	-	-	-	-	-	-	-	-	-	1	1
CO5	-	-	1	3	3	-	-	-	1	-	3	1

Question Pattern:

Section A: MCQ Questions: (20 x 1 =20 marks)

Section B: Answer ALL the Questions: (5 x 5 = 25 marks) EITHER OR (a or b) Pattern.

Section C: Answer ANY THREE Questions: (3 x 10 = 30 marks)

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**Internet of Things Lab (22KP3CS11P)**

1. Write a Internet of Things with Arduino program using LED & resistor Blinking LED.
2. Write a Program to detect vibration, vibration or tilt of any object gives output .
3. Write an Arduino program find the working of a touch sensor is similar to that of a simple switch.
4. Write a program using Arduino Board respectively to generate the Ultrasound using Ultrasonic Sensor find duration and distance.
5. Write a program using smoke sensor has a built-in potentiometer that allows you to adjust the sensor sensitivity according to how accurate you want to detect gas.
6. Write a IoT program using temperature sensor is a device which is designed specifically to measure the hotness or coldness of an object.
7. Write a program using soil moisture to find Measure the Volumetric content of water.
8. Write an Arduino program using IR sensor remote, measure the heat of an object as well as detects the motion.
9. Write an Arduino program using PIR sensor detects a human being moving around.
10. Write an Arduino program using Magnetic Reed Switch, read open or closed.
11. Write an Arduino program using DC motor, the rotor is a permanent magnet.
12. Create an Arduino Sketch With Indicator Alarm.

**Course Outcome:**

CO's	Statements	Bloom's Level
CO1	<b>Understand</b> the Sensing components and devices.	L2
CO2	<b>Generalize</b> the ultrasound using Ultrasonic Sensor find duration and distance.	L4
CO3	<b>Examine</b> and <b>design</b> specifically to measure the hotness or coldness of an object.	L3, L6
CO4	<b>Experiment</b> PIR sensor detects a human being moving around.	L3
CO5	<b>Experiment</b> the Water Level Sensor gets the water level.	L3

CO- PO Mapping :

COs	POs											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	3	-	-	1	-	3	3	-	-
CO2	-	-	-	3	-	-	-	-	3	3	-	-
CO3	-	-	-	3	-	-	1	-	3	3	-	-
CO4	-	-	-	3	-	-	-	-	3	3	-	-
CO5	-	-	-	3	-	-	-	-	3	3	-	-



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**Digital Image Processing (22KP3CSELCS2:1)**

**Objective: To apply knowledge in Image processing applications.**

Unit - I: Introduction : Image Processing – The Origins of Digital Image processing - Examples of Fields that Use DIP - Fundamental step in DIP – Components of an image processing System. Digital Image Fundamentals : Elements of Visual Perception – Image Sensing and Acquisition - Image Sampling and Quantization – Some Basic Relationships between Pixels.

Unit - II: Intensity Transformations and Spatial Filtering : Background - Some Basic Intensity Transformation Functions – Histogram Processing - Fundamentals of Spatial Filtering - Smoothing Spatial Filters – Sharpening Spatial Filters - Combining Spatial Enhancement Methods – Using Fuzzy Techniques for Intensity Transformations Spatial Filtering.

Unit - III: Image Restoration and Reconstruction: A Model of Image Degradation/Restoration Process – Noise Models – Restoration in the Presence of Noise only - Spatial Filtering – Periodic Noise Reduction by Frequency Domain Filtering - Linear, Position - Invariant Degradations - Estimating the Degradation Function Inverse Filtering.

Unit - IV: Image Compression: Fundamentals – Some Basic Compression Methods : Huffman coding - Golomb Coding - Arithmetic Coding - LZW Coding – Run Length Coding– Symbol –Based Coding – Bit- Plane Coding – Block Transform Coding - Predictive Coding - Wavelet Coding.

Unit - V: Morphological Image Processing : Preliminaries – Erosion and Dilation – Opening and Closing - The Hit-or-Miss Transformation – Some Basic Morphological Algorithms – Gray-Scale Morphology - Image Segmentation : Fundamentals - Point, Line and Edge Detection - Thresholding– Object Recognition: Patterns and Pattern Classes – Recognition Based On Decision – Theoretic Methods.

Unit - VI: (for Internal Exam only) Color Image Processing : Color Fundamentals – Color Models – Pseudocolor Image Processing – Basics of Full-Color Image Processing – Color Transformation.

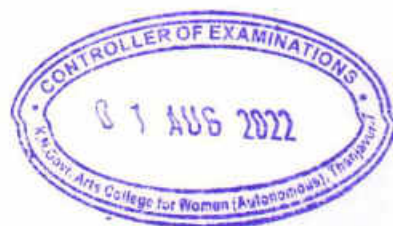
**Text:**

**Unit I – V (Both Internal & External Exam)**

“Digital Image Processing”, Third Edition, First Impression Rafel C.Gonzalez and Richard E. Woods, Pearson Education - 2016.

Unit I – V : Chapters: 1, 2.1, 2.3 - 2.5, 3.1 – 3.8, 5.1 - 5.7, 8.1 – 8.2, 9, 10.1 - 10.3, 12.1, 12.2 .

Unit VI : Chapter : 6.1 – 6.5 ( for Internal Exam Only)



Reference:

1. "Digital Image Processing", Gonzalez, Rafael C, Woods, Richard E, Pearson Education, 4<sup>th</sup> Edition, 2018.
2. "Understanding Digital Image Processing", Taylore & Francis Group, 2018.
3. "Fundamentals of Digital Image Processing", Anil K. Jain, PHI, Pvt, Ltd, Sixth printing 2013.

Course Outcome:

COs	Statements	Bloom's Level
CO1	Understand the Fundamental components of Image Processing.	L2
CO2	Analyze and Solve the concepts of Intensity transformation, Histogram processing and Spacial Filters.	L4 , L6
CO3	Establish the image Restoration , Reconstruction procedure and Various filtering Techniques.	L5
CO4	Execute some basic Compression Methods.	L2
CO5	Construct a model using Morphological Algorithm.	L6

CO-PO Mapping:

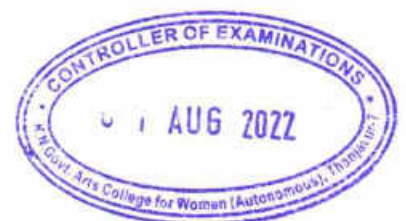
COs	POs											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	-	-	-	-	3	-	-	-	-
CO2	-	3	-	-	1	-	-	3	-	-	-	-
CO3	1	-	-	1	-	-	-	3	-	-	-	-
CO4	-	3	-	-	-	2	-	3	-	-	-	-
CO5	-	-	-	3	-	-	-	3	-	-	-	-
PO Attainment												

Question Pattern:

Section A: MCQ Questions: (20 x 1 = 20 marks)

Section B: Answer ALL the Questions: (5 x 5 = 25 marks) EITHER OR (a or b) Pattern.

Section C: Answer ANY THREE Questions: (3 x 10 = 30 marks)



**Human Computer Interaction (22KP3CSELCS2:2)**

*Objective: To improve research skills in ubiquitous computing.*

Unit - I: Introduction :Cognitive Psychology and Computer Science – Capabilities of Human - Computer Interaction(HCI) – Goal of HCI – Roles of HCI – Basic User Interfaces – Advanced User Interfaces – HCI Design Principles – Interface levels in HCI – GUI Design – Popular HCI Tools – Architecture of HCI Systems – Advances in HCI.

Unit - II: Usability Engineering: HCI and Usability Engineering – Usability Engineering Attributes – Process of Usability – Need for Prototyping. Modelling of Understanding Process: GOMS – Cognitive Complexity Theory (CCT) – ACT-R – State, Operator and Result (SOAR) – BDI – ICARUS – CLARION – Subsumption Architecture

Unit - III: Spoken Dialogue System: Factors Defining Dialogue System – General Architecture of a Spoken Dialogue System – Dialogue Management Strategies – Computational Models for Dialogue Management. Recommender Systems: HCI Study Based on Personalisation – Personalisation in Recommender Systems – Relation between Information Filtering and Recommender Systems.

Unit - IV: Application Areas – Recommender System Field as an Interdisciplinary Area of Research – Phases – User Profiling Approaches – Classification of Recommendation Techniques – Advantages and Disadvantages – Need of Software Agent-based Approach – Evaluating – Integrated Framework.

Unit - V: Advanced Visualization Methods: Ontology Definition – Ontology Visualisation Methods – Space Dimensions of Ontology Visualization – Ontology Languages – Ontology Visualization Tool – Ontology Reasoning – Reasoner - Case Study.

Unit - VI: (for Internal Exam only) Ambient Intelligence(AmI): Ambient Intelligence Definition – Context-aware Systems and HCI – Middleware – Modelling Data for AmI Environment – Case Studies: Development of Context-awareness Feature in Smart Class Room- Context-aware Agentes for Developing AmI Application.

**Text:**

**Unit I – V (Both Internal & External Exam)**

**“Human-Computer Interaction”, K. Meena, R. Sivakumar, PHI Learning Private Limited, 2015 .**

**Unit I – V : Chapters: 1 – 6**

**Unit VI : Chapter 7 (for Internal Exam Only)**

**Reference:**



1. "Human-Computer Interaction" – Alan Dix, Janet Finlay , Gregory D.Abowd, Russell Beale, Third Edition, Pearson Publications , 2008.
2. "Human-Computer interaction" – John M. Carrol – Pearson Education – First impression,2007.
3. "Human- Computer interaction" – Jenny preece – Addison Wesley Publishing Company -1994.

**Course Outcome:**

Cos	Statements	Bloom's Level
CO1	Design principles, interface level of architecture of HCI.	L6
CO2	Understanding the process of GOMS.	L2
CO3	Analyze the recommender system of HCI.	L4
CO4	Summarize the advanced visualization methods.	L5
CO5	Construct the model of AMI environment.	L6

CO

**-PO Mapping:**

COs	POs											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	-	-	-	-	-	2	-	-	-
CO2	-	-	-	3	-	-	-	-	-	-	-	-
CO3	-	-	3	3	-	1	-	-	-	-	-	-
CO4	-	-	-	3	2	-	-	-	-	-	-	-
CO5	-	-	-	3	-	-	-	-	-	-	-	-

**Question Pattern:**

Section A: MCQ Questions: (20 x 1 =20 marks)

Section B: Answer ALL the Questions: (5 x 5 = 25 marks) EITHER OR (a or b) Pattern.

Section C: Answer ANY THREE Questions: (3 x 10 = 30 marks)



**Desktop Publishing (22KP3CSEL02)**

**Objective: To provide Skill Development in DTP and rise become a professional graphic Designer.**

Unit - I : Adobe PageMaker 7: Using the toolbox - Viewing pages - Working with text and graphics - Selecting text with the text tool, Editing text - Moving between pages, move between publication pages: Adding and deleting pages - Correcting mistakes, Undoing changes and reverting publications - Creating a publication from scratch - set margins, Changing Document Setup options, Using Master pages - select a measurement system and set the vertical ruler - set up columns on a page - create different column setups - Setting up ruler guides - Numbering pages.

Unit - II : Creating text blocks - create a text frame, add text a frame - Formatting text - check spelling - edit a track, align a paragraph, specify leading - draw a line or a constrained line, rectangle or a square, ellipse or a circle, a polygon, round rectangle corners - turn a basic shape into a frame - Duplicating an object, copy and paste, delete, resize, Grouping and ungrouping objects - Rotating, Reflecting, Skewing an object, Cropping a graphic - Printing in PageMaker - Printing booked publications.

Unit - III : Using CorelDRAW 12 : CorelDraw terminology and concepts, CorelDRAW application window - CorelDRAW workspace tools - Exploring the toolbox - start CorelDRAW, open a drawing - Working with templates - Undoing, redoing, and repeating actions, Zooming and panning - Saving drawings - Lines, Outlines and Brush Strokes - Drawing rectangles and squares.

Unit - IV : Working with color - Understanding color models, CMYK color model - RGB color model, Grayscale color model, Using Special Effects - Applying a transparency - Using Text in Drawing - Fitting text a path - straighten text - Adding bitmapped images - Print a Drawing - Commercial printing.

Unit - V: Adobe Photoshop: Launching Photoshop - Using the tools, Using palettes - Correcting mistakes - Create, Open, Save image - Shapes and paths - Creating paths - Using Paintbrush tool - Using the Eraser tool - Apply a gradient fill - the Layers palette menu - Changing the size of layer thumbnails - Creating layers and layer sets - Background layer - - lock all properties of a layer or layer set, partially lock a layer - Deleting layers, Merging and stamping layers - merge two layers or layer sets.

Unit - VI : (for internal Exam Only) Stamp layers, - Printing images - print an image with its current options, set printer and page setup options - reposition an image on the paper, scale the print size of an image - print vector data, Preparing images for press - set output options.

**Text:**

**Unit I – V (Both Internal & External Exam)**

**“DTP Course Book – A Complete Text Book of Desktop Publishing for Everyone”, Vishnu Priya Singh, Meenakshi Singh, CompuTech Publication Limited, First Edition, 2008.**

**Chapters: 6, 8, 10**



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Reference Books:

- 1."Rapidex DTP Course Desktop Publishing ", Shirish Chavan, UNICORN BOOKS PVT.Ltd Distributors PUSTAK MAHAL, II nd Reprint Edition, May 2007.
- 2."Digital Painting Fundamentals with Corel Painter 12",Rhoda Grossman Draws, Course Technolog PTR Publication, 2011.
- 3."DTP Training Guide",Satish Jain ,DPB Publications,2006.

Course Outcome:

COs	Statement	Bloom's Level
CO1	Understand the concepts of Adobe PageMaker.	L2
CO2	Examine the formatting Text blocks.	L3
CO3	Analyze the Terminology and concepts of Corel Draw.	L4
CO4	Infer knowledge of Cole Draw Application Window.	L6
CO5	Discuss the concepts of Adobe Photoshop.	L2

CO-PO Mapping:

COs	POs											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	1	-	1	-	-	2	2	1	-
CO2	1	-	-	1	-	1	-	-	1	1	1	-
CO3	1	-	-	1	-	1	-	-	1	1	1	-
CO4	1	-	-	1	-	1	-	-	1	1	2	-
CO5	1	-	-	1	-	1	-	-	1	3	3	-

Question Pattern:

Section A: MCQ Questions: (20 x 1 =20 marks)

Section B: Answer ALL the Questions: (5 x 5 = 25 marks) EITHER OR (a or b) Pattern.

Section C: Answer ANY THREE Questions: (3 x 10 = 30 marks)

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**Embedded System (22KP4CS12)**

**Objective: To apply hardware skills in embedded system design.**

Unit - I: Introduction: Embedded Systems Overview – Design Challenge – Optimizing Design Metrics - Common Design Metrics – Processor Technology – IC Technology – Design Technology – Trade Offs: Design Productivity Gap – Custom Single-Purpose Processors (SPP) Hardware: Combinational Logic – Sequential Logic – Custom SPP Design – RT-Level Custom SPP Design – Optimizing Custom SPP.

Unit - II: General-Purpose Processors (GPP) Software: Basic Architecture – Operation – Programmer's View – Development Environment – Application-Specific Instruction- Set Processors (ASIPs) – Selecting a Microprocessor – GPP Design. Memory: Memory Write Ability and Storage Permanence – Common Memory Types - Composing Memory – Memory Hierarchy and Cache – Advanced RAM.

Unit - III: Interfacing: Introduction – Communication Basics – Microprocessor Interfacing: I/O Addressing – Interrupts – Direct Memory Access – Arbitration – Multilevel Bus Architecture – Advanced Communication Principles – Serial Protocols – Parallel Protocols – Wireless Protocols.

Unit - IV: State Machine and Concurrent Process Models: Introduction – FSM – FSMD – HCFSM and Statecharts Language – Program-State Machine Model (PSM) – Concurrent Process Model – Concurrent Processes – Communication among Processes – Synchronization among Processes – Dataflow Model – Real-Time Systems.

Unit - V: IC Technology: Introduction – Full-Custom (VLSI) IC Technology – Semi-Custom (ASIC) IC Technology – Programmable Logic Device (PLD) Technology. Design Technology: Introduction – Automation: Synthesis – Verification: Hardware/Software Co-Simulation – Reuse: Intellectual Property (IP) Cores – Design Process Models.

Unit - VI: (for Internal Exam only) Digital Camera Example: Introduction – Introduction to a Simple Digital Camera: User's Perspective – Designer's Perspective – Requirements Specification: Nonfunctional Requirements – Informal functional Specification – Refined Functional Specification – Design - Implementations.

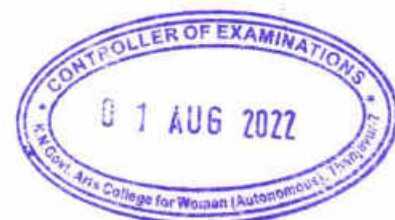
**Text :**

**Unit I – V (Both Internal & External Exam)**

**“Embedded System Design : A Unified Hardware / Software Introduction ” – Frank Vahid, Tony Givargis – Wiley India (P) Ltd., Third Edition, Reprint 2012.**

**Unit I – V: Chapters : 1 – 3, 5 – 6, 8, 10, 11**

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## Unit VI: Chapter : 7 (for Internal Exam only)

Reference :

1. "Embedded System Design" – Peter Marwedel – Springer – 2010.
2. "Programming Embedded Systems: with C and GNU Development Tools" – Michael Barr – O'Reilly Media – 2006, Edition 2.
3. "Designing Embedded Hardware" – John Catsoulis – O'Reilly Media – 2005 Edition 2.

### Course Outcome:

COs	Statement	Bloom's Level
CO1	Focus on the common design technology and combinational logics.	L4
CO2	Transfer the knowledge of general purpose processors and common memory types.	L3
CO3	Compose the understandability of Microprocessors interfacing and advanced communication principles.	L6
CO4	Conclude the state machine and concurrent process models and synchronize and communicate among processes.	L5
CO5	Facilitate the technologies like IC technology and Design technology and reuse them.	L6

### CO-PO Mapping:

COs	POs											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	2	-	-	-	-	3	-	-	-
CO2	-	-	-	-	-	-	-	-	3	-	-	-
CO3	-	-	-	-	-	-	-	-	3	-	-	-
CO4	-	-	-	-	-	2	-	-	3	-	-	-
CO5	-	-	-	-	-	-	-	-	3	-	-	-

### Question Pattern:

Section A: MCQ Questions: (20 x 1 = 20 marks)

Section B: Answer ALL the Questions: (5 x 5 = 25 marks) EITHER OR (a or b) Pattern.

Section C: Answer ANY THREE Questions: (3 x 10 = 30 marks)

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**Deep Learning (22KP4CS13)**

**Objectives:** *To understand the context and working knowledge of deep learning .*

Unit - I: Introduction: Historical Trends in Deep Learning. Probability and Information Theory: Random Variables – Probability Distributions – Marginal Probability – Conditional Probability – The Chain Rule of Conditional Independence – Common Functions – Bayes' Rule – Technical Details of Continuous Variables – Information Theory – Structured Probabilistic Models.

Unit - II: Numerical Computation: Overflow and Underflow – Poor Conditioning – Gradient-Based Optimization. Machine Learning Basics: Learning Algorithms – Hyperparameters and Validation Sets – Estimators, Bias and Variance – Maximum Likelihood Estimation – Bayesian Statistics – Supervised Learning Algorithms - Unsupervised Learning Algorithms – Stochastic Gradient Descent – Building a Machine Learning Algorithm .

Unit - III: Deep Feedforward Networks : Gradient-Based Learning – Hidden Units – Architecture Design – Back-Propagation and Others Differentiation Algorithms. Regularization for Deep Learning: Parameter Norm Penalties – Norm Penalties as Constrained Optimization – Dataset Augmentation – Noise Robustness – Semi-Supervised Learning – Multi-Task Learning – Early Stopping – Sparse Representations– Methods – Dropout.

Unit - IV: Optimization for Training Deep Models: Challenges in Neural Network Optimization – Basic Algorithms – Parameter Initialization Strategies – Algorithms with Adaptive Learning Rates – Approximate Second-Order Methods – Optimization Strategies and Meta-Algorithms. Convolutional Networks: Operation – Motivation – Pooling – Convolutions and Pooling as an Infinitely Strong Prior – Convolution and Pooling – Function –Data Types – Algorithms – Features.

Unit - V : Sequence Modeling: Recurrent and Recursive Nets: Unfolding Computational Graphs – Recurrent Neural Networks – Bidirectional RNNs – Encoder-Decoder Sequence-to-Sequence Architectures – Deep Recurrent Networks – Recursive Neural Network – The Challenge of Long Term Dependencies – Echo State Networks – The Long Short-Term Memory and other Gated RNNs – *Optimization for Long – Term Dependencies.*

Unit - VI: (for Internal Exam only) Practical Methodology: Performance Metrics – Default Baseline Models – Determining Whether to Gather More Data – Selecting Hyperparameters – Debugging Strategies. Applications Large-Scale Deep Learning – Computer Vision – Speech Recognition – Natural Language Processing – Other Applications.

**Text:**

**Unit I - V ( Both Internal & External Exam )**

**“Deep Learning” – Ian Goodfellow, Youshuva Bengio and Aaron Courville.**



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**Chapters:1, 3 to 10 (Relevant Topics only) (Ebook)**  
**Unit VI: Chapters: 11,12. ( For Internal Exam Only)**

Reference :

- 1.“Deep Learning Algorithms and Applications ”, Witold Pedrycz, Shyi-ming chen Editions , Springer Publications 2020.
- 2.“Introduction to Deep Learning ”, Eugene Charniale , MIT Press 2018, Library of Congress Cataloging- in- Publications.
- 3.“Deep Learning A Practical Approach”, Dr.Rajic Chopra, Khanna Publishing , Second Edition , 2018.

**Course Outcome:**

CO's	Staments	Bloom's Level
CO1	Understand the Historical trends and Distinguish normal and random variable.	L2
CO2	Examine the Learning Algorithm and Illustrate the Machine Learning Algorithm.	L3, L2
CO3	Construct the parameter norm Penalties.	L6
CO4	Train and Testing the Deep model.	L6
CO5	Collaborate sequence modeling.	L6

**CO- PO Mapping :**

COs	POs											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	-		-	-	-	-	-	-	-
CO2	3	-	1	2	2	-	1	-	-	-	-	-
CO3	3	-	1	1	2	-	-	-	-	-	-	-
CO4	3	-	1	1	2	-	1	-	-	-	-	-
CO5	3	1	3	1	-	-	2	-	-	-	-	3

**Question Pattern:**

Section A: MCQ Questions: (20 x 1 =20 marks)

Section B: Answer ALL the Questions: (5 x 5 = 25 marks) EITHER OR (a or b) Pattern.

Section C: Answer ANY THREE Questions: (3 x 10 = 30 marks)

**Data Analytics Using R Lab (22KP4CS14P)**

**1. R AS CALCULATOR APPLICATION**

- a. Using with and without R objects on console
- b. Using mathematical functions on console
- c. Write an R script, to create R objects for calculator application and save in a specified location in disk.

**2. DESCRIPTIVE STATISTICS IN R**

- a. Write an R script to find basic descriptive statistics using summary, str, quartile function on mtcars & cars datasets.
- b. Write an R script to find subset of dataset by using subset (), aggregate () functions on iris dataset

**3. READING AND WRITING DIFFERENT TYPES OF DATASETS**

- a. Reading different types of data sets (.txt, .csv) from web and disk and writing in file in specific disk location.
- b. Reading Excel data sheet in R.
- c. Reading XML dataset in R.

**4 VISUALIZATIONS**

- a. Find the data distributions using box and scatter plot.
- b. Find the outliers using plot.
- c. Plot the histogram, bar chart and pie chart on sample data.

**5. CORRELATION AND COVARIANCE**

- a. Find the correlation matrix.
- b. Plot the correlation plot on dataset and visualize giving an overview of relationships among data on iris data.
- c. Analysis of covariance: variance (ANOVA), if data have categorical variables on iris data.

**6. REGRESSION MODEL**

Import a data from web storage. Name the dataset and now do Logistic Regression to find out relation between variables that are affecting the admission of a student in a institute based on his or her GRE score, GPA obtained and rank of the student. Also check the model is fit or not. require (foreign), require(MASS).

**7. MULTIPLE REGRESSION MODEL**

Apply multiple regressions, if data have a continuous independent variable. Apply on above dataset.

## 8. REGRESSION MODEL FOR PREDICTION

Apply regression Model techniques to predict the data on above dataset.

## 9. CLASSIFICATION MODEL

- Install relevant package for classification.
- Choose classifier for classification problem.
- Evaluate the performance of classifier.

## 10 CLUSTERING MODEL

- Clustering algorithms for unsupervised classification.
- Plot the cluster data using R visualizations.

### Course Outcome:

COs	Statements	Bloom's Level
CO1	Design and develop calculator Applications	L6, L3
CO2	Test the active Descriptive Statistics.	L6
CO3	Solve the Corelation and Covariance.	L6
CO4	Predict and apply the data set for Regression.	L3
CO5	Evaluate and choose the classification and Clustering model.	L5, L4

### CO-PO Mapping:

COs	POs											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	2	-	2	-	-	-	-	-	2	3	-
CO2	-	-	-	2	-	-	-	-	-	2	3	2
CO3	-	-	-	3	-	1	-	-	-	3	3	1
CO4	-	-	-	3	-	1	-	-	-	3	3	1
CO5	-	-	-	3	-	3	-	-	-	3	3	3



**Wireless Sensor Network (22KP4CSELCS3:1)**

**Objective :** To study the concepts of Wireless sensor networks, design of efficient protocols, algorithms and architectures in wireless sensor networks.

Unit – I: Introduction – Basic overview of the Technology. Applications of Wireless sensor Networks: Introduction – Background-Range of applications – Examples of category 2 WSN applications - Examples of category 1 WSN Applications - Another Taxonomy of WSN Technology. Wireless Transmission Technology and Systems: Introduction - Radio Technology primer - Available Wireless Technologies.

Unit - II: Medium Access Control Protocols for wireless sensor networks: Introduction – Background - Fundamentals of MAC Protocols - MAC Protocols for WSNs-Case study. IEEE 802.15.4 LR-WPANs Standard Case Study – PHY Layer , MAC Layer.

Unit - III : Routing Protocols for Wireless Sensor Networks – Introduction – Background - Data Dissemination and Gathering - Routing Challenges and Design Issues in Wireless sensor networks - Routing Strategies in Wireless Sensor Networks.

Unit - IV: Middleware for wireless sensor networks-Introduction - WSN Middleware principles - Middleware Architecture - Existing middleware. Operating systems for Wireless Sensor Networks – Introduction - Operating Systems Design Issues - Examples of Operating Systems.

Unit - V: Security – Fundamentals of Network Security – Challenges of Security in Wireless Sensor Networks- Security Attacks in Sensor Networks-Protocols and Mechanisms for Security – IEEE 802.15.4 and ZigBee Security.

Unit - VI : (for Internal Exam only) Sensor Network Programming – Node-centric Programming – Macro programming – Dynamic Reprogramming – Sensor Network Simulators.

**Text:**

**Unit I - V ( Both Internal & External Exam )**

I. “Wireless Sensor Networks echnology, Protocols and Applications”, KazemSohraby, Daniel Minoli , TaiebZnati , Wiley Publications Reprint, 2015.

Chapter : 1.1, 1.2, 2.1-2.6, 4.1-4.3, 5, 6 , 8.1-8.4, 10.2 , 10.3

**UNIT V & VI: FOR INTERNAL ONLY :** “Fundamentals of Wireless Sensor Networks” by Walteneus Dargie & ChristianPoellabauer”, Wiley Publications 2018.

Chapter: 11.1 – 11.5 , 12.1 – 12.5



Reference:

1. "Networking Wireless Sensors", Bhaskar Krishnamachari Cambridge University Press, 2005.
2. "LIDO Telecommunications Essentials", Lillian Goleniewski, 2nd edition, Addison-Wesley Professional, Copyright: 2007.

Course Outcome:

COs	Statements	Level
CO1	Design and Develop wireless sensor networks.	L6.
CO2	Discuss the Fundamentals of designing MAC protocol for Wireless sensor networks.	L2
CO3	Analyse the basic concepts for designing a Routing protocol.	L4
CO4	Identify the Wireless sensor network platform.	L2
CO5	Design secured network application for possible threats.	L6

CO-PO Mapping:

COs	POs											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	3			1	-	1	1	-	1	1
CO2	2		2		1	-	1	-	1	1	-	-
CO3	2	1	1	3	2	1	-	1	2	1	-	-
CO4	3	1	-	-	1	1	-	1	1	-	-	-
CO5	1		2	1	1	-	1	1	1	-	-	1

Question Pattern:

Section A: MCQ Questions: (20 x 1 = 20 marks)

Section B: Answer ALL the Questions: (5 x 5 = 25 marks) EITHER OR (a or b) Pattern.

Section C: Answer ANY THREE Questions: (3 x 10 = 30 marks)



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**Mobile Communication (22KP4CSELCS3:2)**

**Objective: To improve skills in mobile communication technology.**

Unit - I : Introduction: Applications - A Short History Of Wireless Communication - A Market For Mobile Communications - Some Open Research Topics - A Simplified Reference Model. Medium Access Control (MAC): Motivation for a Specialized MAC - SDMA - FDMA - TDMA - CDMA - Comparison of S/T/F/CDMA.

Unit - II : Telecommunications Systems: GSM Mobile Services - System Architecture - Radio Interface - Protocols - Localization And Calling - Handover - Security - New Data Services. Satellite Systems: History - Applications - Basics: GEO, LEO, MEO - Routing - Localization - Handover. Broadcast Systems: Overview - Cyclical Repetition of Data - Digital Audio & Video Broadcasting - Convergence of broadcasting and mobile communications.

Unit - III: Wireless LAN : IEEE 802.11: System And Protocol Architecture - Physical Layer - MAC Layer- MAC Management-802.11b - 802.11a - Newer Developments - Bluetooth: User Scenarios - Architecture.

Unit - IV: Mobile Network Layer : Mobile IP: Goals, Assumptions And Requirements - Entities and Terminology - IP Packet Delivery - Agent Discovery - Registration - Tunneling and Encapsulation - Optimizations - Reverse Tunneling - IPV6 - IP Micro Mobility Support - Dynamic Host Configuration Protocol. Mobile Ad-Hoc Networks: Routing - Destination Sequence Distance Vector - Dynamic Source Routing - Alternative Metrics - Overview of ad-hoc routing protocols. Mobile Transport Layer: Traditional TCP: Congestion Control - Slow Start - Fast Retransmit/Recovery - Implications of Mobility - Classical TCP Improvements: TCP Over 2.5 / 3G Wireless Networks.

Unit - V: 3G: LTE Introduction - OFDM, OFDMA, SC-FDMA - LTE MIMO - TDD & FDD - Frame & sub frame - Physical logical & transport channels - Bands and spectrum - UE categories - SAE architecture - LTE SON - VoLTE - SRVCC - Security.

Unit - VI: (for Internal Exam only) Support for mobility: File systems: Consistency - Coda - Little Work - Ficus - Mio-NFS - Rover - World Wide Web: Hypertext transfer protocol - Hypertext mark up language - Some approaches that might help wireless access - System architecture - Wireless application protocol: Architecture .

**Text :**

**Unit: I – IV: (for Both Internal and External Exam)**

1. "Mobile Communications", Jochen H. Schiller, Pearson Education , Second Edition, Twelfth Impression, 2013 .

Unit: V: "LTE" – Course Material Compiled by M. Ida Rose, Assistant Professor, Department of Computer Science, Kunthavai Naacchiyar Government Arts College for Women (Autonomous), Thanjavur.

Unit I – V: Chapters: 1.1 - 1.5, 3, 4.1, 5, 6, 7.3, 7.5.1 - 7.5.2, 8.1 - 8.3, 9.1 - 9.3

**Unit VI : Chapter : 10.1, 10.2, 10.3.1 (for Internal Exam only)**

**Reference :**

1. "Mobile Computing 2ED" - Asoke K. Talukder - TMH - 2010.
2. "Fundamentals of Mobile Computing" - Pattnaik, Prasant Kumar, Mall, Rajib - PHI - 2012.
3. <http://www.radio-electronics.com/info/cellulartelecomms/lte-long-term-evolution/3g-lte-basics.php>.

**Course Outcome:**

COs	Statements	Bloom's Level
CO1	Identify the fundamental concepts of mobile communications like MAC, SDMA, FDMA, TDMA, CDMA.	L2
CO2	Focus the Architecture and applications of Telecommunication and Broadcast Systems.	L4, L3
CO3	Summarize the ideas of wireless LAN systems, Protocol Architecture and MAC Management.	L5
CO4	Construct the goals and requirements of the mobile network layer and experiment different Routing Algorithm.	L5, L4
CO5	Analyze the role of LTE, Physical logical and transport channels, SAE Architecture and apply the knowledge in data convergence protocols to setup.	L4, L3

**CO-PO Mapping:**

COs	POs											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	2	2	3	-	-	-	2	2	1	-
CO2	-	-	2	2	3	-	-	-	2	2	1	-
CO3	-	-	2	2	3	-	-	-	2	2	2	-
CO4	-	-	2	2	3	3	3	-	-	2	2	-
CO5	-	-	2	2	-	-	3	-	-	2	2	-

**Question Pattern:**

Section A: MCQ Questions: (20 x 1 = 20 marks)

Section B: Answer ALL the Questions: (5 x 5 = 25 marks) EITHER OR (a or b) Pattern.

Section C: Answer ANY THREE Questions: (3 x 10 = 30 marks)

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**Project (22KP4CS15PW)**

**Guidelines:**

1. The students have to do the project work individually in the organization.
2. Any applications either system oriented or application oriented may be selected.
3. One internal examiner and one External Examiner shall evaluate project work.
4. During the evaluation there should be online demonstration.
5. The final copy of Project Report should be submitted to the Department.

**Scheme of valuation**

- |                                      |           |
|--------------------------------------|-----------|
| 1. Selection of Application & Design | -20 Marks |
| 2. Preparation of Source code        | -20 Marks |
| 3. Demonstration /Execution          | -20 Marks |
| 4. Documentation                     | -20 Marks |
| 5. Viva- Voce                        | -20 Marks |



**Cognitive Ability (22KP2ECCCS1)**

**Objective: To improve skills in UGC NET/SET examinations.**

Unit - I: Teaching and Research Aptitude : Teaching Nature – Objectives – Characteristics and Basic Requirements – Learners Characteristics – Factors affecting teaching – Method of Teaching and its Aids – Evaluation systems – Research Meaning – Characteristics and types – Steps of research – Methods of research – Research Ethics – Paper – article – Workshop – Seminar – Conference and Symposium – Thesis Writing : Its characteristics and format.

Unit - II: Reading Comprehension – Communication: Nature – Characteristics – Types – Barriers and Effective Class Room Communication:

Unit - III: Mathematical and Logical Reasoning : Number Series – Letter Series – Codes – Relationships – Classification – Understanding the structure of Arguments – Evaluating and Distinguishing Deductive and Inductive Reasoning. Verbal Analogies: Word Analogy – Applied Analogy. Verbal Classification – Reasoning Logical Diagrams: Simple and Multi – Diagrammatic Relationship. Venn diagram – Analytical Reasoning.

Unit - IV: Data Interpretation and ICT: Sources – Acquisition and Interpretation of Data – Quantitative and Qualitative Data – Graphical Representation and Mapping of data. Information and Communication Technology: Meaning – advantages – disadvantages and uses – General abbreviation and terminology – Basics of internet and e-mailing.

Unit - V: People and Environment: People and environment interaction – sources of pollution – pollutants and their impact on human life, exploitation of natural and energy resources – Natural hazards and mitigation. Higher Education System : Governance, Polity and Administration – Structure of the institution for higher learning and research in India – Formal and distance education – Professional/Technical and general education – Value Education.

**Text:**

**“UGC NET/SLET Junior Research Fellowship and Eligibility for Lectureship Paper – I” Sakthi's Superior Guide – Sakthi Publishing House.**

**Reference:**

1. “UGC NET/SLET Paper-I Teaching & Research aptitude”- UGC Unique Publishers.
2. [www.allquiz.com](http://www.allquiz.com)
3. [www.newrecruitments.com](http://www.newrecruitments.com)
4. [www.ugcnetonline.in](http://www.ugcnetonline.in)



**Core Competence (22KP3ECCCS2)**

**Objective: To improve skills in UGC NET/SET examinations.**

Unit - I : Discrete Mathematics: Sets – Relations - Function – Inclusion – Exclusion principle. Graph: Definition – Walks-paths – trials – connected graph – regular and bipartite graphs – cycles and circuits – tree and rooted tree – spanning trees –Hamiltonian and Eulerian graphs – planar graphs. Groups: Finite field and Error correcting / detecting codes. Propositional logic - predicate logic – well formed formulae (WFF)-Satisfiability and Tautology. Representation of integers:.

Unit - II: System Software and compilers: Assembly language fundamental (8085 based ALP) - Assembler – 2-pass and Single pass – Macros and Macro processors. Loading–Linking - Relocation–Program relocatability – Linkage Editing. Compilation and interpretation – Bootstrap compilers – Phases of compilation process – Lexical analysis. CFG –parsing and parse tree- parse tree derivation - Bottom up parsers - Top down parses: Left recursion and its removal – predictive parser – intermediate Codes: Quadruples –triples-intermediate code generation –code generation and optimization.

Unit - III: Operating Systems (with case study of UNIX): UNIX File systems – process management – Bourne Shell – Shell variables – Command Line Programming. Filters and Commands.

Unit IV: Definition :AI approach for solving problem – Automated reasoning with propositional logic and predicate logic - fundamental proof procedure –refutation – resolution – refinements to resolution – state space representation of problems – founding function – BF,DF ,A,A\*, AO\*,etc., Frames – Scripts – semantic nets- production systems –procedural representation – Prolog programming.

Unit - V : Currents trends and Technologies: Parallel computing - Mobile Computing – E – Technologies :Electronic payment systems – EDI –GIS – ERP package – Data Warehousing – Data Mining.

**Text:“UGC NET/SLET Junior Research Fellowship and Eligibility for Lectureship Computer Science and Applications” – Sakthi’s Superior Guide – Sakthi Publishing House**

Reference:

- 1.“UGC NET/SET computer science &application” - Sanjay singha l& Sameen mishra, Danika publishing company - New edition 2011.
- 2.www.allquiz.com
- 3.www.newrecruitments.com
- 4.www.ugcnetonline.in

