A.VEERIYA VANDAYAR MEMORIAL

SRI PUSHPAM COLLEGE (AUTONOMOUS)

POONDI-613 503, THANJAVUR (DT)

TO LEARN
AND
TO SERVE

SYLLABUS

M.Sc., Computer Science

(From 2020 - 2021 onwards)

M.Sc Computer Science

Program Outcome:-

- Students are able to understand the fundamental of computer applications and all its principles and perspectives.
- Students can develop ability to analyze a problem, identify and define the computing requirements, which may be appropriated to its solution.
- The students will be able to undertake careers involving problem solving using computer science technologies.
- The students gain ability to pursue advanced studies and research in computer Applications.

Program Specific Outcome:-

- On completion of M.Sc.,programme students will be able toget placed in IT sector software and academic field.
- Students acquire depth knowledge in machine learning with python as well as machine learning Experimental,Bigdata analytics as well as big data experiments.
- Students can develop ability to represent solution to various real word problems and gain research development skill.
- Student can learn PIC microcontroller and IoT experiments and they can develop their skill and gain knowledge,creativity, critical thinking analytical ability and research skill.

M.Sc. COMPUTER SCIENCE(2020 - 2021) onwards

S. No	**Semester**	**Category**	**Course code**	**Course Title**	**Maximum marks**			**Minimum marks for pass**			**Hours /week**	**Credits**
					CIA	**E.E**	**TOTAL**	**CIA**	**E.E**	**TOTAL**		
1	**I**	Core	20P1CSC1	Mathematical Foundations of Computer Science	25	75	100	10	30	50	6	6
2		Core	20P1CSC2	**Distributed Programming using J2EE**	25	75	100	10	30	50	6	6
3		Core	20P1CSC3	**Advanced Data Structures and Algorithms**	25	75	100	10	30	50	6	5
4		Core-PL	20P1CSCP1	**Distributed Programming using J2EE Lab**	40	60	100	16	24	50	3	2
5		Core-PL	20P1CSCP2	**Advanced Data Structures and Algorithms Lab**	40	60	100	16	24	50	3	2
6		Elective	20P1CSEL1A/ 20P1CSEL1B/ 20P1CSEL1C	Advanced Software Engineering / **Software Project Management**/ Object Oriented System Development	25	75	100	10	30	50	6	4
7	**II**	Core	20P2CSC4	**Advances in Web Services**	25	75	100	10	30	50	4	4
8		Core	20P2CSC5	**Machine Learning With Python**	25	75	100	10	30	50	5	5
9		Core	20P2CSC6	**Compiler Design**	25	75	100	10	30	50	5	5
10		Core	20P2CSC7	**Internet of Things**	25	75	100	10	30	50	5	5
11		Core-PL	20P2CSCP3	**Machine Learning Lab**	40	60	100	16	24	50	3	2
12		Core-PL	20P2CSCP4	**PIC Programming Lab**	40	60	100	16	24	50	3	2
13		Elective	20P2CSEL2A/ 20P2CSEL2B/ 20P2CSEL2C	PIC Microcontroller And Applications /Ubiquitous Computing/ Wireless and Mobile Networks	25	75	100	10	30	50	5	4
				MOOC								
14	**III**	Core	20P3CSC8	**Human Computer Interaction**	25	75	100	10	30	50	6	6
15		Core	20P3CSC9	**Blockchain Technologies**	25	75	100	10	30	50	5	5
16		Core	20P3CSC10	**Big Data Analytics**	25	75	100	10	30	50	5	5
17		Core	20P3CSC11	**Cross Platform – Mobile Applications Development**	25	75	100	10	30	50	5	5
18		Core	20P3CSCP5	**Big Data Analytics Lab**	40	60	100	16	24	50	3	3
19		EDC	20P3CSEDC	**E-Learning Technologies**	25	75	100	10	30	50	4	-
		Skill	20P3CSCPD	**Communicative Skills& Personality Development**	-	-	-	-	-	-	2	1
				MOOC								
20	**IV**	Elective	20P4CSEL3A/ 20P4CSEL3B	**Computational Lab using R/** **Cross Platform – Mobile Applications Development Lab**	40	60	100	16	24	50	6	4
21		Core-PL	20P4CSCP6	**IOT Lab**	40	60	100	16	24	50	4	2
22			20P4CSPR	Project	40	60	100	16	24	50	3 MONTHS	5
23			20P4CSCN	Comprehension	-	-	100	-	-	50	4	2
					Total Marks-2300						**Credits -**	**90**

M.Sc. COMPUTER SCIENCE - 2020-2021

Paper Code	**Total No. Of Papers**	**Total Marks**	**Total Credits**	**Classification**
Core	17	1700	70	✓
Elective	03	300	12	✓
E.D.C	01	100	-	✓
Project	01	100	05	X
Comprehension Viva	01	100	02	✓
Communicative Skill and personality Development	-	-	01	X
Extra credit-online course MOOC	-	-	-	X
Total	**23**	**2300**	**90**	

GRADING OF COURSE PERFORMANCE (10 POINT SCALE)

Aggregate Marks	Grade	Grade point
96 and above	**S+**	**10**
91-95	**S**	**9.5**
86-90	**D++**	**9.0**
81-85	**D+**	**9.0**
76-80	**D**	**8.0**
71-75	**A++**	**7.5**
66-70	**A+**	**7.0**
61-66	**A**	**6.5**
56-60	**B**	**6.0**
50-55	**C**	**6.5**

Comprehensive Knowledge Test: Objective type question patternwith 100 compulsory questions carrying 100 marks to be answered in 3 Hours with 2 Credits. The portion is entire core courses.

Industrial Internship: Studentshave to undergo IT Sector in Industry or Organization where any process related to Computer Science is going on. The period of training should be minimum 5 days. Students have to submit the report of the training underwent with the certificate from the concerned authority of the Industry/Organanisation.

Industrial visit: Students have to attach a report on the Industrial visit made with the counter signature of staff in charge for the Industrial visit while submitting the Project /Industrial internship report.

MOOC: Massive open online course is introduced in the second and third semester as an extra credit course from this academic year 2020-2021. Students can avail any one or more of the courses available in MOOC to equip their skill and knowledge themselves.

Field Visit / Industrial Visit / Hands on training programme having minimum 15 hours of contact time as Extra Credit course is introduced for I year PG students to gain experiential learning

Evaluation of the visit report will be held at the end of II Semester.

Components of Evaluation

Internal Marks	40
External marks	60
Total	100

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Question Pattern for UG and PG Programmes for students to be admitted during 2020 – 2021 and afterwards.

Total Marks : 75

QUESTION PATTERN

SECTION – A
(Question 1 to 10)

10 x 2 = 20 Marks

1. Short Answer Questions.
2. Two Questions from each unit (All are answerable)

SECTION – B
(Question 11 to 15)

5 x 5 = 25 Marks

1. 5 Paragraph type questions with “either / or” type choice.
2. One question from each unit of the Syllabus.
3. Answer all the questions.

SECTION – C
(Question 16 to 20)

3 x 10 = 30 Marks

1. 5 Essay type questions – any three are answerable.
2. One questions from each unit of the Syllabus.

M.Sc Computer Science

Semester	Subject code	Title of the course	Hours of Teaching /Week	No. of Credits
I	**20P1CSC1**	**Core – MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE**	**6**	**6**

Objective

- To describe the Mathematical techniques required for computer science.
- To impart knowledge to the students about matrices.
- To teach the concepts related to description logics.
- To cultivate the skills related to reasoning
- To inculcate the basic concepts regarding AI

Unit I

Statements and Notation – Connectives – Negation – Conjunction – Disjunction - Statements formulas and Truth tables-Conditional and Biconditional - Well formed formulas – Tautologies -Equivalence of formulas - Two state devices and statement logic-Disjunctive Normal Forms-Conjunctive normal forms-Principal Disjunctive normal forms-Principal Conjunctive Normal forms -Rules of inference

Unit II

Matrices - Various types of matrices - Operations on matrices - Multiplication of matrices -Adjoint and Inverse of a matrices - Characteristic roots and Characteristic Equation of a matrices.

Unit III

An Introduction to Description Logics-From networks to Description Logics-Knowledge representation in Description Logics- Description Logics systems - Applications developed with Description Logics systems-Relationship to other fields of Computer Science - Basic Description Logics

Unit IV

Introduction - Definition of the basic formalism–Reasoning algorithms– Language extensions - Complexity of Reasoning– Introduction- OR- branching: finding a model - AND- branching: finding a clash – Combining sources of complexity- Reasoning in the presence of axioms –Undecidability - Reasoning about individuals in ABoxes-A list of complexity results for ubsumption and satisfiability– Relationships with other Formalisms.

Unit V

AI knowledge representation formalisms - Logical formalisms - Database models Expressive Description Logics- Introduction - Correspondence between Description Logics and Propositional Dynamic Logics - Functional restrictions - Qualified number restrictions- Objects- Fixpoint constructs - Relations of arbitrary arity - Finite model reasoning - Undecidability results - Extensions to Description Logics – Introduction-Language extensions- Non-standard inference problems.

M.Sc Computer Science

Course Outcomes:

After completion of the course, students will be able to

- understand the significance of algebraic structural ideas used in coding theory and cryptography.
- apply Boolean laws and Boolean functions in combinatorial circuitdesigns.
- understand the essentials of software and hardware to solve problems in a variety of business, scientific and social context
- find carrier opportunity to get employed as data Analyst for problem-solving and data analyzation.
- face the competitive exams and aptitude test and logical reasoning

Text books

1. Discrete mathematical structure with applications of computer science- P.TremblayR.Manohar-McGraw Hill Publishing Company limited, 2003
2. An Introduction to matrices – S.C.Gupta-Sultan chand and son's publication.
3. THE DESCRIPTION LOGIC HANDBOOK:-Theory, implementation, and applications- Edited by Franz Baader, Deborah L. McGuinness, Daniele Nardi, Peter F. Patel-Schneider.

M.Sc Computer Science

Semester	Subject code	Title of the course	Hours of Teaching /Week	No. of Credits
I	**20P1CSC2**	**Distributed Programming using J2EE**	**6**	**6**

Objective

- To impart knowledge about the distributed environment, its architecture, application development with RMI.
- To cultivate skills regarding Java Servlets
- To interpret the knowledge of learning communities in connection with java Server Pages, Structs and EJB using J2EE technologies.
- To teach the concepts related to client,server and its communication technologies
- To inculcate knowledge about the session bean and entity bean.

UNIT I:

Client/Server Concepts: Client/Server, File Server, Database server, Group server, Object Server, Web server, Middleware – General middleware –Service specific middleware. Client/Server Building blocks – RPC – Messaging – Peer- to- Peer. Web Services – SOA, SOAP, WSDL, REST Services.

UNIT II:

Distributed Computing using RMI: Introduction – RMI Architecture – RMI Exceptions – Developing Applications with RMI –RMI with Database connectivity

Evolution of the web applications: The HTTP protocol – Web containers and web applications.

UNIT III:

Java server pages : JSP: JSP overview – JSP syntax and semantics- Expressions- JSP elements – Expressions- Scriplets- Request and Response objects – Redirection and forwarding – JSP with database connectivity – session tracking: Hidden form fields – URL rewriting – The Cookie class – The Session tracking class

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UNIT IV:

Introduction J2EE platform – J2EE Architecture – Containers – J2EE Technologies: Component – service – communication technologies – Developing J2EE application

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UNIT V:

EJB Architecture and Design: Introduction to EJB – The EJB containers and its services- Working with EJB – Session Bean and Business Logic – Entity Bean and Persistence.

JMS and Message Driven Beans: The JMS architecture – Message Driven beans

Course Outcomes:

After completion of the course, students will be able to

- understand the difference between RMI and Javaframework.
- create applications using various dataproviders.
- create web application usingJSP.
- acquire the skills to develop multi-tier, web-based applications using a series of protocols and application programming interfaces (APIs).
- find carrier opportunities in IT industry to serve as programmer or software developer or data analyst

Text Books:

1. Robert Orfali, Dan Harkey and Jeri Edwards, "The Essential Client / Server Survival Guide", Galgotia Publications Pvt.Ltd, 2002 (Unit 1).
2. Professional Java server programming – Subrahmanyam Allamaraju and Cedric Buest .

M.Sc Computer Science

Semester	Subject code	Title of the course	Hours of Teaching /Week	No. of Credits
I	**20P1CSC3**	**Core – ADVANCED DATA STRUCTURES AND ALGORITHM DESIGN**	**6**	**6**

Objective

- To cultivate the usage of hierarchical datastructures.
- To interpret with various heapstructures.
- To teach the usage of graphalgorithms.
- To impart the skills involved in analyzing the efficiency of computer algorithms.
- To inculcate the usage of algorithm design paradigms to solve real life problems.

Unit I

ADVANCED NON-LINEARDATASTRUCTURES

AVL Trees – Splay Trees: Splaying – Top Down Splay Trees – B-Trees – RedBlack Trees: Bottom Up Insertion – Tries.

Unit II

HEAPSTRUCTURES

Binary Heaps – Min Max Heaps – Leftist Heaps – Skew Heaps – Binomial Heaps – Fibonacci Heaps – Lazy Merging for Binomial Queues – Fibonacci Heap Operations – AmortizedAnalysis.

Unit III

GRAPHALGORITHMS

Graphs: Representation of Graphs – Graph Traversals – Topological Sort – Shortest Path Algorithms: Dijkstra's Algorithm – Graph with Negative Edge Costs – All Pairs Shortest Path - Minimum Spanning Tree: Prim's and Kruskal'sAlgorithm.

Unit IV

ALGORITHMSINCOMPUTING

Introductions to Algorithms – Iterative and Recursive Algorithms – Designing Algorithms – Analyzing Algorithms – Growth of Functions: Asymptotic Notations – Standard Notations and Common Functions – Recurrences: The Substitution Method – The Recursion – Tree Method – Master's Method.

Unit V

ALGORITHMDESIGNTECHNIQUES

Greedy Algorithms: Huffman Codes – Divide and Conquer: Merge Sort – Dynamic Programming: Using a Table instead of Recursion – Ordering Matrix Multiplications – Introduction to NP Completeness – NP Complete Problems: Traveling Salesman Problem – Randomization Approach.

Course Outcomes:

After completion of the course, students will be able to

- design algorithms using graph structures to solve real lifeproblems.
- analyze and compare the algorithms based on theirefficiency.
- solve real time problems by implementing learned algorithm design techniques and datastructures.
- solve NP complete problems using appropriatemethods.
- solve the real-world problems efficiently because Data Structures and algorithms are the fundamentals of Software Development.
- get career opportunities in Lincode Labs as Data Scientist and Gensuite LLC as Data Analyst at Bangalore.

REFERENCES

1. Mark Allen Weiss, “Data Structures and Algorithm Analysis in Java”, Third Edition, Pearson Education,2012.
2. Michael T. Goodrich, Roberto Tamassia, “Data Structures and Algorithms in Java”, Fourth Edition, Wiley,2002.
3. Robert Sedgewick, “Algorithms in Java”, Third Edition, Addison Wesley,2002.
4. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, “Introduction to Algorithms”, Third Edition, PHI Learning,2002.
5. S. Sridhar, “Design and Analysis of Algorithms”, Oxford University Press,2014.
6. Alferd V. Aho, John E. Hopcroft and Jeffrey D. Ullman, “Data Structures and Algorithms”, Pearson Education, 1983.
7. Anany Levitin, “Introduction to Design and Analysis of Algorithms”, Third Edition, Pearson Education,2012.

M.Sc Computer Science

Semester	Subject code	Title of the course	Hours of Teaching / Week	No. of Credits
I	**20P1CSCP1**	**DISTRIBUTED PROGRAMMING USING J2EE LAB**	**3**	**2**

Objectives:

- To introduce the usage and implementation of distributed application development packages.
- To impart knowledge about the distributed environment, its architecture, application development with RMI.
- To cultivate skills regarding Java Servlets
- To interpret the knowledge of student communities in connection with Java Server Pages, Structs and EJB using J2EE technologies.
- To teach the concepts related to client,server and its communication technologies
- To inculcate knowledge about the session bean and entity bean.

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1. Distributed applications using RMI

    a. Simple RMI application

    b. RMI application with a server and more than one clients

    c. RMI application with Database Connectivity

2. JSP program to implement form data validation to accept correct data
3. JSP script to demonstrate the use of <jsp:include …..> by displaying an external webpage and <jsp:plugin ……> to run an applet
4. JSP program for demonstrating creation and accessing Java Beans
5. Enterprise Java Beans

    a. Session Bean

    i. Stateless Session Bean

    ii. Stateful Session Bean

    b. Entity Bean

    i. Container Managed Persistence

    ii. Bean Managed Persistence

Course Outcomes:

After completion of the course, students will be able to

- develop and execute RMI concept.
- work with the basic and advanced features of RMI.
- create applications using various dataproviders.
- create web application usingJSP by Integrating all the features of J2EE
- find the carrier opportunities as web developer.

M.Sc Computer Science

Semester	Subject code	Title of the course	Hours of Teaching / Week	No. of Credits
I	**20P1CSCP2**	**ADVANCED DATA STRUCTURES AND ALGORITHMS LAB**	**3**	**2**

OBJECTIVES:

- To teach the usage of advanced tree structures.
- To explain the usage of heap structures.
- To describe the usage of graph data structures and spanning trees.
- To interpret the complexities of algorithms.
- To illustrate the various design strategies of algorithms.

6. Implementation of AVL tree and its operations.
7. Implementation of Splay tree and its operations.
8. Implementation of red-black tree and its operations.
9. Implementation of basic heap and leftist heap operations.
10. Implementation of Fibonacci heap operations.
11. Implementation of representation of graphs and topological sort.
12. Implementation of a spanning tree for a given graph using Prim's algorithm.
13. Implementation of shortest path algorithms such as Dijkstra's and Floyd Warshall's algorithm.
14. Implementation of iterative and recursive algorithms with its complexity analysis.
15. Implementation of merge sort algorithm analysis using divide and conquer approach.
16. Implementation of matrix chain multiplication using dynamic programming approach.
17. Implementation of Huffman coding using greedy approach.

Course Outcomes:

After completion of the course, students will be able to

- implement basic and advanced data structuresextensively.
- choose and apply suitable hierarchical data structures for real timeproblems.
- apply suitable heap data structures based on the problemrequirements.
- design and apply algorithms using graphstructures.
- design and implement iterative and recursive algorithms with minimumcomplexity.
- design and develop efficient algorithms by adopting suitable algorithm design strategies in IT industry.

M.Sc Computer Science

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
I	**20P1CSEL1A**	**Elective – I** **ADVANCED SOFTWARE ENGINEERING**	**6**	**4**

Objectives

- To cultivate the advances in development software in the minds.
- To impart knowledge about the different phases and the models involved in the development of software.
- To cultivate skills in the minds of the students about the design engineering,user interface design.
- To sharpen and widen the knowledge in connection with testing and debugging.
- To inculcate the concepts related to configuration management,change management
- To impart knowledge about the project management and develop the software that best meets the needs and expectation of the user.

UNIT I

A Generic view of Process: Layered Technology-Process Framework-Capability Maturity Model Integration-Process Patterns-Process Assessment-Personal and Team Process Models-Process Technology-Product and Process. **Process Models:** Waterfall Models-Incremental Process Model-Evolutionary Process Model-Specialized Process Model-Unified Process.

UNIT II

Requirement Engineering: Tasks-Initiating Requirement Engineering Process-Eliciting Requirements-Developing Use case-Building Analysis Model-Negotiating Requirements-Validating Requirements. **Building Analysis Model:** Requirement Analysis –Analysis Modeling Approaches-Data Modeling Concepts-Object Oriented Analysis-Scenario Based Modeling-Flow Oriented- Class Based –Behavioral Model.

UNIT III

Design Engineering: Context of Software Engineering –Design Process and Design Quality-Design Concepts-Design model-Pattern Based Design. **Architectural Design:** Software Architecture-Data Design-Architectural Styles and Pattern-Architectural Design-Alternate Architectural Design-Mapping Data Flow. **User Interface Design:** Golden Rules-User Interface Analysis and Design-Interface Analysis-Interface Design- Design Evaluation.

UNIT IV

Testing Strategies: Strategic Approach-Strategic Issues-Strategic for Conventional Software-Strategic for Object Oriented Software-Validation Testing-System Testing-Art of Debugging. **Testing Tactics:** Testing fundamentals-Black box Testing-White Box Testing-Basis Path Testing-Control Structure Testing-Object Oriented Testing-Testing Methods Applicable-Interclass Test Case Design-Testing for Specialized Environments-Testing Patterns.

UNIT V

Project Management: Management Spectrum – People –Product-Process-Project-W5HH Principle-Critical Practices. **Quality Management**: Quality Concepts-Software quality Assurance-Software Reviews-Technical Reviews –Statistical SQA-Software Reliability-ISO 9000 Quality Standards-SQA Plan. **Change Management:** Software Configuration management-SCM Repository-SCM Process-Configuration Management for Web Engineering.

Course Outcomes:

`After completion of the course, students will be able to

- understand of the role and impact of software engineering in contemporary business, global, economic, environmental and societalcontext.
- elicit the requirements for real, time problems. Analyze and use open source tools for projectdesigning.
- develop Use case for the givensystem.
- work in a software company and play the role as developer,team leader and tester.
- develop the module based on the needs of the user and the organizations
- test the code by using the testing tools and software.

References:

1. Software Engineering (Sixth Edition) by ROGER S. PRESSMAN, McGraw-Hill International Edition, 2005.
2. Richard E.Fairley, “Software Engineering Concepts”, McGraw-Hill Book Company – 1985.

M.Sc Computer Science

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No.of Credits
I	**20P1CSEL1B**	**Elective -I** **SOFTWARE PROJECT MANAGEMENT**	**6**	**4**

OBJECTIVES:

- To interpret an awareness of the need for project planning andmanagement.
- To facilitate software effort estimation and activityplanning.
- To explain risk and peoplemanagement.
- To illustrate project monitoring and controlmechanisms.
- To impart the skills related to software qualitymanagement.

UNIT- I

INTRODUCTION

Basics of Software Project Management: Definition – Software Projects Versus Other Types of Project – Contract Management and Technical Project Management – Activities – Plans, Methods and Methodologies – Requirement Specification – Management Control – Overview of Project Planning – Introduction to Step Wise Project Planning – Programme Management and Project Evaluation: Programme Management, Benefits, Evaluation, Technical Assessment, Cost - Benefit Analysis, Risk Evaluation – Selection of an Appropriate Project Approach: Choosing Technologies, Process Models, Software Prototyping, Dynamic Systems Development Method, Managing Iterative Processes.

UNIT- II

SOFTWARE EFFORT ESTIMATION ANDACTIVITYPLANNING

Software Effort Estimation: Problems with Over and Under Estimates – Basis of Software Estimating – Techniques – Expert Judgment – Cosmic Full Function Points – A Procedural Code Oriented Approach – COCOMO: A Parametric Model – Activity Planning: Objectives – Project Schedules – Projects and Activities – Sequencing and Scheduling Activities – Network Plannin0g Models – Formulating A Network Model – Identifying Critical Path – Shortening the Project Duration – Identifying Critical Activities – Activity-on-arrow Networks.

UNIT- III

SOFTWARE RISK ANDPEOPLEMANAGEMENT

Categories of Risk – Framework for Dealing with Risk – Risk Identification – Risk Assessment – Risk Planning – Risk Management – Evaluating Risks to the Schedule – Applying the PERT Technique – Monte Carlo Simulation – Critical Chain Concepts – Resource Allocation: Nature of Resources – Identifying Resource Requirements – Scheduling Resources – Creating Critical Paths – Counting the Cost – Cost Schedules – SchedulingSequence.

UNIT- IV

SOFTWARE PROJECT MONITORINGANDCONTROL

Creating the Framework – Collecting the Data: Partial Completion Reporting – Risk Reporting – Visualizing Progress: Gantt chart – Slip chart – Ball Charts – The Timeline – Cost Monitoring – Earned Value Analysis – Prioritizing Monitoring – Getting the Project Back to Target – ChangeControl.

UNIT- V

SOFTWAREQUALITYMANAGEMENT

Managing Contracts: The ISO 12207 Approach, Supply Process, Types, Stages, Contract Management Managing People and Organizing Teams: Understanding Behaviour, Organizational Behaviour, Motivation, The Oldham-Hackman Job Characteristics Model, Decision Making, Leadership, Dispersed and Virtual Teams, Software Quality – Importance, Defining Software Quality, ISO 9126, Software Quality Measures, Product Versus Process Quality Management, External Standards, Quality Plans.

Course Outcomes:

After completion of the course, students will be able to

- understand the software processmodels and its working principles.
- prepare project planningdocuments.
- estimate the software cost forprojects.
- perform effective communication,planning,modeling ,construction and deployment activities.
- serve as project manager,Team leader and developer in MNC.
- manage and control software quality activities.

REFERENCES:

1. Bob Hughes, Mike Cotterell, “Software Project Management”, Fourth Edition, Tata McGraw-Hill,2011.
2. Walker Royce, “Software Project Management: A Unified Framework”, Pearson Education, 2004.
3. Rishabh Anand, “Software Project Management”, S. K. Kataria,2013.
4. S. A. Kelkar, “Software Project Management: A Concise Study Paperback”, Prentice Hall of India,2013.
5. Ramesh Gopalaswamy, “Managing Global Software Projects”, Tata McGraw Hill, 2001.
6. Humphrey Watts, “Managing the software process”, Addison Wesley,1989.
7. Ashfaque Ahmed, “Software Project Management Process Driven Approach”, Auerbach Publications,2011.

M.Sc Computer Science

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No.of Credits
I	**20P1CSEL1C**	**Elective -I** **Object Oriented System**	**6**	**4**

Objective

- To teach the concepts related toobject oriented analysis and design techniques.
- To impart the skills related toUML notations in OOSD.
- To cultivate the knowledge in the minds of the young communitiesabout use case diagrams.
- To teach the working principles of the use case.
- To impart the knowledge about software quality assurance.

UNIT- I

An Overview of Object Oriented Systems Development - Object Basics - Object Oriented Systems Development Life Cycle.

UNIT- II

Rumbaugh Methodology - Booch Methodology - Jacobson Methodology - Patterns-Frameworks - Unified Approach - Unified Modeling Language - Use case - class diagram - Interactive Diagram - Package Diagram - Collaboration Diagram - State Diagram - Activity Diagram.

UNIT- III

Identifying use cases - Object Analysis - Classification – Identifying Object relationships - Attributes and Methods.

UNIT- IV

Design axioms - Designing Classes - Access Layer - Object Storage - Object Interoperability.

UNIT- V

Designing Interface Objects - Software Quality Assurance – System Usability - Measuring User Satisfaction

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Course Outcomes:

After completion of the course, students will be able to

- predict the relationship between classes and objects.
- incorporate the UML diagrams in the working sector for ease of understanding.
- better understand the relationship between the class variables and methods
- design the attractive diagrams by using uml notations.
- reduce development time, reduce the time and resources required to maintain existing applications, increase code reuse, and provide a competitive advantage to organizations that use it.
- find the career opportunities as design engineer in it industry by utilizing the modernized CAD tools and software.

BOOKS FOR STUDY:

1. Ali Bahrami, “Object Oriented Systems Development”, Tata McGraw-Hill, 1999

REFERENCES:

1. Stephen R. Schach, “Introduction to Object Oriented Analysis and Design”, Tata McGraw-Hill, 2003.
2. James Rumbaugh, Ivar Jacobson, Grady Booch “The Unified Modeling Language Reference Manual”, Addison Wesley, 1999.
3. Hans-Erik Eriksson, Magnus Penker, Brain Lyons, David Fado, “UML Toolkit”, OMG Press Wiley Publishing Inc., 2004.

M.Sc Computer Science

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
II	**20P2CSC4**	**Core – ADVANCES IN WEB SERVICES**	**6**	**6**

Objective:

- To teach the concepts about Web services.
- To impart the knowledge in the minds of the students about Geospatial web services .
- To inculcate the working principles and the technologies of the web services.
- To impart the knowledge about software quality assurance.
- To cultivate the knowledge in the minds of the learners about mangoDB and python programming.

Unit I

API - applications of API- web services- architecture of web services- tools and technologies enabling web services -soap-wscl- wsfl- wsdl uddi= benefits and challenges of using web services- types of web services- soap web services- rest web services - comparison of soap with REST web services

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Unit II

Web service security- security threats and countermeasure- web service security standards- example of building secure web services- security best practices- xml-parsing xml using DOM- XINS- generic frame work for testing web service transaction – understanding errors.

Unit III

Geospatial web services- web services in multimedia communications- machine learning in web service discovery- web services in machine learning server- Microsoft Web Services – Google Web Services – Amazon Cloud based Web Services

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Unit IV

JAX- WS – JAX –RS- example- lightweight restful web service –calling and creating web service in java- json web service example – creating soap web service with spring frame work

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Unit V

Creating soap and rest web service with mangoDB- soap ad restful web service with python – python web service framework- python web service library – machine learning prediction as a restful web service

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Course Outcomes:

After completion of the course, students will be able to

- acquire the skills regarding communication between devices over the internet and are usually independent of the technology or language the devices are built on as they use standardised eXtensible Markup Language (XML) for information exchange.
- know the essentials of XML-based information exchange systems that use the Internet for direct application-to-application interaction.Gain the knowledge
- understand the essence of open standards such as TCP/IP, HTTP, Java, HTML, and XML.
- find the carrier opportunities as Back-end web developers.
- get employment in IT industries and serve as Front-end web developers,Internet application developers,Internet developers,Intranet developers,Web architects,Web content developers,Web designers.

Text book:

1. Web Services Hand Book – Dr.T.S.Baskaran, jazyam publications, ISBN 978-93-87360-09-9
2. Features of Future Web Services–Dr.T.S.Baskaran, Jami publications, ISBN 978-93-87354-21-0

Reference books:

https://www.springer.com/gp/book/9781461475347
https://www.routledge.com/Advances-in-Web-based-GIS-Mapping-Services-and-Applications/Li-Dragicevic-Veenendaal/p/book/9781138117815
https://www.guru99.com/web-service-architecture.html
https://www.sciencedirect.com/topics/computer-science/web-service-architecture
https://www.w3.org/TR/ws-arch/
https://towardsdatascience.com/build-your-own-python-restful-web-service-840ed7766832
https://www.pythonforbeginners.com/python-on-the-web/how-to-access-various-web-services-in-python
https://wiki.python.org/moin/WebServices

M.Sc Computer Science

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
II	**20P2CSC5**	**Core – MACHINE LEARNING WITH PYTHON**	**6**	**6**

Objective:

1. To encompassthe major areas in machine learning.
2. To demonstrate different machine learning methods to solve any problem using python programming.
3. To sharpen the knowledge about the different learning techniques such as supervised and unsupervised learning.
4. To impart the skills related to Clustering.
5. To inculcatethe skills about collaborative filtering.

Unit I

Introduction to Machine Learning: Introduction-Machine learning process-Why python-Download and install python-Anaconda first python program-Python Basics-Data structure and loops-**Feature Engineering:** Why Feature Engineering-Feature Extraction-Feature Selection-Feature Engineering methods-Feature Engineering with Python.

Unit II

Data Visualization: Line chart-Bar Chart-Pie Chart-Histogram-Scatter plot-Box plot-Plotting using object oriented way-Sea born-**Regression:** Simple-Multiple-Model assessment-**More on Regression:** Ridge Regression-Lasso Regression-Non-parametric Regression.

Unit III

Classification: Linear classifiers-Logistic Regression-Decision Trees-Random forest-Naive byes-**Unsupervised Learning: Clustering-**K-Means clustering-Hierarchical Clustering-Distance metrics-Linkages.

Unit IV

Text Analysis: Basic Text processing with python-Regular Expression-Natural Language Processing-Text Classification-Topic modeling-**Neural network and deep learning:** Veetorization-Neural network-Deep Learning-Deep learning Architecture-Deep Learning Framework.

Unit V

Recommendation System: Popularity based recommender Engines-context based Recommendation Engine-Classification based recommendation engine-Collaborative filtering-**Time series Analysis:** Date and Time handling –Window functions-Correlation-Time series forecasting.

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COURSE OUTCOME:

After completion of the course, students will be able to

- understand that machine learning incorporates the functionalities of artificial intelligence.
- gain skills that python do a set of complex machine learning tasks and enable you to build prototypes quickly that allow you to test your product for machine learning purposes.
- serve as machine learning engineer,data scientist,human-centered machine learning designer,computational linguist,software developer.
- perform the research activities in connection with the supervised learning and unsupervised learning.
- predict the accuracy and find the solution easily

Text book:

1. Machine Learning with python-An approach to machine learning-ABHISHEK VIJAYVARGIA-BPB Publications-First Edition 2018.

Reference books:

1. Machine learning using python-U.Dinesh kumar, manarajam pradhan-Wiley India Pvt Ltd.
2. Stephen Asbury, ScottR. Weiner, Wiley, Developing Java Enterprise Applications, 1998.

M.Sc Computer Science

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
II	**20P2CSC6**	**Core – COMPILER DESIGN**	**6**	**6**

Objective

To teach about the design principles of compiler.
To cultivate the skills related to grammers,Parsers.
To inculcate the skills about the advances in various Parsers.
To describe the concepts related to symbol tables,error detection and recovery.
To cultivate the knowledge about the code optimization techniques.

Unit I

Introduction to Compilers: Compliers and Translators, Structure of a Compiler, Compiler Writing tools, Programming Languages, High Level Programming Languages, Definitions of Programming Languages, Lexical and syntactic structure of a Language-Finite Automata and Lexical analysis, Role of a lexical analyzer, Regular expressions, 8Finite Automata, Minimizing the number of syntactic specification of Programming languages.

Unit II

Context free grammars, derivations and parse tree, capabilities of context free grammars- Basic Parsing techniques: Shift reproduce parsing- Operator precedence parsing- Top down Parsing- Predictive Parsers – Automatic Constructions of efficient Parsers. LR Parser- Constructing SLR- Canonical LR and LALR Parsing tables- Using Ambiguous Grammars- Automatic Parser Generator- Implementation of LR Parsing Tables.

Unit III

Syntax Directed Translation: Schemes- Implementation- Intermediate Code- Postfix Notation- Parse Tree and Syntax Trees- Three Address Code- Quadruples and Triples-Translation of Assignment Statements- Boolean Expression- postfix Translations-Translation with a Top- Down Parser.

Unit IV

Symbol Tables, Contents data Structures, representing scope information. Runtime Storage Administration, Implementation and Storage allocation of simple stack allocation schemes and block structured languages, Error detection and recovery, Lexical Phase Errors, Syntactic Phase errors, Semantic errors.

Unit V

Introduction to Code Optimization, Principle Sources of Optimization, Loop Optimization, DAG Representation of basic blocks, Global data flow Analysis, Code generation, Problems in Code Generation Register allocation and Assignment, Code Generation from DAG's, Peephole Optimization.

Course Outcomes:

After completion of the course, students will be able to

- understand the various phases of a compiler
- acquire the knowledge in connection with automata theory and various parsing techniques.
- understand the code optimization techniques
- know the structure and various phases of compiler andTo implement lexical analyzer
- learn the basic parsing techniques
- search for the carrier opportunity to serve as Compiler engineer.

Reference:

1. Alfred V.Aho and Jeffrey D.Ullman, “Principles of Compiler Design”, Addition Wesley, Narosa publishing House, 1999.

General References:

1. Gray Cornell and Cay S.Horstman, Core Java Vol1 and 2, Sun Microsystems Press, 1999.

2. Stephen Asbury, ScottR. Weiner, Wiley, Developing Java Enterprise Applications, 1998.

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Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
II	**20P2CSC7**	**Core – INTERNET OF THINGS (IoT)**	**6**	**6**

Objectives

- To impart knowledge to make the learningcommunitiesknow the essentials of IoTin real life.
- To facilitateIoT Applications for specific domains.
- To describe the Programming Fundamentals with C using Arduino.
- To impart the skills in minds of the learning community to step into the research field.
- To illustrate the role of communication in connection with sensors using IoT.

Unit I

Introduction and definition to IOT - What is an IOT? - Explore the scenario for application of IOT Communication definitions Concepts - Capturing and Storing the data - What to do with the data…applying Expert Systems and Machine Learning; IOT Detailed understanding of Solution Architecture - IOT Device Architecture - IOT Network/Communication Architecture with an understanding on client server and looselycouple storage servers and message queues - IOT Application Architecture.

Unit II

Programming Fundamentals with C using Arduino IDE - Understanding the Arduino IDE - Installing and Setting up the Arduino IDE - Connecting the Arduino IDE with devices - Program Structure in C - Basic Syntax - Data Types / Variables / Constants - Operators, Conditional Statements and Loops -Functions , Array and Pointers - Strings and I/O -Using Arduino C Library functions for Serial, delay and other invoking functions - Working with LED and Switch example on Arduino C Library functions

Unit III

Working with Arduino for data acquisition with IOT Devices - Understanding Sensors and Devices - Understanding basic electronic components and power elements - Understanding the Inputs from Sensors - Working with Temperature Sensors -Working with Ultrasound Sensor -Working with humidity sensor - Working with Motion Sensor - Working with IR Sensor -

Working with Proximity Sensor - Working with Photo Diode - Working with Accelerometer and vibration sensor - Measuring Voltage and Current

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Unit IV

Working with Arduino for data acquisition with IOT Devices - Understanding the Outputs - Activating LED Lights - Activating Relays - Activating Buzzer - Running DC Motors - Running - Stepper Motors and Servo Motors

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Unit V

Programming Fundamentals with Web Applications for handling Data Communication from IOT Device - Understanding the data capture through web services - Creating and Programming a rest web service with PHP - Calling and accessing the Web Service in a Client; Building and Using Communication Devices to data transfer from IOT Devices - Understanding the Communication Principles to Transfer the data from IOT Devices; Remote Communication to cloud/external application - Using WIFI to Transfer the data from IOT Sensor.

Course Outcomes:·

After completion of the course, students will be able to

- understand the use of aurdino in doing research.
- imbibe the application areas of IoT.
- realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks ·
- understand the building blocks of Internet of Things and characteristics and serve as researcher.
- implement IOT in different applications and work in an embedded sector

Reference:

1. Michael Margolis, “Arduino Cookbook” 2nd Edition, O'Reilly Media, 2011
2. Michael Collier, Robin Shahan, “Fundamentals of Azure”, Microsoft Press, 2015, ISBN: 978-0-7356-9722-5
3. Rick Rainey, “Azure Web Apps for Developers”, Microsoft Press, 2015, ISBN: 978-1-5093-0059-4 4. Microsoft Azure, “Introduction to Microsoft Azure Storage”, https://docs.microsoft.com/en-us/azure/storage/common/storage-introduction

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Semester	Subject code	Title of the course	Hours of Teaching / Week	No. of Credits
II	**20P2CSCP3**	**MACHINE LEARNING LAB**	**3**	**2**

OBJECTIVES:

- To teach essentials of Data sets to implement the machine learning algorithms in various domains.
- To interpret the machine learning concepts and algorithms in any suitable language of choice.
- To facilitate problem solving to attain the goals.
- To explain the AI concepts in various application areas.
- To inculcate the advanced networking concepts and implementation of the algorithms to find the solution or to improve the accuracy of the results.

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1. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.

2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.

3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.

4. Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets.

5. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.

6. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.

7. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.

8. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.

9. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.

10. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.

Course Outcomes:

After completion of the course, students will be able to

- understand the implementation procedures for the machine learning algorithms
- design Java/Python programs for various Learning algorithms.
- apply appropriate data sets to the Machine Learning algorithms
- identify and apply Machine Learning algorithms to solve real world problems
- get an opportunity to Serve as Analyst,researcher and developer in MNC .

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Semester	Subject code	Title of the course	Hours of Teaching/ Week	No.of Credits
II	**20P2CSCP4**	**PIC Programming Lab**	**3**	**3**

Objective

- To impart the skills about the PIC microcontroller.
- To cultivate the knowledge about the concepts and the working principles of stepper motor,timer and keypad interfacing.
- To demonstrate the experiments by using different advanced microcontroller kits.
- To inculcate the skills about sensors.
- To impart the knowledge regarding digital and analog converter in the minds of thelearning communities.

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1. **I/O PORT PROGRAMMING-LED BLINKING**
2. **LCD INTERFACING**
3. **STEPPER MOTOR INTERFACING**
4. **STUDY OF ANALOG TO DIGITAL CONVERTER PROGRAMMING**
5. **TIMER PROGRAMMING- (TIMER0,TIMER1,TIMER2,TIMER3)**
6. **COUNTER PROGRAMMING**
7. **COMPARE MODE PROGRAMMING**
8. **CAPTURE MODE PROGRAMMING**
9. **PWM PROGRAMMING**
10. **TIMER PROGRAMMING USING INTERRUPTS**
11. **SERIAL COMMUNICATION- USART- POLLING AND INTERRUPTS**
12. **KEYPAD INTERFACING**
13. **INTERFACING OF DIGITAL TO ANALOG CONVERTER**
14. **ADC – TEMPERATURE MEASUREMENT USING LM35**
15. **OBJECT COUNTING USING IR sensor**
16. **SPI programming**

Course Outcomes:

After completion of the course, students will be able to

- understandof the role and impact of microcontroller.
- developpic programming in c.
- analyze and resolve function of risc architecture.
- understand and develop the pic18 serial port and interrupt programming.
- develop the chips and work in a dynamic embedded environment.

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Semester	Subject code	Title of the course	Hours of Teaching/ Week	No.of Credits
II	**20P2CSEL2A**	**Elective – II** **PIC MICROCONTROLLER AND APPLICATIONS**	**5**	**4**

Objectives

- To teach the function of RISC architecture and On-Chip peripherals of PIC microcontroller.
- To impart knowledge of the PIC processor
- To inculcate the working principles of stepper motor,timer and keypad interfacing.
- To cultivate the skills about sensors to the learners.
- To interpret the knowledge regarding digital and analog converter in the minds of the youngsters.

Unit -I PIC Architecture

Overview of the PIC 18 family – The WREG in the PIC – The PIC file register – Using instructions with the default access bank – PIC status register – data formats and directives- program counter and ROM space – RISC architecture in the PIC

Unit -II Instructions of PIC

Branch, Call and Time Delay Loop – I/O port programming – Arithmetic, logic instructions and programs

Unit -III PIC programming in C

Data types and time delays in C – I/O programming in C – Logic operations in C – Data conversion –Programming Timers 0 and 1 – Counter Programming – Programming timers 0 and 1 in C- Programming timers 2 and 3.

Unit -IV PIC18 Serial Port and Interrupt Programming

Serial Port: Basics of Serial Communication – Serial Port Programming in Assembly and C. PIC interrupts- Programming Timer Interrupts – External Hardware Interrupts – Serial Communication Interrupts - Interrupt Priority

Unit -V Interfacing

LCD and Key board interfacing – ADC, DAC and sensor interfacing – SPI protocol - DS1306 RTC Interfacing –DC motor interfacing- Stepper motor.

Course Outcomes:

After completion of the course, students will be able to

- understand of the role and impact of microcontroller.
- developpic programming in c.
- understand the issue of pic18 serial port and interrupt programming.
- learnabout microcontrollers, and gain some basic understanding of electronics. some of the best-embedded design engineers are also good hardware engineers.
- develop the chips and work in a dynamic environment like silicon valley.

Book for Study

1. Muhammad Ali Mazidi, RolindD.Mckinlay, Danny Causey, "PIC Microcontroller and Embedded Systems Using Assembly and C for PIC 18", Pearson, 2012.

Book for Reference

1. Ramesh Gaonkar, "Fundamentals of Microcontrollers and Applications in Embedded Systems", Penram International Publishing Pvt. Ltd.
2. Han-Way Huang, "*PIC Microcontroller an Introduction to Software and Hardware Interfacing*", Delmar Cengage Learning, New Delhi,2012.

Semester	Subject code	Title of the course	Hours of Teaching / Week	No. of Credits
II	**20P2CSEL2B**	**Elective – II** **UBIQUITOUS COMPUTING**	**5**	**4**

Objectives

- To describe the advances in pervasive computing.
- To impart the concepts regarding privacy in ubiquitous computing.
- To cultivate the knowledge about Ethnography .
- To teach the objectives of the GUI.
- To improve the computing skills.

Unit – I

An Introduction to Ubiquitous Computing : Founding Contributions to Ubiquitous Computing - Ubiquitous Computing in U.S. Universities - Ubiquitous Computing in European Laboratories and Universities - Modern Directions in Ubiquitous Computing - The Research Community Embraces Ubiquitous Computing - The Future of Ubiquitous Computing

Unit – II

Ubiquitous Computing Systems : Ubicomp Systems Topics and Challenges - Creating Ubicomp Systems-Implementing Ubicomp Systems-Evaluating and Documenting Ubicomp Systems.

Unit – III

Privacy in Ubiquitous Computing: Understanding Privacy - Technical Solutions for Ubicomp Privacy - Address Privacy. Ubiquitous Computing Field Studies : Three Common Types of Field Studies - Study Design - Participants- Data Analysis - Steps to a Successful Study

Unit – IV

Ethnography in Ubiquitous Computing - From Ethnography to Design - Design-Oriented Ethnography in Practice. From GUI to UUI: Interfaces for Ubiquitous Computing: Interaction Design-Classes of User Interface-Input Technologies.

Unit – V

Location in Ubiquitous Computing: Characterizing Location Technologies - Location Systems. Context-Aware Computing: Context-Aware Applications - Designing and Implementing Context-Aware Applications - Issues to Consider when Building Context-Aware Applications- Challenges in Writing Academic Papers on Context Awareness

Course Outcomes:

After completion of the course, students will be able to

1. describe the characteristics of pervasive computing applications including the basic computing application problems, performance objectives and quality of services, major system components and architectures of the systems.
2. analyze the strengths, problems and limitations of the current tools, devices and communications for pervasive computing systems.
3. recognize the different ways that humans will interact with systems in a ubiquitous environment and account for these accordingly
4. list and exemplify the key technologies involved in the development ubicomp systems
5. develop an attitude to identify and propose solutions for security and privacy issues.
6. explore the trends and problems of current pervasive computing systems and step into small scale and large scale industry.

Reference:

Ubiquitous Computing Fundamentals - Edited by John Krumm Microsoft Corporation Redmond, Washington, U.S.A.

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Semester	Subject code	Title of the course	Hours of Teaching / Week	No. of Credits
II	**20P2CSEL2C**	**Elective – II** **Wireless and Mobile Networks**	**5**	**4**

Objectives:

- Familiarize the basic concepts of Personal Communication Services(PCS) principles and fundamentals.
- Be exposed to the required Operations Mobility Management and handoff Management.
- Learn the design of the IS-41,CDPA.
- Teach the essentials of the GSM networks and its functionalities.
- Cultivate the skills about GPS in wireless and mobile networks.

UNIT I: Network Planning

Introduction – wireless network Topologies – Cellular Topology – Cell Fundamentals – Signal -to-Interference Radio Calculation-Network Planning for CDMA Systems.

UNIT II: Wireless Network Operation

Introduction – Mobility Management – Radio Resources and Power Management – Security in Wireless Networks

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UNIT III: Wireless WANS

what is GSM – Mechanisms to Support a Mobile Environment – Communication in Infrastruc-ture – CDMA – IMT-2000 – GPRS and Higher Data rates – short Message service in GSM – Mobile Application Protocols

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UNIT IV: Local Broadband and Adhoc networks

IEEE 802.11 – PHY layer – MAC Sublayer -Wireless ATM – HIPERLAN – HYPERLAN-2 – IEEE 802.15 WPAN–HomeRF–Bluetooth–Interference between Bluetooth and 802.11

UNIT V: Wireless Geolocation System

What is wireless Geolocation – Wireless geolocation System Architecture – Technologies for Wireless Geolocation – Geolocation standards for E-911 Services – Performance Measures for geolocation Systems.

Course Outcomes:

After completion of the course, students will be able to

- understand different types of sensors, their actuators and the architecture ofmotes.
- design the topology of WSN using different types of zigbee devices and understanding theirroles.
- understand and apply data centric computing in wireless sensornetworks.
- apply appropriate localization techniques for differentscenarios.
- manage sensor networks by synchronizing the time, locating and trackingobjects.carry out experiments in simulators and realsensors
- develop the apps for android mobile and work in a development sector.

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Book for Study:

1.Kaveh Palavan, Prashant Krishnamoorthy , ***Principles of Wireless Networks***, Eastern Economy Edition,2002,ISBN- 81-203-2380-7 (Chapter 5,6,7,8,9,11,12,13,14 only),ISBN: 978-0-470-69708-5

Books for References :

1. Jochen Schiller, ***Mobile Communications***, Second Edition, Pearson Education, Ltd., 2003 ISBN81-**2.** 297-0350-5.
2. T.S. Rappaport, ***Wireless Communications: Principles and Practice*** , Second Edition, Prentice Hall, 2002,ISBN: 9780130422323 .

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Semester	Subject code	Title of the course	Hours of Teaching/ Week	No.of Credits
III	**20P3CSC8**	**Core- HUMAN COMPUTER INTERACTION**	**5**	**5**

Objective

- Toimpart the skills related to techniques involved for effective interaction between Human and Computers
- To deliver the importance of spoken dialogue system and recommender system.
- To cultivate the importance of the ontology tool in HCI.
- teach the objectives of ambient intelligence in Computing.
- To inculcate the interaction skills and various methodologies to establish effective HCI.

Unit I:

Cognitive Psychology and Computer Science - Capabilities of Human–Computer Interaction (HCI)-Goals of Human–Computer Interaction (HCI)-Roles of Human, Computer and Interaction in HCI - Basic User Interfaces- Advanced User Interfaces-Justification of Interdisciplinary Nature-Standard Framework of HCI-HCI Design Principles-Interface Levels in HCI- Steps in Designing HCI Applications -Graphical User Interface Design -Popular HCI Tools - Architecture of HCI Systems - Advances in HCI - Overview-HCI Sample Exercises **Usability Engineering -**Introduction-HCI and Usability Engineering-Usability Engineering Attributes -Process of Usability-Need for Prototyping.

Unit II

Modelling of Understanding Process – Introduction- Goals, Operators, Methods and Selection Rules (GOMS) - Cognitve Complexity Theory (CCT) - Adaptive Control of Thought-Rational (ACT-R)-State, Operator, and Result (SOAR)-Belief-Desire-Intention (BDI)-ICARUS-Connectionist Learning with Adaptive Rule Induction On-line (CLARION)-Subsumption Architecture -**Spoken Dialogue System-** Introduction - Factors Defining Dialogue System-General Architecture of a Spoken Dialogue System**-** Dialogue Management (DM) Strategies -Computational Models for Dialogue Management- Statistical Approaches to Dialogue Management - Learning Automata as Reinforcement Learners-Case Study: Learning Dialogue Strategy Using Interconnected Learning Automata -Software and Toolkits for Spoken Dialogue Systems Development.

Unit III

Recommender Systems- Introduction- HCI Study Based on Personalisation - Personalisation in Recommender Systems -Relation between Information Filtering and Recommender Systems -Application Areas of Recommender Systems-Recommender System Field as an Interdisciplinary Area of Research -Phases of Recommender Systems -User Profiling Approaches-Classification of Recommendation Techniques -Advantages and Disadvantages of Recommender System Approaches -Need of Software Agent-based Approach in Recommender Systems -Evaluating Recommender Systems -Integrated Framework for Recommender Systems -Case Study: Music Recommender System .

Unit IV

Advanced Visualisation Methods- Ontology Definition -Ontology Visualisation Method -Space Dimensions of Ontology Visualisation -Ontology Languages-Ontology Visualisation Tools -Ontology Reasoning–Reasoner Case Study 1: Teaching Ontology with C Programming Language-Case Study 2: Activity for Ontology Creation with a Case of a Software Company Scenario-Case Study 3: Activity for History Ontology Creation.

Unit V

Ambient Intelligence: The New Dimension of Human–Computer Interaction - Introduction - Ambient Intelligence Definition-Context-aware Systems and Human–Computer Interaction -Middleware - Modelling Data for AmI Environment -Development of Context-awareness Feature in Smart Class Room— A Case Study - Context-aware Agents for Developing AmI Applications—A Case Study.

Course Outcomes:

Aftercompletion of the course, students will be able to

- interpret the contributions of human factors and technical constraints on human computer interaction.
- evaluate the role of current hci theories in the design ofsoftware.
- design and develop interfaces related to realapplications.
- apply exploratory and experimental research methods inhci.
- be equipped with principles and guidelines of user centered interface design process, evaluation methodologies and tools to analyze theinterfaces.
- implement human computer interfaces for different applications using various tools andtechnologies and be recruited as ontology engineer.

Text book:

1. K. Meena, R. Sivakumar, ″Human–ComputerInteraction″, PHP Learning Private limitedDelhi-110092, 2015.

Reference:

1.″Alan Dix, Janet Finlay, Gregory D.Abowd, Russell Beale″, "Human-Computer Interaction", 3rd Edition, Pearson publications, 2008.

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Semester	Subject code	Title of the course	Hours of Teaching/ Week	No.of Credits
III	**20P3CSC9**	**Core -BLOCKCHAIN TECHNOLOGIES**	**5**	**5**

Objective:

- To decompose a blockchain system's fundamental components, how they fit together and examine a decentralization usingblockchain.
- To explain how Cryptocurrency works, from when a transaction is created to when it is considered part of theblockchain.
- To explain the components of Ethereum and programming languages forEthereum.
- To impart the basics of Hyperledger andWeb3.
- To provide details of alternative blockchain and blockchain projects in different perspective.

Unit – I

INTRODUCTION TOBLOCKCHAIN

History of Blockchain – Types of Blockchain – Consensus – Decentralization using Blockchain – Blockchain and Full Ecosystem Decentralization – Platforms for Decentralization.

Unit – II:

INTRODUCTIONTOCRYPTOCURRENCY

Bitcoin – Digital Keys and Addresses – Transactions – Mining – Bitcoin Networks and Payments – Wallets – Alternative Coins – Theoretical Limitations – Bitcoin limitations – Name coin – Prime coin – Zcash – Smart Contracts – RicardianContracts

Unit – III:

ETHEREUM

The Ethereum Network – Components of Ethereum Ecosystem – Ethereum Programming Languages: Runtime Byte Code, Blocks and Blockchain, Fee Schedule – Supporting Protocols – Solidity Language.

Unit IV:

WEB3AND HYPERLEDGER

Introduction to Web3 – Contract Deployment – POST Requests – Development Frameworks - Hyperledger as a Protocol – The Reference Architecture – Hyperledger Fabric – Distributed Ledger – Corda.

Unit – V:

ALTERNATIVE BLOCKCHAINS AND NEXTEMERGINGTRENDS

Kadena – Ripple – Rootstock – Quorum – Tendermint – Scalability – Privacy – Other Challenges – Blockchain Research – Notable Projects – Miscellaneous Tools.

Course Outcomes:

After completion of the course, students will be able to

- understand the technology components of blockchain and how it works behind – the scenes.
- be aware of different approaches to developing decentralizedapplications.
- understand the bitcoin and its limitations by comparing with other alternativecoins.
- establish deep understanding of the ethereum model, its consensus model and code execution.
- understand the architectural components of a hyperledger and its development framework.
- blockchain technology can be used to create a permanent, public, transparent ledger system for compiling data on sales, tracking digital use and payments to content creators, such as wireless users or musicians.

REFERENCES:

1. Imran Bashir, “Mastering Blockchain: Distributed Ledger Technology, Decentralization and Smart Contracts Explained”, Second Edition, Packt Publishing, 2018.
2. Arshdeep Bahga, Vijay Madisetti, “Blockchain Applications: A Hands On Approach”, 2017.
3. Andreas Antonopoulos, Satoshi Nakamoto, “Mastering Bitcoin”, O’Reilly,2014.
4. Roger Wattenhofer, “The Science of the Blockchain” CreateSpace Independent Publishing,2016.
5. A. Narayanan, J. Bonneau, E. Felten, A. Miller, S. Goldfeder, “Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction”, Princeton University Press,2016.
6. Alex Leverington, “Ethereum Programming” Packt Publishing,2017.

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Semester	Subject code	Title of the course	Hours of Teaching/ Week	No.of Credits
III	**20P3CSC10**	**Core -Big Data Analytics**	**5**	**5**

Objective:

- To provide an overview of an exciting growing field of big data analytics.
- To introduce the tools required to manage and analyze big data like Hadoop, NoSql Map- Reduce.
- To teach the fundamental techniques and principles in achieving big data analytics with scalability and streaming capability.
- enable students to have skills that will help them to solve complex real-world problems in for decision support.

Unit – I

Getting Ready to Use R and Hadoop:

Installing R – Installing RStudio – Understanding the features of R language – Installing Hadoop – Understanding Hadoop features – Learning the HDFS and MapReduce architecture – Understanding Hadoop subprojects.

Writing Hadoop MapReduce Programs:

Introducing Hadoop MapReduce – Understanding the Hadoop MapReduce scenario – Understanding the Hadoop MapReduce fundamentals – Learning the different ways to write Hadoop MapReduce in R.

Unit – II:

Integrating R and Hadoop :

Introducing RHIPE – Understanding the architecture of RHIPE – Understanding the RHIPE function –Introducing RHadoop.

Using Hadoop Streaming with R :

Understanding the basics of Hadoop streaming - Understanding how to run Hadoop streaming with R - Exploring the HadoopStreaming R package.

Unit – III:

Learning Data Analytics with R and Hadoop : Understanding the data analytics project life cycle - Understanding data analytics problems- Computing the frequency of stock market change – Predicting the sale price of blue book for bulldozers – case study.

Unit IV:

Understanding Big Data Analysis with Machine Learning :

Introduction to machine learning–Supervised machine-learning algorithms – Unsupervised machine learning algorithm –Recommendation algorithms –Steps to generate recommendations in R –Generating recommendations with R and Hadoop.

Unit – V:

Importing and Exporting Data from Various DBs:

Learning about data files as database – Understanding MySQL– Understanding Excel– Understanding MongoDB– Understanding SQLite– Understanding PostgreSQL - Understanding Hive - Understanding HBase

Course Outcomes:

After completion of the course, students will be able to

- to teach the fundamental techniques and principles in achieving big data analytics withscalability and streaming capability.
- cultivate the skills that will help them to solve complex real-worldproblems in for decision support.
- combine structured, semistructured and unstructured data collected by organizations that can be mined for information.
- to develop the projects in connection with machine learning,predictive modeling and other advanced analytics applications.
- work as business analyst and build several database by using big data tools in it industry.

Books for Study:

1.Vignesh Prajapat , " Big Data Analytics with R and Hadoop"– Packet Publishing Pvt. Ltd,2013

M.Sc Computer Science

Semester	Subject code	Title of the course	Hours of Teaching /Week	No. of Credits
III	**20P3CSC11**	**Cross Platform – MobileApplicationsDevelopment**	**5**	**5**

Objectives:

- To inculcate the need and characteristics of mobileapplications.
- To design the right user interface for mobileapplication.
- To teach the design issues in the development of mobileapplications.
- To define the development procedure for mobileapplication.
- To develop mobile applications using various tools andplatforms.

Unit I
Mobile Development Using Xamarin

What is Xamarin – What's new: Mobile Development Techniques – Mobile UI – Xamarin Forms Custom Renderers – Building Mobile User Interfaces – Xamarin Forms Architecture – Platform UI Specification Approach – Xamarin Forms or a Platform-Specific UI.

Unit II
Xamarin Views

Xamarin Forms - Creating Xamarin Forms Solution –Adding Xamain.Forms views – UI Design Using Layouts – Xamarin Forms Layouts – Android Layout – iOS Layout

Unit III
Xamarin Controls

Xamain.Forms Views – Android controls – iOS controls – Making a Scrollable List – Data Adapters – Xamarin. Forms Listview – Android Listview – iOS TableView

Unit IV
Navigation, Database & Custom Renderers

Navigation Patterns – Xamarin. Forms Navigation – android Navigation – iOS Navigation – Data Access with SQLite and Data Binding - Custom Renderers – Preparing custom renderers – Creating Custom renderers – android, iOS, Windows phone custom renderers –

Unit V (Self Study) **Hrs 0**
Cross – Platform Architecture

Cross platform Architecture – Shared code and Platform specific code – Core Library – PCL – Dependency Injection.

Course Outcomes:

After completion of the course, students will be able to

- development using xamarin.
- design the right user interface for mobileapplication.
- implement mobile application using ui toolkits andframeworks.
- design a mobile application that is aware of the resource constraints of mobile devices.
- develop web based mobile application that accesses internet and locationdata.
- implement android application with multimediasupport.
- work as database administrator,manage and maintain the database used for mobile app and communicate effectively with mobile apps

Text book:

Xamarin Mobile Application Development: Cross-Platform C# and Xamarin.Forms Fundamentals 2015 by Dan Hermes, Apress

M.Sc Computer Science

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
III	**20P3CSCP5**	**Big Data Analytics Lab**	**3**	**3**

Objectives:

- To learn the usage and implementation of Big Data Analytics development packages.
  - To provide an overview of an exciting growing field of big data analytics.
  - To introduce the tools required to manage and analyze big data like Hadoop, NoSql Map- Reduce.
  - To teach the fundamental techniques and principles in achieving big data analytics with scalability and streaming capability.
  - To enable students to have skills that will help them to solve complex real-world problems in for decision support.

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1. Study of Hadoop ecosystem
2. Programming exercises on Hadoop
3. Programming exercises in No SQL
4. Implementing simple algorithms in Map- Reduce (3) - Matrix multiplication, Aggregates, joins, sorting, searching etc.
5. Implementing any one Frequent Itemset algorithm using Map-Reduce
6. Implementing any one Clustering algorithm using Map-Reduce
7. Implementing any one data streaming algorithm using Map-Reduce
8. Mini Project: One real life large data application to be implemented (Use standard Datasets available on the web)
   a. Twitter data analysis
   b. Fraud Detection
   c. Text Mining etc.

Course Outcomes:

After completion of the course, students will be able to

- design the tools forvisualization
- learn nosql databases andmanagement and to teach the fundamental techniques and principles in achieving big data analytics withscalability and streaming capability.
- combine structured, semistructured and unstructured data collected by organizations that can be mined for information.
- to develop the projects in connection with machine learning,predictive modeling and other advanced analytics applications.
- find the carrier opportunity to work as business analyst and build several databases for handling massive amount of data i.e manage billion and trillion of data.

M.Sc Computer Science

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
III	**20P3CSEDC**	**E-Learning Technologies**	**4**	**4**

Objective

- To learn the various E-learning approaches andcomponents.
- To create awareness about the types of design models ofE-Learning in the minds of the learners .
- To explore the models for E-learning coursewaredevelopment.
- To learn about E-learning authoringtools.
- To know about evaluation and management of E-learningsolutions.

UNITI
INTRODUCTION

Need for E-Learning – Approaches of E-Learning – Components of E-Learning – Synchronous and Asynchronous Modes of Learning – Quality of E-Learning – Blended Learning: Activities, Team and Technology – Work Flow to Produce and Deliver E-Learning Content – Basics of Design Thinking.

UNITII
DESIGNING E-LEARNINGCOURSECONTENT

Design Models of E-Learning – Identifying and Organizing E-Learning Course Content: Needs Analysis – Analyzing the Target Audience – Identifying Course Content – Defining Learning Objectives – Defining the Course Sequence – Defining Instructional Methods – Defining Evaluation and Delivery Strategies – Case Study.

UNITIII
CREATINGINTERACTIVECONTENT

Preparing Content: Tips for Content Development and Language Style – Creating Storyboards: Structure of an Interactive E-Lesson – Techniques for Presenting Content – Adding Examples – Integrating Multimedia Elements – Adding Examples – Developing Practice and Assessment Tests – Adding Additional Resources– Courseware Development Authoring Tools – Types of Authoring Tools – Selecting an Authoring Tool

UNITIV
LEARNINGPLATFORMS

Types of Learning Platforms – Proprietary Vs. Open – Source LMS – LMS Vs LCMS – Internally Handled and Hosted LMS – LMS Solutions – Functional Areas of LMS.

UNITV
COURSE DELIVERY ANDEVALUATION

Components of an Instructor-Led or Facilitated Course – Planning and Documenting Activities – Facilitating Learners Activities – E-Learning Methods and Delivery Formats – Using Communication Tools for E-Learning – Course Evaluation.

Course Outcomes:

After completion of the course, students will be able to

- distinguish the phases of activities in the models ofe-learning.
- identify appropriate instructional methods and deliverystrategies.
- choose appropriate e-learning authoring tools.
- create interactive e-learningcourseware.
- evaluate and manage the e-learningcourseware.
- e-learning provide a good career because it simply relies on the principle of “more experience more benefits (perks)”

REFERENCES:

1. Clark, R. C. and Mayer, R. E, “eLearning and the Science of Instruction”, Third Edition, John Wiley,2016.
2. Means, B., Toyama, Y., and Murphy, R, “Evaluation of Evidence – Based Practices in Online Learning: A Meta – Analysis and Review of Online Learning Studies”, Centre for Learning Technologies, 2010.
3. Crews, T. B., Sheth, S. N., and Horne, T. M, “Understanding the Learning Personalities of Successful Online Students”, Educause Review,2014.
4. Johnny Schneider, “Understanding Design Thinking, Lean and Agile”, O’Riley Media, 2011.
5. Madhuri Dubey, “Effective E – learning Design, Development and Delivery”, University Press,2011.

M.Sc Computer Science

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
IV	**20P4CSCP6**	**INTERNET OF THINGS (IOT) LAB**	**4**	**2**

OBJECTIVES:

- To develop the fundamentals of Internet ofThings.
- To build a small low cost embedded system using Arduino / Raspberry Pi orequivalent boards.
- To build IoT using Rasberry Pi
- To build IoT with Galileo and Arduino
- To apply the concept of Internet of Things in the real worldscenario

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1. Write a Internet of Things withArduino program using LED &resistor Blinking LED.
2. Write a Program detect **vibration**, vibration or tilt of any object gives output .
3. Write a 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 a Arduino program using DC motor, the rotor is a permanent magnet.
12. Create a Arduino Sketch With Water Level Sensor get the water level Indicator Alarm.

Course Outcomes:

After completion of the course, students will be able to

- design a portable IoT using arduino/ equivalent boards and relevantprotocols
- develop web services to access/control IoTdevices
- deploy an IoT application and connect to thecloud
- analyze applications of IoT in real timescenario
- work as network engineer and service engineer.

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Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
IV	**20P4CSEL3A**	**COMPUTATIONAL LABORATORYUSINGR LAB**	**4**	**2**

OBJECTIVES

- To introduce finite state automata as language acceptor of regularsets.
- To introduce context free grammars and context free languages and their normalforms.
- To explain pushdown automata as the language acceptor of context-freelanguage.
- To demonstrate Turing machine as a mathematical model of language acceptor of recursively enumerable language and computer of computing number theoreticfunctions.
- To predict the relationship between classification and correlation.

Implement the following using R:

1. Classification and tabulation of data and graphical and diagrammatic presentation of data
2. Perform calculation that measures the central tendency and dispersion of data and implementation of measures of skewness, moments and kurtosis.
3. Determination of point and interval estimations.
4. Regression analysis and Correlation
5. Plotting of various distributions.
6. Implementation of central limit theorem
7. Case study: complete statistical analysis on any real time dataset

Course Outcomes:

After completion of the course, students will be able to

- design finite state automata to accept regularsets.
- form context free grammar to generate context free language and able to obtain its normal form.
- design pushdown automata to accept a context freelanguage.
- design turing machine to accept recursive enumerable language, to compute number theoretic functions and able to understand the limitation of turing computingmodel.
- serve as computational engineer and analyst.

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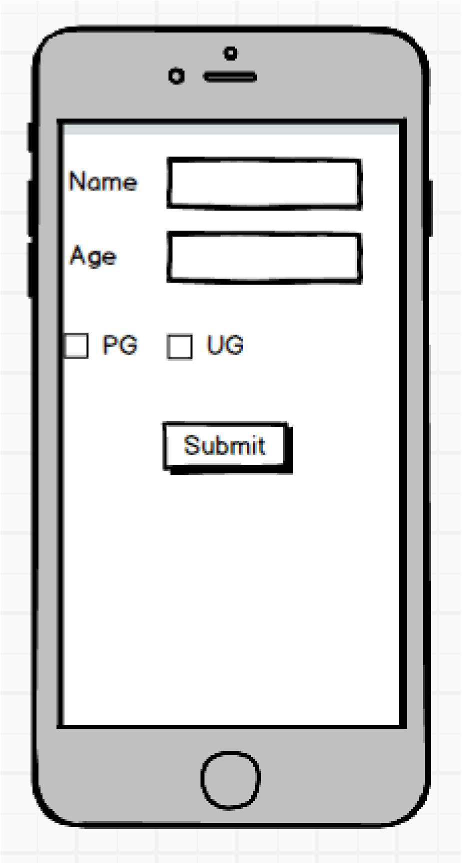
Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
IV	**20P4CSEL3B**	**Cross Platform - Mobile ApplicationsDevelopmentLAB**	**3**	**2**

OBJECTIVES

- Building mobile applications.
- Availing variety of mobile brands and models for testing objectives in same location.
- Pushing the innovation in mobile applications.
- TO train the learners about the essentials of navigation.
- To incorporate the advanced technologies in android environment.

Perform the experiments in J2ME / Android SDK framework

1. Timer: Create a Page, change the background and Foreground colour randomly using Xamarin Timer
2. Platform Specific: Create a form like below based on the platform change the Font Name, Font Size and display the form information in the Message Box.



3. Zoom:Using Pinch gesture class to Zoom the image in Xamarin Forms.
4. Animation: Create a button, using button click event animate images in Xamarin Forms.

5. Dependency Service: Using Dependency Service find the sum of anumber, which enters by the user in the Xamarin Forms.
6. Android DB: Store& Retrieve the Form data into the SQLite.
7. Windows Phone DB: Store & Retrievethe Form data into the SQLite.
8. Navigation: Implementing Navigation using Pushing and Popping and Handling the Back button.
9. Master Detail Page: Create Navigation drawer using the MasterDetailPage.
10. Tabbed Page: Using Tabbed page load different page based on Tab click, one tab form should be implemented Popup menu handling.

Course Outcomes:

After completion of the course, students will be able to

- design the right user interface for mobile application.
- implement mobile application using J2ME / android SDK toolkits and frameworks.
- design mobile applications that are aware of the resource constraints of mobile devices.
- develop web based mobile application that accesses internet and location data.
- serve as app creator and developer in mnc ,implement android application with multimedia support.

M.Sc Computer Science

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No.of Credits
IV	**20P4CSPR**	**Core – PROJECT**	**3 Months**	**5**

Main Project

Objective

- To master technical and Software development Skills.
- To realize the importance of the front end and back end tools in developing the modules.
- To teach the working principles of the modules and test the modules.
- Impart the skills related to different phases of software development life cycle.
- describe the different testing types and know the importance of testing and debugging.

to undergo Industrial Software Development projects using recent technologies.

Course Outcomes:

After completion of the course, students will be able to

- to develop the software codes using front end and back end tools
- build the modules
- derive the test case and develop the skills to test and debug.
- integrate the skills to build quality software that best meets the needs of the organization and the needs of the user.
- work in a MNC as project leader and project manager

M.Sc Computer Science

COMMUNICATION SKILL AND PERSONALITY DEVELOPMENT

SEMESTER	SUBJECT CODE	TITLE	HOURS OF TEACHING/ WEEK	NOOF CREDITS
IV	20P4-CPD	Communication Skill and Personality Development	1	

COURSE OBJECTIVES:

- To cultivate positive personality traits for successful life.
- To groom Winning Attitude among the learners.
- To assist the learners to identify their own potential and realize their aspirations.
- To enable a holistic development.
- To facilitate optimum means of improving personal performance.

UNIT 1

1. Personality- Definition.
2. Determinants of Personality.
3. Perceptual Process.
4. Personality Traits.
5. Developing Effective Habits.
6. Self Esteem (Freud and Erikson).
7. Self Appraisal and Self Development.
8. Dos and Don’ts to develop positive self esteem.
9. Interpersonal Relationship.
10. Difference between Aggressive, Submissive and Assertive behaviour.
11. Mind Mapping, Competency Mapping, 360 degree assessment.
12. Presentation Skills – Opening, ending, Handling nerves, Handling audience, Power Storytelling, Visual aids, Question and answer session

UNIT 2

1. Projecting Positive Body Language.
2. Conflict Management.
3. Change Management.
4. Stress Management.
5. Time Management.
6. Goal Setting.
7. Assertiveness and Negotiating Skill.
8. Problem Solving Skill.
9. Decision Making Skills.
10. Leadership Qualities of a Successful Leader.
11. Attitudes – Positive Attitudes.
12. Public Speaking – Engaging, Connecting, and Influencing the audiences.
13. Employability Skill – Group Discussion, Interview Questions, Psychometric analysis.

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COURSE OUTCOMES:

After completion of the course, Students will be able to:

- Gain self confidence and broaden perception of life.
- Maximize their potential and steer that into their career choice.
- Enhance one's self image & self esteem.
- Find a means to achieve excellence and derive fulfilment.

References:

Hurlock.E.B (2006) : Personality Development, 28th Reprint. New Delhi: Tata McCraw Hill.
Stephen.P.Robbins and Timothy. A.Judge (2014) : Organisation Behaviour.16th Edition.Prentice Hall.
Andrews, Sudhir. How to Succeed at Interviews. 21st (rep) New Delhi.Tata McGrew Hill 1988.
Lucas, Stephen. Art of Publication. New Delhi. Tata McGrew Hill. 2001.
Kumar, Pravesh. All about Self Motivation. New Delhi. Goodwill Publication House. 2005.

EXTRA DISCIPLINARY COURSES

Sl. No.	Subject Code	Title of the Paper	Department
1.	20P3HYEDC	**INDIAN ADMINISTRATION**	History
2.	20P3ECEDC	**ISSUES IN INDIAN ECONOMY**	Economics
3.	20P3TAEDC	**தமிழ்மொழி வரலாறு**	Tamil
4.	20P3ENEDC	**SHAKESPEARE STUDIES**	English
5.	20P3CMEDC	**ENTREPRENEURIAL DEVELOPMENT**	Commerce
6.	20P3MAEDC	**APPLICABLE MATHEMATICAL TECHNIQUES**	Mathematics
7.	20P3PHEDC	**FUNDAMENTALS OF NANOTECHNOLOGY**	Physics
8.	20P3CHEDC	**CHEMISTRY IN EVERY DAY LIFE**	Chemistry
9.	20P3BOEDC	**MEDICAL BOTANY AND PHARMACOGNOSY**	Botany
10.	20P3MBEDC	**MUSHROOM TECHNOLOGY**	Microbiology
11.	20P3ZOEDC	**CLINICAL LAB TECHNOLOGY**	Zoology
12.	20P3BTEDC	**RECENT TRENDS IN BIOTECHNOLOGY**	Biotechnology
13.	20P3CSEDC 20P3ITEDC	**E-LEARNING TECHNOLOGIES**	Computer Science
14.	20P3LSEDC	**DOCUMENTATION CENTERS IN INDIA**	Library and Information Science

Semester	Course Code	Title of the Course	Hours of Teaching /Week	No. of Credits
III	**20P3HYEDC**	**Extra Disciplinary Courses – Indian Administration**	**5**	**--**

Objectives:

1. To know the evolution of Indian Administration.
2. To prepare the students for the competitive examination.
3. To give up-to-date knowledge on Indian administration.
4. To trace economic planning of India, through which the students may get practical knowledge on budget, etc.
5. To expose the state administration and the latest issues like Lok Ayukt and LokPal through which the students may get awareness about the latest issues.

Unit I ***Hrs 15***

The evolution of Indian administration: Structure and Functions–Mauryan and Mughal legacy; British Indian system: Company's experiments–Warren Hastings, Lord Cornwallis, Lord Hastings and Lord Dalhousie; Administrative consolidation since 1861 – Famine policy - Financial, Police and judicial administration.

Unit II ***Hrs 15***

Indian Administration since 1950: Parliamentary Democracy–Federation–Structure of Central Administration–Central Secretariat–Cabinet Secretariat, Ministries–Department of Boards.

Unit III ***Hrs 15***

Machinery for planning: Plan formulation at the National level – National Development Council – Planning Commission – Public undertaking – Controls of Public expenditure.

Unit IV ***Hrs 15***

State Administration–Executives–Secretariat–Chief Secretary–Directorates–District and Local Administration–District Rural Development Agency–Special development programmes.

Unit V ***Hrs 15***

Center-State relations – Public services – Police and Judicial administration – Lok Ayukt – Lok Pal – issues on Indian administration – Integrity in administration – Administrative reforms.

General References:

1. Altekar, A.S., State and Government in Ancient India, 1958.
2. Bhambri, C.H., Public Administration in India.
3. Vidya Bhushan, Indian Administration, Delhi, 2000.
4. Vishnoo Bhagawan & Vidhya Bhushan., Indian Administration, New Delhi, 1996.

Course Outcome: The students have clearly understood about the evolution of Indian Administration, State and Central administration, police and judicial administration, Centre State relations, etc.

Semester	Subject code	Title of paper	Hours of Teaching / Week	No. of Credit
III	**20P3ECEDC**	**Extra Disciplinary Courses – Issues in Indian Economy**	**4**	**-**

Objective:

- This Elective paper is offered to the Non-Economics Students to make them familiar with the recent trends in Indian Economy. The syllabus is framed accordingly with the Civil Service Examination.

Course Outcomes

- To understand the status of Indian economy before the reforms
- To assess the rationale of introducing reforms in India
- To familiarize with the package of LPG
- to get insight on the recent trends in EXIM policy

Unit I **Hrs 15**

Economic development and growth – determinants of growth and development – Market Economy – Indian Economy – a shift form mixed economy to Market economy – Reform measures introduced in India – First and second generation reforms – (Brief out line)

Unit-II **Hrs 15**

Economic reforms in India – background, rational – implementation – Trade policy – Industrial policy – exchange rate and capital market reforms

Unit-III **Hrs 15**

Dis-investment of public enterprises – rational – changing profile of PSUs comparison of public and private sector

Unit-IV **Hrs 15**

Privatization – Meaning and scope – Globalization – impact on India – foreign capital – Types FDI and FII, Policies and pattern.

Unit-V **Hrs 15**

Foreign Trade – Exim Policies – Recent exim policy – BOP- Trends in BOP – Economic reforms and BOP.

References:

Uma kapila	–	Indian Economy (Issues in Development and Planning and Sectoral aspects) Fifth Edition, 2006-07, Academic Foundation, New Delhi
Datt Ruddar & Sundharam K.P.M.	-	Indian Economy (2007)
Misrapuri	-	Indian Economy

Semester	Subject Code	Title of the Paper	Hours of Teaching/Week	No. of Credits
III	**20P3TAEDC**	**கூடுதல் சிறப்புப் பாடம்:** **தமிழ்மொழி வரலாறு**	**4**	**-**

கூறு: 1 இந்திய மொழிக் குடும்பங்கள் நேரம்: 12

இந்தோ ஆரிய மொழிகள் - ஆஸ்டிக் மொழிகள் - சீன திபெத்திய மொழிகள் - திராவிட மொழிக் குடும்பம் - டாக்டர் கால்டுவெல், திராவிட மொழிகளின் சிறப்பியல்புகள் - தென் திராவிட மொழிகள் - தென் திராவிட மொழிகளில் தமிழ் - நடுத்திராவிட மொழிகள் - வட திராவிட மொழிகள்.

கூறு: 2 தமிழ் நேரம்: 12

தமிழ் என்பதன் வடிவம் பற்றியும் பொருள் பற்றியும் பல்வேறு செய்திகள் - பெயரெச்சங்கள் - வினையெச்சம் - சங்க இலக்கியத்தில் வினையெச்சங்கள் - தொல்காப்பிய உரைகாரர்களும் வினையெச்சங்களும்.

கூறு: 3 நேரம்: 12

தமிழ் எழுத்தின் தோற்றமும் வளர்ச்சியும் - ஆய்வெழுத்து இராசியெழுத்து, நாள், எழுத்து - ஓவியம், பானை ஓடுகள், இலங்கை முத்திரை முதலானவற்றில் காணப்படும் உருவ எழுத்துகள் - வட்டெழுத்து, பண்டைத் தமிழ் எழுத்து. தமிழ்மொழி வரலாறு: தமிழின் தொல் வரலாறு, தமிழ்மொழி வரலாறு - பழந்தமிழ்க் காலம், இடைத்தமிழ்.

கூறு: 4 நேரம்: 12

தொல்காப்பியமும் ஒலியியலும் - தொல்காப்பியமும் சொல்லியலும் - தமிழ் ஒலிகளின் பிறப்பு விளக்கம் - புணர்ச்சி வகை. தமிழ் உருபனியலும் தொடரியலும் - தலைமை இலக்கணக் கூறுகள் - தொடரமைப்பு இலக்கணம். பெயர்த்தொடர் அமைப்புகள்: மொழியின் பெருமை - எழுத்தும் பேச்சும் - கிளை மொழிகள் தோற்றம் - இலக்கியக் கிளைமொழி- வட்டாரக்கிளை மொழிகள்.

கூறு: 5 நேரம்:12

தமிழ் வளர்ச்சி - தமிழ் ஆட்சிமொழி வரலாறு - தமிழ் கல்விமொழி வரலாறு - கலைச் சொல்லாக்கம் - அறிவியல் தமிழ் வளர்ச்சி-உலகத் தமிழ் மாநாடுகள்- உலக அரங்கில் தமிழ் - தமிழ் அமைப்புகள்- உலகத் தமிழாராய்ச்சி நிறுவனம் - தமிழ்ப்பல்கலைக் கழகம்-செம்மொழி ஆய்வுமையம் - அயல் மாநிலங்களில் தமிழ்.

பார்வை நூல்கள்:

1. *தமிழ் வரலாறு - தேவநேயன். ஞா.*
2. *தமிழ் மொழி வரலாறு - பரிதிமாற்கலைஞர்*
3. *பழந்தமிழ் - இலக்குவனார் . சி*
4. *தமிழ் வரலாறு - குணா*
5. *தமிழ் மொழி வரலாறு - தமிழ் வளர்ச்சி இயக்ககம்*
6. *ஆட்சித் தமிழ் - புதுவை மொழியியல் பண்பாட்டுக் கழக வெளியீடு*
7. *இந்திய ஆட்சிப்பணி வழிகாட்டி - முனைவர் ரெ. குமரன்.*
8. *உலகத்தமிழ் மாநாடுகள் - சாலை இளந்திரையன்*
9. *தாய்மொழியில் படிக்க வைப்போம் - NCBH வெளியீடு.*
10. *தமிழ் ஆட்சி மொழி வரலாறு - தமிழ்ப்பல்கலைக்கழகம்.*
11. *தமிழ் ஆட்சிமொழி வரலாறு - தெ.பொ.மீ.*
12. *தமிழ் மொழி வரலாறு - சக்திவேல்*

Semester	Course Code	Title of the Course	Hours of Teaching / Week	No. of Credits
III	**20P3ENEDC**	**Extra Disciplinary Course - Shakespeare Studies**	**4**	

Objective

- To initiate the non English majoring students to study Shakespeare's plays, and his sonnets.

Outcome

- Gaining appreciative and analytical understanding of Shakespeare's dramas and sonnets.
- Achieving potentiality to situate and relate Shakespeare's wisdom in various current disciplines and media cultures.
- Obtaining a profound perspectives on handling racism, class divisions, gender roles, crime, love, war, death betrayal, hope, loyalty etc., derived from the works

Unit – I

Shakespeare's Sonnets 1, 18, 29, 33, 35, 65 and 130

Unit – II

The Merchant of Venice

Unit – III

Henry IV, Part I

Unit – IV

Othello

Unit – V

Antony and Cleopatra

References:

- Bates, Jonathan. *The Genius of Shakespeare.* London: Picador, 1997.
- Leishman, J.B. *The Theme and Variation in Shakespeare's sonnets.* London: Routledge, 2005.

Semester	Subject Code	Title of the paper	Hours of Teaching/ Week	No. of Credits
III	**20P3CMEDC**	**Entrepreneurial Development**	**4**	**-**

Objective:
• To make the students to become a successful entrepreneur and to know the process involved in entrepreneurship.
Course Outcome:
• Learn the incentives and subsidies provided to budding entrepreneurs and Become familiar with institutions offering various forms of assistances.

Unit - I

Entrepreneurship - Nature and Characteristics of an Entrepreneur - Difference between Entrepreneur and Manager - Qualities, Types, and Functions of an Entrepreneur - Role of Entrepreneur in Economic Development.

Unit - II

Business Ideas - Sources of Idea - Idea Processing and Selection - Start up Process - Project Identification and Selection - Project Formulation - Project Appraisal.

Unit - III

Factory Design and Layout - Importance - Factors affecting Factory Design - Factory Layout - Objectives - Types - Consideration in Designing Layout - Design Requirements.

Unit - IV

Institutions Assisting to Entrepreneurs - NSIC - SIDCO - SSIB - DIC – TIIC – KVIC – TCO – ITCOT - Commercial Banks and New Entrepreneurial Development Agency.

Unit - V

Entrepreneurship Development Programmes - Need - Objectives - Institutional efforts in Developing Entrepreneurship – Evaluation of EDPs – Problems in the conduct of EDPs – Suggestions to make EDPs effective – Planning EDPs - Role of SISI, SIPCOT and SIDBI – Recent Development in Small Enterprises in India – Government rules and regulations – Rural Entrepreneurship – Need for Rural Entrepreneurship Problems – SHGs and Rural Development – MUDRA Banking /MSME Loans.

Text book:

1. C.B.Gupta., N.P.Srinivasan, (2018), Entrepreneurial Development, Sultan Chand & Sons, New Delhi.

Reference Books

1. Khanka S.S., (2019) Entrepreneurial Development, S.Chand & Co, New Delhi.
2. Saravanavel, P. (2016), Entrepreneurial Development, Principles, Policies and Programmes, Ess Pee Kay Publishing House, Tanjore.
3. Renu Arora, Sood S.K., (2018)Fundamentals of Entrepreneurship and Small Business, Kalyani Publications, Ludhiana.
4. Jayashree Suresh, (2019)Entrepreneurial Development, Margham Publications, Chennai.

Semester	Subject Code	Title of the Paper	House of Teaching / Week	No.of Credits
III	**20P3MAEDC**	**Extra Disciplinary Course-Applicable Mathematical Techniques**	**4**	**-**

Objectives:

- To discuss various methods of Interpolation

Out comes: After studying this course the student will be able to

- Student will demonstrate the ability to solve financial math problem.

Unit I **12 Hrs**

Interpolation with unequal intervals: Newton's divided difference formula - Lagrange's interpolation formula and inverse interpolation. (Only simple Problems)

Unit II **12 Hrs**

Assignment problems

Unit III **12 Hrs**

Replacement problems (Only simple Problems)

Unit IV **12 Hrs**

Decision Analysis

Unit- V **12 Hrs**

Game Theory

Text Book:

1. *For unit I,* ***Numerical Methods*** *– P. Kandasamy, K. Thilagavathy, K. Gunavathy, S.Chand*
2. *For units II to V,* ***Operation Research 12th Edition 2004:****KanthiSwarap, P.K. Gupta and Manmohan, Sultan Chanda and sons, New Delhi.*

Unit I	:	Chapter - 8 (Sec: 8.5, 8.7)
Unit II	:	Chapter - 11 (Sec: 11.1 to 11.4)
Unit III	:	Chapter - 18 (Sec: 18.1 to18.3)
Unit IV	:	Chapter - 16 (Sec: 16.1 to 16.5)
Unit V	:	Chapter - 17 (Sec: 17.1 to 17.6)

General Reference:

1. *S.S. Sastry Introductory Methods of Numerical Analysis Prentice Hall of India 2000.*
2. *H.A. Taha Operation Research Prentice Hall of India 1995.*

Semester	Subject Code	Title of the paper	Hours of Teaching / Week	No. of Credits
III	**20P3PHEDC**	**Extra Disciplinary Course- Fundamentals of Nanotechnology**	**4**	**-**

Unit – I Introduction to Nanotechnology

Nanotechnology – Definitions - History of nanotechnology – Nanomaterials: classification – zero, one and two dimensional nanomaterials – Classification based on the composition of materials (metal, semiconductor, ceramic, polymeric and carbon-based nanomaterials) - Properties of nanomaterials – Surface area to volume ratio (S.A/V) – Quantum dots - Challenges in nanotechnology.

Unit – II Preparation Methods

Top-down and Bottom-up approaches – Top down methods: Ball milling - Electron beam lithography – Advantages – Limitations. Bottom-up methods: Vacuum evaporation - Sputter deposition process - Laser ablation – Advantages – Limitations.

Unit – III Fullerenes

Fullerenes – Types of fullerenes – Bucky ball/Buckminster fullerene - Carbon nano tubes (CNTs) - Single walled CNTs – Multi walled CNTs – Differences – mechanical and electrical properties of CNTs - preparation of CNTs – Plasma discharge method – Applications.

Unit – IV Characterization Techniques

Construction, working principle, merits and demerits of X-ray diffractometer - Scanning Electron Microscope (SEM) – Atomic Force Microscope (AFM) - UV-Vis–NIR double beam spectro photometer – Energy dispersive X-ray analysis (EDAX) .

Unit – V Applications

Nanoelectronics – Nanophotonics – Nanomaterials in energy conversion and storage – Nanomaterials as antibacterial agents – Nanomaterials as photocatalysts – Nanomaterial in industrial applications – Bio-medical applications : Targeted drug delivery – Nanomaterial based radiation therapy – Photodynamic therapy (PDT) – Bio imaging.

Books for Study

1. K. Ravichandran, K. Swaminathan, P.K. Praseetha, P. Kavitha, Introduction to Nanotechnology, JAZYM publications.
2. M.Ratner.et al., Nanotechnology; A Gentle intro Practices – hall ISBN 0-13-101400-5, 2003.
3. Nanotechnology; Basic Science and Emergining Technologies, CRC Press

Books for Reference

1. Charles P.Poole Jr and Frank J.Owens. "Introduction to Nanotechnology" Wiley, 2003.
2. A. S. Edelstien and R.C. Cornmarata, Nanomaterials; synthesis, Properties and Applications, 2ed, Iop (U.K), 1996.

Semester	Subject code	Title of the paper	Hours of Teaching/ Week	No. of Credits
III	**20P3CHEDC**	**Extra Disciplinary Course - Chemistry in Every Day Life**	**4**	

OBJECTIVES

Students learn about the scientific and chemical principles underlying in everyday life.

- Students learn about the cleaning agents and water chemistry,
- Students understand about the food chemistry,
- Students shall learn about the cosmetic and their effect in health aspects
- Students shall know about the green chemistry and their significance for clean environments
- Students learn about the nano technology and their importance.

Unit-I

Cleaning agents - manufacture and uses of soaps, detergents, baking powder, shampoo, washing powder and bleaching powder **Water –** uses of water Characteristics' of water, soft water and hard water - removal of hardness – ion exchange method. Reverse osmosis method, Water pollution, causes and prevention.

Unit-II

Food – importance – spoilages – causes, preservation – additives – colouring and flavouring agents, beverages. Soft drinks aerated water – manufacturing – mineral water. Fruits, vegetables, dairy product – storage, preservation. Minerals in food and anti oxidants. Preparation of fruit Jam and pickle.

Unit-III

Cosmetics – Face powder – constituents, uses – side – effects. Nail polish, hair dye – composition and side effects. Tooth powder – lotions. Preparation of phenyl, liquid blue and incense sticks.

Unit-IV

Basic concepts of Green chemistry and its significance in day to day life. Polymers – Classification – Types of polymerization – plastics – classification – types of plastics – PVC, Teflon, PET, Bakelite – Rubber – Natural and synthetic – Bunas rubber, Butyl Rubber. Vulcanization of rubber, neoprene rubber, Plastic pollution and prevention.

Unit-V

Basic concepts of Nano Technology and its importance in day to day life.

Dyes – importance of food colours – PFA (Prevention of Food Adulteration Act) Natural dyes – Synthetic Classification importances – Uses of the following Synthetic dyes - Direct dyes, acid dye, Basic dye, mordant dye, Reactive dye, Disperse dye, Fastness – Light and Washing. Application of dyes in food, paper, plastic and lather.

COURSE OUTCOME:

- Students should able to learn about the cleaning agents and water chemistry,
- Students should able to understand about the food chemistry,
- Students should able to learn about the cosmetic
- Students shoud able to know about the green chemistry
- Students should able to learn about the nano technology

References:

1. Norrish Shreave. R. and Joseph A. Brink Jr Chemical Process Industries, McGraw Hill, Industrial Book Company London 1978.
2. Brain A.C.S. Reinhold, Production and properties of Industrial chemicals 11th Ed, John Wiley & Sons, New York.
3. Burgh, A. Fermentation Industries, Inter science, 4th Ed, 1983, A *Inter science*, New York.
4. Ramani,V. Alex, Food Chemistry(2009),MJP publishers.

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
III	**20P3BOEDC**	**Extra Disciplinary Course – Medicinal Botany and Pharmacognosy**	**4**	**-**

Objectives

- ❖ To enable the students to identify local medicinal plants.
- ❖ To enable the students to prepare herbal medicines for curing human ailments.
- ❖ To impart knowledge to students on Botany and Phyto chemistry of medicinal plants.

Unit I

Medicinal Botany: Definition, Introduction, History, – Classification – Common medicinal plants cultivation, storage, collection and habitats of medicinal plants (*Catharanthus, Coleus*, *Aloe*) – Importance of medicinal plants.

Unit II

Indian systems of medicine – AYUSH - Siddha, Ayurveda, Homeopathy and Unani – Indigenous medicinal plants – Useful parts –Chemical constituents – medicinal uses – medicinal plant drugs.

Unit III

Herbal medicines for human ailments – Heart, kidney, liver, eye, skin, hair, stomach problems, diabetics, blood pressure, headache, cough, cold, fever, digestive problems, joint pains and wounds.

Unit IV

Pharmacognosy – History, Introduction, commercial drugs, crude drugs – classification of drugs – Chemistry of drug and drug evaluation of natural products.

Unit V

Drug adulteration and detection – Substitution – Detection of Adulterations - Elementary knowledge on alkaloids and flavonoids – Preparation of herbal oil, herbal tooth powder, herbal soup, herbal immune boosters.

Books for Reference

- ➢ Kumar, N.C., (1993). An introduction to Medical Botany and Pharmacognosy.
- ➢ Shah, S.C. and Quadry (1990). A text book of Pharmacognosy.
- ➢ Nadkarni, (1981). Indian MateriaMedica.
- ➢ Jain, S.K., (1980). Indian Medicinal Plants.
- ➢ Balu, S., Murugan, R. and Pandiyan, P., (2005). Herbal Technology.

Outcome

After completion of this course, students would be able to

- ➢ Understand the various Indian system of medicine
- ➢ Learn about the vital role of herbal medicines for human ailments
- ➢ Outline and classify the crud drugs
- ➢ Trained about drugs adulteration and direction

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
III	**20P3MBEDC**	**Extra Disciplinary Course – Mushroom Technology**	**4**	**-**

Objectives

- To know the various types of edible mushroom and their nutritional value.
- To understand the methods of cultivation of mushrooms.
- To know the types of food prepared from mushroom and their importance in human health.
- Marketing of mushrooms in India and abroad.
- Mushroom cultivation unit visit- mandatory –Neighbouring District –one day.

Unit I

Introduction – history – scope of edible mushroom cultivation – Types of edible mushrooms available in India – *Calocybeindica, Volvariellavolvacea, Pleurotuscitrinopileatus*, and *Agaricusbisporus.*

Unit II

Pure culture – preparation of medium (PDA and Oatmeal agar medium) sterilization – preparation of test tube slants to store mother culture – culturing of *Pleurotus*mycelium on petriplates, preparation of mother spawn in saline bottle and polypropylene bag and their multiplication.

Unit III

Cultivation Technology: Infra structure – Mushroom bed preparation – paddy straw, sugarcane thrash, maize straw, banana leaves. Factors affecting the mushroom bed preparation – Low cost technology. Composting technology in Mushroom production.

Unit IV

Storage and nutrition: Short-term storage (Refrigeration – upto 24 hours) Long term Storage (canning, pickles, papads), drying, storage in salt solutions. Nutritive value – proteins – amino acids, mineral elements – Carbohydrates, Crude fibre content – Vitamins.

Unit V

Food Preparation – Types of food prepared from mushroom; Soup, Cutlet, Omlette, Samosa, Pickles, Curry – Research Centres – National level and Regional level – Cost benefit ratio – Marketing in India and abroad, Export value.

Books for Reference:-

- Marimuthu, T., Krishnamoorthy, A.S., Sivaprakasam, K. and Jayaranjan, R., (1991). Oyster Mushrooms, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.
- Swaminathan, M., (1960). Food and Nutrition. Bappco, The Bangalore Printing and Publishing Co. Ltd., No.88, Mysore Road, Bangalore 560 018.
- Tewari, Pankaj Kapoor, S.C., (1988). Mushroom Cultivation, Mittal Publications, Delhi.
- Nita Bahi (1984-1988). Handbook of Mushrooms, II Ed, Vol. I & II.
- Paul Stamets, J.S and Chilton J.s (2004). Mushroom cultivation. A practical guide to graining mushroom at home Agarikon Press.

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
III	**20P3ZOEDC**	**Extra Disciplinary Course – Clinical Lab Technology**	**4**	**-**

Objectives:

1. To study the various sterilization techniques.
2. To know the disposal of waste.
3. To identify the blood group and urine sugar.
4. To identify the bacteria and fungus.
5. To know the various diagnostic equipment.

Unit I **12 Hrs**

Scope for study of Clinical Technology. Sterilization – Methods of Sterilization – Dry heat method – Wet heat method – Chemical method of sterilization – Disposal of hospital wastes and infected material - Disinfection laboratory glassware and equipments.

Unit II **12 Hrs**

Composition of blood–ABO blood typing–Rh blood typing–Blood cells counting – Total erythrocyte count, total WBC count and differential count – Sugar level in Blood – Hypoglycemia, Hyperglycemia conditions. Composition of urine – Physical characters of urine–Method of urine analysis for sugars.

Unit III **12 Hrs**

Analysis of Semen, Sputum and stool, Identification of blood parasites, Bacterial culture in NA medium, Fungal culture in PDA medium, Histological study of cells – Histological procedure for the preparation of tissue slides.

Unit IV **12 Hrs**

Diagnostic equipment and apparatus – ECG, EEG, Colorimeter, pH meter, PCR, laminar airflow inoculation chamber, Binocular microscope and Incubator.

Unit V **12 Hrs**

Immuno techniques – ELISA, HLA typing, VDRL Test.

Viral , bacterial and fungal diseases, First aid- definition and types and applications

Reference:

1. Medical Laboratory Technology (1994) (4th edition), By Ramik Sood, Jaypee Brother Medical Publishers (P) Ltd., New Delhi 110 002.
2. Medical Laboratory Technology, K.M. Samuel.
3. Clinical Pharmacology (1987), by Dr. Lawrance and P.N. Bennett (Sixth Edition), ELBS, English Language Book Society, Churchil Livingstone, England.
4. District Laboratory Practice in Tropical countries, part I, By Mouica Cheesbrough, Cambridge Las Priced Edition, Cambridge University Press, Cambridge, U.K.
5. Basic Clinical Paraitology (1993), W.Harold Brown and A.Franklin Neva (5th edition), Prntice Hall Internation Edition.
6. Biological Chemistry – Leringer.

7. Human Physiology by Pearse.
8. The Biology of Animal Paraistes (1984), Cheng, T.Toppan C9 Ltd., Japan.
9. Medical Laboratory Technology: A procedure manual for routine diagnostic tests Volume – I-II By Kanai, L.Mukherjee, Tata McGraw – Hill Publishers, New Delhi.
10. Basic Clinical Paraitology 5th Edn, Harrold, W.Harold Brown and A. Franklin Neva-prentice Hall Internation Editions, U.S.A.

Web Links:

https://www.sunydutchess.edu/academics/catalog/current/courses/medical_laboratory_tech/index.pdf(Dutchess Community College, New York).
https://www.sunydutchess.edu/academics/catalog/current/programs/medicalandalliedhealth/mlt.pdf(Dutchess Community College, New York).
https://makautwb.ac.in/syllabus/BSc%20(Medical%20Lab%20Technology)28.02.2018.pdf

Course Outcome

- Pare the way for basic idea of various aseptic technique.
- Understanding the significance of waste disposal.
- Knowledge on Blood grouping and Blood sugar & urine sugar level.
- Gaining knowledge on culture of Bacteria, fungi and expertise on histological slide preparation.
- Operation technique of Diagnostic apparatus.
- Understanding for various immune techniques.

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
III	**20P3BTEDC**	**Extra Disciplinary Course – Trends in Biotechnology**	**4**	**-**

Objectives:

1. To study the concept and scope of Biotechnology.
2. To Understand r-DNA Technology.
3. To aware the programmes of cell culture, preparations of hormones and vaccines, transgenic animals and human genome project.
4. To study the Bioprocess technology and their applications.
5. To study the Environment Biotechnology and aware the biodiversity and their conservation.

Unit I **Hrs12**

Biotechnology – Introduction and Scope of Biotechnology – Gene Cloning, Cell –free protein production – Production of Health care Products, Medical and Forensic application (RFLP, RAPD, DNA finger printing). Applications of PCR and LCR in disease diagnosis.

Unit II **Hrs12**

Nuclear transplantation, Transgenic Animals Development and uses – mice, goat, fish and sheep. Tendered meat production. Transgenic Plant: Insect resistance, fungus resistance, virus resistance, drought, cold resistance, saline resistance, Transgenic plant with vitamin A, Gene Production of therapeutic antibodies and edible vaccine.

Unit III **Hrs12**

Bioprocess technology – Scope – Fermentor –Bioprocess products: Organic acids – Citric acid, Lactic acid, acetic acid. Antibiotics – Wide and Narrow specxtrum antibiotics. Aminoacids – Glutamic acid, Lysine, Isoleucine, Aspartic acid and Proline. Production of SCP. Enzyme Production – Amylase, Pectinase and Cellulase. Dairy products and Biofuel production.

Unit IV **Hrs12**

Biofertilizers – N_2 fixing microbes (Azolla, Azatobacter, Azospirillum) for use in Agriculture – A. tumifasciens for crop improvement – Biopesticides. Biopolymer and its Application – Biosensor and its application – Bioleaching- Biomining – Biotechnology in oil recovery – Bioremediation of Xenobiotics – superbug – its application. Biodegradation.

Unit V **Hrs12**

Regulations of Biosafety: possible dangers of GEO, Biohazards of rDNA technology. National and International biosafety guidelines, Primary and secondary containments and implementation. Web based information of biosafety on GMO.

Reference:

1. Dubey, R.C. – A Text Book of Biotechnology, S. Chand & Co., Ltd, New Delhi, 1996.
2. Gupta, P.K. – Elements of Biotechnology, Rastogi and Co., Meerut, 1994.
3. Kumar, H.F. A text book on Biotechnology, Affiliated East & West Press Pvt., Ltd, N-Delhi.
4. D.Balasubramanian *et. al.,* - Concepts in Biotechnology.
5. Singh, R.S. – Introductory Biotechnology, Central book deport, Allahabad.
6. Primrose, R. – Molecular Biotechnolgoy, ASM Press.
7. Lick, E.R. and Pastenak – J.J. Molecular Biotechnology.
8. Ignachimuthu – Plant biotechnology, Oxford IBH Publishers, New Delhi.
9. Ranga – Fishery Biotechnology.
10. Primrose, R. – Molecular Biotechnology, ASM Press.
11. Purohit – A Text Book of Biotechnology, Agrobions, Jodhpur.

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
III	**20P3CSEDC/ 20P3ITEDC**	**Extra Disciplinary Course- E-Learning Technologies**	**4**	**-**

Objective

- To learn the various E-learning approaches and components.
- To understand the types of design models of E-Learning.
- To explore the models for E-learning courseware development.
- To learn about E-learning authoring tools.
- To know about evaluation and management of E-learning solutions.

UNIT I INTRODUCTION

Need for E-Learning – Approaches of E-Learning – Components of E-Learning – Synchronous and Asynchronous Modes of Learning – Quality of E-Learning – Blended Learning: Activities, Team and Technology – Work Flow to Produce and Deliver E-Learning Content – Basics of Design Thinking.

UNIT II DESIGNING E-LEARNING COURSE CONTENT

Design Models of E-Learning – Identifying and Organizing E-Learning Course Content: Needs Analysis – Analyzing the Target Audience – Identifying Course Content – Defining Learning Objectives – Defining the Course Sequence – Defining Instructional Methods – Defining Evaluation and Delivery Strategies – Case Study.

UNIT III CREATING INTERACTIVE CONTENT

Preparing Content: Tips for Content Development and Language Style – Creating Storyboards: Structure of an Interactive E-Lesson – Techniques for Presenting Content – Adding Examples – Integrating Multimedia Elements – Adding Examples – Developing Practice and Assessment Tests – Adding Additional Resources– Courseware Development Authoring Tools – Types of Authoring Tools – Selecting an Authoring Tool

UNIT IV LEARNING PLATFORMS

Types of Learning Platforms – Proprietary Vs. Open – Source LMS – LMS Vs LCMS – Internally Handled and Hosted LMS – LMS Solutions – Functional Areas of LMS.

UNIT V COURSE DELIVERY AND EVALUATION

Components of an Instructor-Led or Facilitated Course – Planning and Documenting Activities – Facilitating Learners Activities – E-Learning Methods and Delivery Formats – Using Communication Tools for E-Learning – Course Evaluation.

REFERENCES:

1. Clark, R. C. and Mayer, R. E, "eLearning and the Science of Instruction", Third Edition, John Wiley, 2016.
2. Means, B., Toyama, Y., and Murphy, R, "Evaluation of Evidence – Based Practices in Online Learning: A Meta – Analysis and Review of Online Learning Studies", Centre for Learning Technologies, 2010.
3. Crews, T. B., Sheth, S. N., and Horne, T. M, "Understanding the Learning Personalities of Successful Online Students", Educause Review, 2014.
4. Johnny Schneider, "Understanding Design Thinking, Lean and Agile", O'Riley Media, 2011.
5. Madhuri Dubey, "Effective E – learning Design, Development and Delivery", University Press, 2011.

Course Outcomes:

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

- Distinguish the phases of activities in the models of E-learning.
- Identify appropriate instructional methods and delivery strategies.
- Choose appropriate E-learning authoring tools, Create interactive E-Learning courseware, Evaluate the E-learning courseware, Manage the E-learning courseware.

Semester	Subject Code	Title of the Paper	Hours of Teaching / Week	No. of Credits
III	**20P3LSEDC**	**Extra Disciplinary course** **Documentation Centers in India**	**4**	**-**

Objectives:

- To promote and support adoption of standards in library operations.
- To coordinate with other regional, national & international network for exchange of information and documents

Unit I

Components of information systems-Libraries, Documentation centers, Information centers.

Unit II

Data banks, Information analysis centers, Referral centers, Clearing Houses, Reprographic and translation centers-Their function and services.

Unit III

National Information systems: DESIDOC, NASSDOC, SENDOC, NISCAIR and INFLIBNET.

Unit IV

Information Aggregators, Databases Proquest, EBscohost, J-gate, POPLINE, Shodhganga, NDL,.

Unit V

Information products and series – Newsletters, House Bulletins in – house Journals, state of art reports, digest and Technical Digest.

Outcome:

The students shall be able to:

- Know the standards in library operations.
- Understand the regional, national & international network for exchange of information and documents

Reference:

1. Date, C.J. An Introduction to Database System, ed.7, Delhi: Pearson Education (Singapore), 2002
2. Desai, Bipin C. An Introduction to Database System, New Delhi, Galgetia, 2001
3. Karts Henry F, DBS Computer, New Delhi, McGraw Hill, 2000.
4. Raghu Ramakrishnan, DBMSS, New Delhi, McGraw Hill, 2000.
5. Gangadharaiah G, Management of Information Products and Services in University Libraries, Common Wealth, New Delhi, 2012.