BHARATHIDASAN UNIVERSITY TIRUCHIRAPPALLI -620 024.

M.Sc. COMPUTER SCIENCE: CHOICE BASED CREDIT SYSTEM - LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK (CBCS - LOCF)

(Applicable to the candidates admitted from the academic year 2022-23 onwards)

Sem.	Course	Course Title	Ins. Hrs.	Credit	Exam Hrs.	Marks		Total
						Int.	Ext.	
I	Core Course – I (CC)	Mathematical Foundation for Computer Science	6	5	3	25	75	100
	Core Course – II (CC)	Problem Solving using Python and R	6	5	3	25	75	100
	Core Choice Course I (CCC)	Any One from the list	6	4	3	25	75	100
	Core Practical I (CP)	Problem Solving using Python and R	3	2	3	40	60	100
	Core Choice Practical I (CP)	Any One from the list	3	2	3	40	60	100
	Core Elective – I (CE)	Any One from the list	6	4	3	25	75	100
	Value Added Course I (VACI)	Security in Computing	-	2*	3	25	75	100*
	Total		**30**	**22**	**-**	**-**	**-**	**600**
II	Core Course III (CC)	Advanced Database Management System	6	5	3	25	75	100
	Core Course IV (CC)	Compiler Design	5	5	3	25	75	100
	Core Choice Course II (CCC)	Any One from the list	5	4	3	25	75	100
	Core Practical II (CP)	Advanced Database Management System	3	2	3	40	60	100
	Core Choice Practical II (CP)	Any One from the list	3	2	3	40	60	100
	Elective Course II (EC)	Any One from the list	5	4	3	25	75	100
	Non-major Elective Course I	Fundamentals of Information Technology	3	2	3	25	75	100
	Total		**30**	**24**	**-**	**-**	**-**	**700**
III	Core Course V (CC)	Big Data Analytics	5	5	3	25	75	100
	Core Course VI (CC)	Artificial Intelligence and Machine Learning	6	5	3	25	75	100
	Core Choice Course III (CCC)	Any One from the list	5	4	3	25	75	100
	Core Practical III (CP)	Machine Learning Lab	3	2	2	40	60	100
	Core Choice Practical III (CP)	Any One from the list	3	2	2	40	60	100
	Elective Course III (EC)	Any One from the list	5	4	3	25	75	100
	Non-major Elective II	Fundamentals of Internet	3	2	3	25	75	100
	Total		**30**	**24**	**-**	**-**	**-**	**700**
IV	Core Course – XIII (CC)	Agile Technologies	6	5	3	25	75	100
	Core Course VIII (CC)	Cloud Computing	6	5	3	25	75	100
	Entrepreneurship / Industry Based Course	Technology Innovation and Sustainable Enterprise	6	5	3	25	75	100
	Project Work	Dissertation	12	5	-	20	80	100
	Value Added Course (VAC - II)	Foundations of IoT	-	2*	3	25	75	100*
	Total		**30**	**20**	**-**	**-**	**-**	**400**
Grand Total				**90**				**2400**

***The value added courses credit will not be included in the total CGPA.**
These courses are extra-credit courses.
Instruction hours for these courses is 30 hours.

LIST OF CORE CHOICE COURSES

Core Choice Course I		Core Choice Course I Practical	
1.	Advanced Java Programming	1.	Advanced Java Programming
2.	Web Technologies	2.	Web Technologies
Core Choice Course II		**Core Choice Course II Practical**	
1.	Distributed Technologies	1.	Distributed Technologies
2.	Mobile Application Development	2.	Mobile Application Development
Core Choice Course III		**Core Choice Course III Practical**	
1.	User Interface Design and Development	1.	User Interface Design and Development
2.	Cryptography and Network Security	2.	Cryptography and Network Security

LIST OF ELECTIVE COURSES

Core Elective I	
1.	Web Services
2.	Microprocessor and Microcontrollers
3.	Computer Graphics and Multimedia
Core Elective II	
1.	E-Commerce Technologies
2.	Open Source Systems
3.	Green Computing
Core Elective III	
1.	Swarm Intelligence
2.	Block Chain Technology
3.	Digital Image Processing

SUMMARY OF CURRICULUM STRUCTURE OF PG PROGRAMMES

Sl. No.	Types of the Course	No. of Courses	No. of Credits	Marks
1.	Core Course	8	40	800
2.	Core Choice Courses	3	12	300
3.	Core Practical	6	12	600
4.	Elective Courses	3	12	300
5.	Entrepreneurship/ Industry Based Course	1	5	100
6.	Project	1	5	100
7.	Non-Major Elective Courses	2	4	200
	Total	24	90	2400
	Value Added Courses *	2*	4*	200*

PROGRAMME OBJECTIVES:

- Practice and grow as computing professionals, conducting research and/or
- leading, designing, developing, or maintaining projects in various technical areas of computer science.
- Drives scientific and societal advancement through technological
- innovation and entrepreneurship
- To enable the students, to understand the core concepts, visualize and to apply them in the real time scenarios

PROGRAMME OUTCOMES:

After the successful completion of M.Sc (Computer Science) programme, the Graduates will be able to:

- An ability to apply mathematical model, algorithmic principles, and computer science theory in the design of real-time applications
- Get expertise in developing smart applications
- Apply computer science theory and software development concepts to construct computing-based solutions.
- Discover the opportunity for entrepreneurship and create and add value for the betterment of an individual and society at large.
- Use research-based knowledge and research methods to design, analyze, and interpret data and synthesize information to provide valid findings to serve the community.

PO,PSO, CO Attainment Level

High level - 3, Moderate level-2, Low level-1

First Year **CORE COURSE I** **Semester I**

MATHEMATICAL FOUNDATION FOR COMPUTER SCIENCE

Code: P22CSCC11 **(Theory)** **Credit: 5**

COURSE OBJECTIVE:

- Ability to apply mathematical logic to solve problems.
- Understand Propositions, tautologies, and inference rules.
- Able to formulate problems and apply the test of hypothesis

UNIT - I MATRICES:

Determinants, inverse of matrix. System of equations, Linear transformation - rank and nullity, Consistency and inconsistency of linear system of equations, rank nullity theorem, Echelon form of a matrix, and Row reduced echelon form of matrix. Eigen values and Eigen vectors.

UNIT – II POWER METHOD TO FIND THE DOMINANT EIGEN VALUES, NUMERICAL LINEAR ALGEBRA:

Gauss elimination method, Gauss Jordan Method, Jacobi Method for solving linear systems.

UNIT – III SETS:

Operations on sets, Venn Diagrams, Multi Sets, Binary Relations, Equivalence Relations, Ordering Relations, Operations on Relations, Partial Orders . Statements and Notation, Connectives, Quantified Propositions, Logical Inferences, Methods of Proof of an Implication, First Order Logic and other Methods of Proof, Rules of Inference for Quantified Propositions, Proof by Mathematical Induction.

UNIT – IV GENERATING FUNCTIONS OF SEQUENCES:

Calculating Coefficients of Generating Functions, Recurrence Relations, Solving Recurrence Relations by Substitution and Generating Functions, the Method of Characteristic Roots, Solutions of Inhomogeneous Recurrence Relations

UNIT – V INTRODUCTION TO PROBABILITY:

Random variables - discrete and continuous, probability functions, density and distribution functions, mean and variance, special distributions (Binomial, Hyper geometric, Poisson, Uniform, exponential and normal). Testing of Hypothesis, Null and alternative hypothesis, level of significance, one-tailed and two tailed tests, tests for small samples- T-test, Chi-square test.

UNIT – VI CURRENT CONTOURS (For continuous internal assessment only):

Contemporary Developments Related to the Course during the Semester Concerned

REFERENCES:

1. Kenneth H. Rosen, "Discrete Mathematics And Its Applications", 7th Ed, Mc Graw Hill, 2012.
2. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley India, 9th Edition 2011.
3. Bernard Kolman, Robert Busby and Sharon Cutler Ross, "Discrete Mathematical Structures for Computer Science", 6 th Ed, PHI, 2013.
4. Walpole, R. E., Myers, R. H., Myers S L & Keying Ye, 'Probability and Statistics for Engineers and Scientists'. 8th ed, Pearson Education, 2007.
5. Eric Lehman, F. Thomson Leighton, Albert R. Meyer, "Mathematics for Computer Science", MIT 7th Ed, 2015
6. William Stein, "Elementary Number Theory: Primes, Congruences, and Secrets": A Computational Approach Springer, 2008.
7. Sipser, "Introduction to the Theory of Computation, CENGAGE Learning, 2014. 4. Ernest Davis, "Linear Algebra and Probability for Computer Science Applications ", 1st Edition, CRC Press 2012.
8. Tom M. Apostol, "Introduction to Analytic Number Theory", Springer, 1998.
9. https://mrcet.com/downloads/digital_notes/IT/MATHEMATICAL%20FOUNDATIONS%20OF%20(R17A0503).pdf
10. https://stattrek.com/tutorials/probability-tutorial
11. https://www.tutorialspoint.com/discrete_mathematics/discrete_mathematics_sets.htm
12. https://repositorio.uci.cu/jspui/bitstream/123456789/9433/1/Mathematical%20Foundation%20of%20Computer%20Science%20%28%20PDFDrive%20%29.pdf

COURSE OUTCOMES:

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

CO	COURSEC OUTOME	K LEVEL
CO1	Apply the basis of the mathematical applications.	**K3**
CO2	Apply iterative methods (Gauss Jordan, Gauss Elimination and Jacobi) to solve systems of linear equations.	**K3**
CO3	Understand Propositions, tautologies and inference rules.	**K2**
CO4	Use sets and operations on sets.	**K3**
CO5	Formulate problems and apply testing of hypothesis.	**K3**

Mapping with Programme and Programme specific Outcomes:

CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	2	2	2	3	2	3	3	3	2
CO2	2	2	2	2	2	2	2	2	3	3
CO3	2	2	2	2	3	3	2	2	3	2
CO4	2	2	1	2	2	3	3	3	2	3
CO5	2	2	1	2	1	3	3	3	2	2

First Year **CORE COURSE II** **Semester I**

PROBLEM SOLVING USING PYTHON AND R

Code: P22CSCC12 **(Theory)** **Credit: 5**

COURSE OBJECTIVES:

- To understand Computational thinking using Python.
- To develop simple Python programs for solving problems.
- To make students exercise the fundamentals of statistical analysis in R environment.

UNIT – 1 INTRODUCTION TO PYTHON:

Introduction – Python overview – Getting started – Comments – Python identifiers – Reserved keywords – Variables – Standard data types – Operators – Statements and Expressions – String operations – Boolean expressions. Control Statements: The for loop – while statement – if-elif-else statement – Input from keyboard. Functions: Introduction – Built-in functions – User defined functions – Function Definition – Function Call - Type conversion – Type coercion – Python recursive function.

UNIT – II STRINGS:

Strings –Compound data type – len function – String slices – String traversal – Escape characters – String formatting operator – String formatting functions. **Tuples:** Tuples – Creating tuples – Accessing values in tuples – Tuple assignment – Tuples as return values – Basic tuple operations – Built-in tuple functions. **Lists:** Values and accessing elements – Traversing a list – Deleting elements from list – Built-in list operators & methods. **Dictionaries:** Creating dictionary – Accessing values in dictionary – Updating dictionary – Deleting elements from dictionary – Operations in dictionary - Built-in dictionary methods.

UNIT – III FILES AND EXCEPTIONS:

Introduction to File Input and Output - Writing Structures to a File - Using loops to process files Processing Records - Exception. Classes and Objects in Python: Overview of OOP – Data encapsulation – Polymorphism – Class definition – Creating objects – Inheritance – Multiple inheritances – Method overriding – Data encapsulation – Data hiding.

UNIT – IV DATA MANIPULATION TOOLS & SOFTWARES:

Numpy: Installation - Ndarray - Basic Operations -Indexing, Slicing, and Iterating - Shape Manipulation - Array Manipulation - Structured Arrays -Reading and Writing Array Data on Files. **Pandas:** The pandas Library: An Introduction - Installation -Introduction to pandas Data Structures - Operations between Data Structures - Function Application and Mapping - Sorting and Ranking - Correlation and Covariance - —Not a Number Data - Hierarchical Indexing and Leveling – **Reading and Writing Data:** CSV or Text File - HTML Files – Microsoft Excel Files.

UNIT – V PROGRAMMING WITH R:

Variables - Vector, matrix, arrays – List – Data Frames – Functions – Strings – Factors – Loops – Packages –Date and Time – Files - Making packages

UNIT – VI CURRENT CONTOURS (For continuous internal assessment only):

Contemporary Developments Related to the Course during the Semester Concerned

REFERENCES:

1. Python: The Complete Reference, Matrin C Brown, McGrraw-Hill, 2018.
2. Python Programming a Modular Approach with Graphics, Database, Mobile, and Web Applications – SheetalTaneja, Naveen Kumar – Pearson Publication, 2018.
3. Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython, Wes McKinny, 2nd Edition,O'Reilly Media, 2017.
4. Data Analytics Using Python, Bharti Motwani, Wiley, 2020
5. Richard Cotton, "Learning R", O'Reilly, 2013
6. Python for Everybody: Exploring Data Using Python3, Dr. Charles R. Severance, 2016.
7. E Balagurusamy, ―Introduction to computing and problem solving using Python‖, McGraw Hill Publication,2016.
8. Mark Summerfield, Programming in Python 3: A Complete Introduction to the Python Language, 2nd Ed.,Addison-Wesley Professional, 2010.
9. Mark Lutz, ―Learning Python‖, 5th Ed., 2013.
10. Welsey J. Chun, ―Core Python Programming‖, Prentice Hall, 2001
11. https://realpython.com/python-practice-problems/
12. https://freepdf-books.com/impractical-python-projects-playful-programming-activitiesto-make-yousmarter-book-of-2019/
13. https://freepdf-books.com/fundamentals-of-python-first-programs-second-editionbook-of-2019
14. https://docs.python.org
15. https://www.learnpython.org/
16. https://www.javatpoint.com/python-tutorial
17. https://www.tutorialspoint.com/r/index.htm

COURSE OUTCOMES:

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

CO	COURSEC OUTOME	K LEVEL
CO1	Write Python programs using Python data structures	**K2**
CO2	Develop object oriented programs in Python	**K4**
CO3	Manipulate files using Python	**K4**
CO4	Apply the Python libraries NumPy and Pandas for problem solving	**K3**
CO5	Write R programs for data visualization.	**K2**

Mapping with Programme and Programme specific Outcomes:

CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	3	3	3	2	3	3	3	2
CO2	2	3	2	2	2	2	2	2	3	3
CO3	3	2	2	2	3	3	2	2	3	2
CO4	2	2	3	2	2	3	3	3	2	3
CO5	2	2	1	3	2	3	3	3	2	2

First Year	CORE CHOICE COURSE I 2) WEB TECHNOLOGIES	Semester I
Code: P22CSCC1B	(Theory)	Credit: 4

COURSE OBJECTIVES:

- To provide fundamental concept of Internet, JavaScript, XML, JSP, ASP with a view to developing professional software development skills.
- To make familiar with client server architecture.
- To get project-based experience needed for entry into web application and development careers.

UNIT – I INTERNET BASICS:

Basic Concepts – Internet Domains – IP Address – TCP/IP Protocol – The WWW – The Telnet –– Introduction to HTML: Web server - Web client / browser - Tags – Text Formatting – Lists – Tables – Linking Documents - Frames.

UNIT – II JAVASCRIPT:

JavaScript in Web Pages – The Advantages of JavaScript –Writing JavaScript into HTML – Syntax – Operators and Expressions –Constructs and conditional checking – Functions – Placing text in a browser – Dialog Boxes – Form object's methods – Built in objects – user defined objects.

UNIT – III XML:

Comparison with HTML – DTD – XML elements – Content creation –Attributes – Entities – XSL – XLINK – XPATH – XPOINTER – Namespaces –Applications – integrating XML with other applications.

UNIT – IV JSP FUNDAMENTALS:

Basics – Directive basics – Page directive – The taglib directive – The include directive – JSP Standard Actions – Java Beans –Error Handling.

UNIT – V ASP:

Introduction to ASP – Objects – Components – Working with HTML forms – Connecting to Microsoft SQL Server & MS–Access Database – SQL statements with connection object – Working with record sets.

UNIT – VI CURRENT CONTOURS (For continuous internal assessment only):

Contemporary Developments Related to the Course during the Semester Concerned

REFERENCES:

1. "Web Enabled Commercial Application Development Using HTML, DHTML, Java Script, Perl CGI", Ivan Bayross, BPB Publication.

2. "XML Bible", Elliotte Rusty Harold, 2nd Edition, Wrox Publication.
3. "Beginning Java Server Pages", Vivek Chopra, Sing Li, Rupert Jones, Jon Eaves, John T. Bell, Wrox Publications.
4. "Practical ASP", Ivan Bayross, BPB Publication
5. Crouch Matt J, "ASP.NET and VB.NET Web Programming", Addison Wesley 2002.
6. J.Liberty, D.Hurwitz, "Programming ASP.NET", Third Edition, O'REILLY, 2006.
7. https://www.geeksforgeeks.org/web-technology/
8. https://study.com/academy/lesson/what-is-web-technology-definition-trends.html

COURSE OUTCOMES:

On the successful completion of this course, Students will be able to:

CO	COURSEC OUTOME	K LEVEL
CO1	Design a web page with Web form fundamentals and web control classes	K5
CO2	Recognize the importance of validation control, cookies and session	K3
CO3	Apply the knowledge of ASP.NET object, ADO.NET data access and SQL to develop a client server model.	K3
CO4	Recognize the difference between Data list and Data grid controls in accessing data.	K3
CO5	Know the code optimization techniques; Understand the techniques of Internet, JavaScript, XML, JSP, ASP with a view to developing professional software development skills.	K2

Mapping with Programme and Programme specific Outcomes:

CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3	2	3	3	3	2
CO2	3	2	3	3	1	2	2	2	3	3
CO3	2	2	3	3	3	3	2	2	3	2
CO4	1	2	2	1	3	3	3	3	2	3
CO5	2	3	3	1	3	3	3	3	2	2

First Year | **CORE PRACTICAL I** | **Semester I**

PROBLEM SOLVING USING PYTHON AND R

Code: P22CSCC1P | **(Practical)** | **Credit: 2**

(a). Implement the following concepts using Python

1. Decision Making and Looping statements.
2. Function Definition & Function call.
3. Create and Access Lists.
4. Built-In Tuple Functions.
5. Create and Access Dictionaries.
6. Files and Exceptions.

(b). Implement the following concepts using R

1. Loops with different examples.
2. Implement data frames in R.
3. Implement different data structures in R (Vectors, Lists, Data Frames)
4. Write a program to read a csv file and analyze the data in the file
5. Create pie charts and bar charts using R.

Mapping with Programme and Programme specific Outcomes:

CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	2	2	3	2	2	3	3	3	2
CO2	2	2	2	3	3	2	2	2	3	3
CO3	3	2	2	2	2	3	2	2	3	2
CO4	2	2	2	2	3	3	3	3	2	3
CO5	3	2	2	2	2	3	3	3	2	2

First Year **CORE CHOICE PRACTICAL I** **Semester I**

2) WEB TECHNOLOGIES

Code: P22CSCC1BI **(Practical)** **Credit: 2**

1. Write a XML program for job listing in HTML.

2. Write a JavaScript code block, which checks the contents entered in a form's text element. If the text entered is in the lower case, convert to upper case.

3. Write a JavaScript code block, which validates a username and password.

   a) If either the name or password field is not entered display an error message.
   b) The fields are entered do not match with default values display an error message.
   c) If the fields entered match, display the welcome message.

4. Write a JavaScript code to display the current date and time in a browser.

5. Write a JSP Program for user authentication.

6. Write a JSP Program for a simple shopping cart.

7. Write a JSP Program to prepare a bio data and store it in database.

8. Write an ASP Program using Response and Request Object.

9. Write an ASP Program using AdRotator Component.

10. Write an ASP program using database connectivity for student's record

Mapping with Programme and Programme specific Outcomes:

CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	2	2	3	2	2	3	3	3	2
CO2	2	2	2	3	3	2	2	2	3	3
CO3	3	2	2	2	2	3	2	2	3	2
CO4	2	2	2	2	3	3	3	3	2	3
CO5	3	2	2	2	2	3	3	3	2	2

First Year **CORE ELECTIVE I** **Semester I**

3) COMPUTER GRAPHICS AND MULTIMEDIA

Code: P22CSCC1C **(Theory)** **Credit: 4**

UNIT – I GRAPHICS HARDWARE:

Basic of Computer Graphics, display technology, Raster Scan & Random scan display systems, Input devices.

UNIT – II BASIC RASTER GRAPHICS FOR DRAWING 2_D PRIMITIVES:

Scan converting lines, circles, ellipse; filling rectangles, polygons, generating characters; antialiasing. Matrix representation and Homogeneous coordinates, two dimensional transformations, 2D line clipping, polygon clipping algorithms, window to viewport transformation.

UNIT – III VIEWING IN 3D:

Three dimensional transformation, projections: Parallel, prospective, viewpoints.

UNIT – IV REPRESENTATION OF CURVES & SURFACES:

Bezier method, B-spline methods. Visible surface determination: Z-buffer, Algos, List priority algorithms, Scan line algorithms. Light and shading models: Illumination models, shading models for polygons, shading algorithms, Gouraud & Phong, color models like RGB, YIU, copy, HSV etc.

UNIT – V INTRODUCTION TO MULTIMEDIA:

Multimedia components; multimedia hardware, SCSI, IDE, MCI, Multimedia data and file formats, RTF, TIFF, MIDI, JPEG, DIB, MPEG, Multimedia tools, presentations tools, Authoring tools, presentations. Graphics animation : Tweeking, Morphing simulating accelerator, motion specification.

UNIT – VI CURRENT CONTOURS (For continuous internal assessment only):

Contemporary Developments Related to the Course during the Semester Concerned

REFERENCES:

1. Foley, Van Dam, Fundamentals of Interactive Computer Graphics, Addison Wesly
2. Hearn and Baker Computer Graphics, Prentice Hall of India
3. Rogers D.F. Procedural Elements of Computer Graphics, McGraw Hill
4. R Steimnetz, K Nashtet, Multimedia Computing Communications & Appl., PHI
5. John F.K. Buford, Multimedia System, Addision Wesley
6. Prabhat K. And leigh and Kiran Thakkar, Multimedia System Design, PHI.
7. Roger S. David Mathematical Elements for Computer Graphics, McGraw Hill

8. https://www.tutorialspoint.com/computer_graphics/computer_graphics_curves.htm
9. http://ecoursesonline.iasri.res.in/mod/page/view.php?id=2479
10. https://www.tutorialspoint.com/computer_graphics/index.htm

COURSE OUTCOMES:

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

CO	COURSEC OUTOME	K LEVEL
CO1	Understand the graphics hardware	**K2**
CO2	Get knowledge about Raster Graphics for drawing 2_D primitives	**K4&K2**
CO3	Understand 3D Transformations	**K2**
CO4	Gain knowledge about different types of curves	**K2**
CO5	Understand Multimedia components.	**K2**

Mapping with Programme and Programme specific Outcomes:

CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	3	3	3	2	3	3	3	2
CO2	2	3	2	2	2	2	2	2	3	3
CO3	3	2	2	2	3	3	2	2	3	2
CO4	2	2	3	2	2	3	3	3	2	3
CO5	2	2	2	3	2	3	3	3	2	2

First Year	VALUE ADDED COURSE I SECURITY IN COMPUTING	Semester I
Code: P22CSVAC1	(Theory)	Credit: *2

COURSE OBJECTIVES:

- Understand various threats
- Understand Security in operating systems, database and networks
- Identify different tools

UNIT – I INTRODUCTION AND BASIC CONCEPTS:

Threats, vulnerabilities, controls; risk; Breaches; confidentiality, integrity, availability; Attacks, Exploits. Information Gathering (Social Engineering, Foot Printing & Scanning). Open Source/ Free/ Trial Tools: nmap, zenmap, Port Scanners, Network scanners.

UNIT – II EXPLANATION OF MALWARE, TYPES OF MALWARE:

Virus, Worms, Trojans, Rootkits, Robots, Adware's, Spywares, Ransom wares, Zombies etc., , Malware Analysis. Open Source/ Free/ Trial Tools: Antivirus Protection, Anti Spywares, System tuning tools, Anti Phishing.

UNIT – III SECURITY IN CONVENTIONAL OPERATING SYSTEMS:

Memory, time, file, object protection requirements and techniques Identification and authentication. Trusted operating systems.

UNIT – IV DATABASE MANAGEMENT SYSTEMS SECURITY:

Database integrity, Database secrecy , Inference control , Multilevel databases.

UNIT – V NETWORK SECURITY:

Network threats: eavesdropping, spoofing, modification, denial of service attacks, Introduction to network security techniques: firewalls, intrusion detection systems. Cyber crimes and control measures.

UNIT – VI CURRENT CONTOURS (For continuous internal assessment only):

Contemporary Developments Related to the Course during the Semester Concerned

REFERENCES

1. Charles P. Pfleeger, Shari Lawrence Pfleeger, Jonathan Margulies, Security in Computing", 5 th Ed, Prentice hall, 2015.
2. Michael E. Whitman, 'Information Security: incident response and disaster recovery', Cengage Learning, 2009
3. WM. Arthur Conklin, Gregory B. White, Chuck Cotheren, Dwayne Williams, Roger Lavis,"Principles of Computer Security", 4 th Ed,Mc Graw Hill 2016
4. https://www.w3schools.com/cybersecurity/index.php
5. https://www.javatpoint.com/cyber-security-tools

COURSE OUTCOMES:

CO	COURSEC OUTOME	K LEVEL
CO1	Understand the basic concepts of information security – Threats, Vulnerabilities and Controls	K2
CO2	Examine various malwares and program flaws	K5
CO3	Compare Security enabled in conventional and trusted operating systems.	K4
CO4	Understand various security measures in database management systems	K2
CO5	Gain knowledge on network threats and security techniques.	K2

Mapping with Programme and Programme specific Outcomes:

CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	3	3	3	2	3	3	3	2
CO2	2	3	2	2	2	2	2	2	3	3
CO3	3	2	2	2	3	3	2	2	3	2
CO4	2	3	3	2	2	3	3	3	2	3
CO5	2	2	1	3	2	3	3	3	2	2

First Year **CORE COURSE III** **Semester II**

ADVANCED DATABASE MANAGEMENT SYSTEM

Code: **(Theory)** **Credit: 5**

COURSE OBJECTIVES:

- Understand Relational Model
- Get knowledge about SQL as well as NoSql
- Understand transaction management

UNIT – I INTRODUCTION:

Database System Applications – Purpose of Database Systems -View of Data – Database Languages - Relational Databases – Database Design - Data Storage and Querying - Transaction Management, Database Architecture -Database Users and Administrators

UNIT – II RELATIONAL MODEL:

Structure of Relational Database - Database Schema, Keys, Schema Diagrams, Relational Query Languages, Relational Operations- Design Phases – Pitfalls in Design – Attribute types –ER diagram – Database Design for Banking Enterprise – Functional Dependence – Normalization (1NF, 2NF, 3NF, BCNF, 4NF, 5NF).

UNIT – III INTRODUCTION TO SQL:

SQL Data Definition, Basic Structure of SQL Queries - Additional Basics Operations, Set Operations - Null Values, Aggregate Functions - Nested Subqueries, Modification of the Database

Intermediate SQL: Join Expression, Views - Transactions, Integrity Constraints - Data Types and Schemas, Authorization

Advanced SQL: Accessing SQL from Programming Language, Functions and Procedures, Triggers

UNIT – IV TRANSACTIONS AND RECOVERY:

Transactions: Transaction Concept– Simple Transaction Model – Storage Structure - Transaction Atomicity and Durability. Transaction Isolation – Serializability - Transaction Isolation and Atomicity – Transaction Isolation Levels – Implementation of Isolation Levels – Transactions as SQL Statements Recovery Systems: Failures Classification – Storage Recovery and Atomicity – Recovery Algorithm Buffer Management – Failure with Loss of Nonvolatile Storage - Early Lock Release and Logical Undo Operations - Remote Backup Systems

UNIT – V NOSQL DATABASE AND BIG DATA STORAGE SYSTEM:

Introduction to NoSQL Systems - The CAP Theorem - Document Based NoSQL Systems and MangoDB - NoSQL key value Stores - Column based or Wide Column NoSQL Systems - NoSQL graph Databases and Neo4j.

UNIT – VI CURRENT CONTOURS (For continuous internal assessment only):

Contemporary Developments Related to the Course during the Semester Concerned

REFERENCES:

1. Database System Concepts, 6/e, Avi Silberchartz, Henry F. Korthand S. Sudarsha, Mc Graw– Hill Higher Education, International Edition, 2013.
2. Ramesh Elmasri and Shamkant B.Navathe, Fundamentals of Database Systems,7thEdition,Pe arson,NewDelhi,2016
3. Database Principles, 2/e, Peter Rob, Carlos Coronol, Steven A.Morris, KeeleyCrokett, Cengage Learning, 2013
4. Database System Concepts, PeterRob, CarlosCoronel, CengageLearning,2008.
5. DatabaseDevelopmentandManagement,LeeChao,AuerbachPublications,2010
6. NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence,Sadalage, P. &Fowler, PearsonEducation, 2013
7. Seven Databases in Seven Weeks: A Guide to Modern Databases and the NoSQLMovement,1stEdition,LucPerkins,EricRedmond,etal.O'ReilleyPublishers,2018
8. https://www.javatpoint.com/dbms-normalization
9. https://www.mongodb.com/nosql-explained
10. https://www.geeksforgeeks.org/database-recovery-techniques-in-dbms/

COURSE OUTCOMES:

CO	COURSEC OUTOME	K LEVEL
CO1	Revise the components, functions and various database Design techniquesused for modelling the databases management system.	K1
CO2	Examine the clauses and functions of SQL and write optimal queries in theabove languages.	K4,K6
CO3	Design entity-relationship diagrams to represent simple Database application scenarios and can apply the database schema Normalizationrules and techniques to criticize and improve the data base design.	K6
CO4	Analyze the concept of transaction processing, concurrent transaction processing and recovery procedures.	K4
CO5	Employ the NoSQL database concepts.	K3

SUBJECT CODE : P22CSCC21

PSO-PO-CO MAPPING MATRIX										
PO & PSO CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03	PSO04	PSO05
CO01	3	2	3	3	3	3	2	3	3	2
CO02	2	3	2	2	2	3	2	2	3	2
CO03	3	2	2	2	3	2	3	1	2	2
CO04	2	2	3	2	2	2	2	1	2	2
CO05	2	2	1	3	2	3	2	1	2	2
TOTAL	12	11	11	12	12	13	11	8	12	10

*****

First Year	CORE COURSE IV COMPILER DESIGN (Theory)	Semester II
Code:		Credit: 5

COURSE OBJECTIVES:

- Define the design and intrinsic functioning of compilers
- Identify the purpose and functions of phases of the compiler
- Describe the Contents and data structures for Symbol table with errors

UNIT – I INTRODUCTION TO COMPILERS:

Compilers - Analysis - Synthesis model of compilation - Analysis of the source program - The phases of a compiler -Cousins of the compiler - Compiler construction tools - Error handling.

UNIT – II LEXICAL ANALYZER:

Lexical analysis - Role of lexical analyzer - Tokens, Patterns and lexemes - Input buffering - Specification of tokens - Regular expressions - Recognition of tokens - Transition diagrams - Implementing a transition diagram - Finite Automata - Regular expression to NFA - Conversion of NFA to DFA

UNIT – III SYNTAX ANALYZER:

Syntax analysis - Role of parser - Context-free grammars - Derivations - Writing a grammar - Top Down parsing - Recursive descent parsing - Predictive parsers - Non-recursive predictive parsers - Construction of predictive parsing tables - Bottom up parsing - Handles - Shift reduce parser - Operator precedence parsing - LR parsers - Canonical collection of LR (0) items -Constructing SLR parsing tables.

UNIT – IV INTERMEDIATE CODE GENERATION:

Intermediate code generation - Intermediate languages - Graphical Representation - Three Address Code - Assignment statements - Boolean expressions - Flow of Control Statements - Case Statements - .Syntax directed translation of case statements

UNIT – V CODE OPTIMIZATION AND CODE GENERATION:

An Organization for an Optimizing Compiler - the Principle sources of optimization - Function Preserving Transformations - Common Subexpression - Copy propagation - Optimization of basic blocks - The use of Algebraic identities - Loops in flow graphs - Code generation - issues in the design of a code generator - The target machine.

UNIT – VI CURRENT CONTOURS (For continuous internal assessment only):

Contemporary Developments Related to the Course during the Semester Concerned

REFERENCES:

1. "Compilers: Principles, Techniques, and Tools", Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, Second Edition, Pearson Addison Wesley, 2007.
2. Compiler Construction Principles and Practice – D.M. Dhamadhere, McMillan India Ltd., Madras, 1983.
3. Alfred V. Aho, Ravi Sethi and Jeffrey D Ullman, "Compilers, Principles, Techniques and Tools", Addison Wesley Longman (Singapore Pvt. Ltd.), 2011.
4. Alfred V. Aho, Jeffrey D Ullman, "Principles of Compiler Design", Addison Wesley, 1988.
5. David Galles, "Modern Compiler Design", Pearson Education, 2008

COURSE OUTCOMES:

On completion of the course, students will be able to

CO	COURSEC OUTOME	K LEVEL
CO1	Understand the fundamentals of a compiler.	K2
CO2	Get knowledge about the context-free grammars and various parsing techniques.	K2
CO3	Understand the lexical analyzer and syntax analyzer of Compiler.	K2
CO4	Understand the types and sources of errors, from the compilers perspective.	K2
CO5	Know the procedures and principles involved in the machine code generation.	K2

SUBJECT CODE : P22CSCC22

PSO-PO-CO MAPPING MATRIX										
PO & PSO / CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03	PSO04	PSO05
CO01	3	2	2	1	1	2	1	1	3	2
CO02	2	3	3	3	3	3	3	2	3	2
CO03	3	3	3	3	2	3	3	2	2	2
CO04	2	3	3	1	2	3	3	2	2	2
CO05	2	1	2	2	3	1	2	2	2	2
TOTAL	12	12	13	10	11	12	12	9	12	10

*****

First Year **CORE CHOICE COURSE II** **Semester II**

1) DISTRIBUTED TECHNOLOGIES

Code: **(Theory)** **Credit: 4**

COURSE OBJECTIVES:

- To provide ideas to be able to compare the architectures of distributedsystems;
- To know the art of developing ASP.NET pages with web server and HTMLcontrols;
- To become familiar with the disconnected data access technology in ADO.NET.

UNIT – I OVERVIEW OF DISTRIBUTED COMPUTING:

Introduction to distributed Computing – Challenges involved in establishing remote connection – Strategies involved in remote computation –Current Distributed computing practices through Dot Net and Java technologies - Client server architecture: 2-tier model - 3-tier model - n-tier model.

UNIT – II ARCHITECTURE AND JAVA BEANS:

J2EEarchitecture - DOTNET architecture - MVC Architecture – JavaBeans – Enterprise Java Beans – Distributed Object models – RMI – XML-JSP.

UNIT – III ADVANCED ASP.NET:

AdRotator, Multiview, Wizard and Image Map Controls – Master Pages – Web Parts - Security in ASP, NET – State Management in ASP, NET – Mobile Application development in ASP. NET- Uses of these controls and features in Website development.

UNIT – IV ADVANCED ADO.NET:

Disconnected Data Access – Grid view, Details View, Form View controls – Crystal Reports – Role of ADO.NET in Distributed Applications.

UNIT – V WEB SERVICES:

Role of Web services in Distributed Computing –WSDL, UDDI, SOAP concepts involved in Web Services – Connected a Web Service to a Data Base – Accessing a Web Service through ASP.NET application.

UNIT – VI CURRENT CONTOURS (For continuous internal assessment only):

Contemporary Developments Related to the Course during the Semester Concerned

REFERENCES:

1. Walther, ASP. NET 3.5, SAMS Publication, 2008.
2. Justin Couch, Daniel H. Steinberg, "J2EE Bible", Wiley India(P) Ltd, New Delhi, 2002
3. Platt S David, "Introducing Micorsoft .Net", Prentice Hall of India, New Delhi,2005.
4. Paul Tremblett, "Instant Enterprise Java y – Beans", Tata McGraw Hill Publishing Company, New Delhi, 2001
5. Stephanie Bodoff, Dale Green, Eric Jendrock, "The J2EE tutorial", Addison-Wesley, 2002
6. Hitesh Seth, "Microsoft .NET: kick start", Sams Publishing, 2004
7. K.Meena, R.Sivakumar, A.B.Karthlck Anand Babu, Dot Net Technologies, Himalaya Publishing House Pvt., Ltd., Bangalore, 2016, (ISBN:978 -93-5037-938-9)

COURSE OUTCOMES:

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

CO	COURSEC OUTOME	K LEVEL
CO1	Compare the architectures of distributed systems;	**K4**
CO2	Differentiate the technologies associated with presentation and interactionservices;	**K4**
CO3	Have sound knowledge in developing applications with components;	**K2**
CO4	Understand the art of developing ASP.NET pages with web server and HTMLcontrols;	**K2**
CO5	Become familiar with the disconnected data access technology in ADO.NET.	**K2,K3**

SUBJECT CODE : P22CSCC2A

PSO-PO-CO MAPPING MATRIX										
PO & PSO / **CO**	**PO01**	**PO02**	**PO03**	**PO04**	**PO05**	**PSO01**	**PSO02**	**PSO03**	**PSO04**	**PSO05**
CO01	3	3	3	3	3	3	2	2	3	3
CO02	2	3	3	3	1	1	3	2	3	3
CO03	3	2	3	3	3	2	1	3	3	3
CO04	1	2	2	2	3	3	4	3	3	3
CO05	2	2	3	2	3	3	2	3	3	3
TOTAL	11	12	14	13	13	12	12	13	15	15

First Year **CORE PRACTICAL II** **Semester II**

ADVANCED DATA BASE MANAGEMENT SYSTEM

Code: **(Practical)** **Credit: 2**

Implement the following Concepts:

- Tables Creations, Sorting, Setting relation between tables
- Queries using single and multiple tables
- Exception Handling
- Cursor and Triggers
- Import & Export Tables
- Indexing and Query Processing
- Reports

SUBJECT CODE : P22CSCC2P

PSO-PO-CO MAPPING MATRIX										
PO & PSO / CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03	PSO04	PSO05
CO01	3	2	3	3	3	3	2	3	3	3
CO02	3	3	2	2	2	3	2	2	3	3
CO03	3	3	2	2	3	2	3	2	2	2
CO04	2	2	3	3	2	2	2	2	2	3
CO05	2	2	2	3	2	3	2	2	2	2
TOTAL	13	12	12	13	12	13	11	11	12	13

*****

First Year	CORE CHOICE PRACTICAL II 1) DISTRIBUTED TECHNOLOGIES	Semester II
Code:	(Practical)	Credit: 2

List of Programs:

1. RMI application with a server and more than one client.
2. RMI application with Database Connectivity
3. Webpages using JSP Scriptlet.
4. Webpage using JSP of java beans.
5. Performing XML transformation using XML and XSL coding.
6. Create XML Schema.
7. Creation of a table and insertion of a few records using Disconnected Access.
8. Viewing records using GridView, Details View, Form View Controls.
9. Generation of a crystal report from an existing database.
10. Web page that uses of Ad Rotator Control.

SUBJECT CODE : P22CSCC2AP

PSO-PO-CO MAPPING MATRIX										
PO & PSO CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03	PSO04	PSO05
CO01	3	2	3	3	3	3	2	3	3	3
CO02	2	3	2	2	2	3	2	2	3	3
CO03	3	3	2	2	3	2	3	2	2	2
CO04	2	2	3	2	2	2	2	2	3	3
CO05	3	2	1	3	2	3	2	2	3	3
TOTAL	13	12	11	12	12	13	11	11	14	14

*****

First Year	ELECTIVE COURSE II	Semester II
	1) E-COMMERCE TECHNOLOGIES	
Code:	(Theory)	Credit: 4

COURSE OBJECTIVE:

The course should enable the students to:

- Get knowledge about e-commerce framework.
- Explain electronic system for payment.
- Understand the usage of multimedia systems for e-commerce

UNIT – I ELECTRONIC COMMERCE FRAMEWORK:

Electronic Commerce Framework – Electronic Commerce and Media Convergence The Anatomy of E-Commerce Applications – Electronic Commerce Consumer Applications – Electronic Commerce Organization Applications. The Network Infrastructure for Electronic Commerce: Components of the High way – Network Access Equipment – Global information Distribution Networks.

UNIT – II THE INTERNET AS A NETWORK INFRASTRUCTURE:

The Internet Terminology – NSFNET Architecture and components – National Research and Education Network – Internet Governance – An overview of Internet Applications. The Business of Internet Commercialization :Telco/Cable/On-Line Companies - National Independent ISPs –Regional Level ISPs – Local –level ISPs – Internet Connectivity options.

UNIT – III ELECTRONIC COMMERCE AND THE WORLD WIDE WEB:

Architectural Framework for Electronic Commerce – World Wide Web as the Architecture – Technology behind the Web – Security and the Web, Consumer-Oriented Electronic Commerce: Consumer-Oriented Applications – mercantile process model – mercantile models from the consumers perspective.

UNIT – IV ELECTRONIC PAYMENT SYSTEMS:

Types of Electronic Payment Systems – Digital Token based Electronic Payment Systems – Credit Card – Based Electronic Payment Systems– Risk and Electronic Payment Systems – Designing Electronic Payment Systems. Interorganizational Commerce and EDI: Electronic Data Interchange – EDI Applications in Business – EDI: Legal, Security and Privacy issues. Business – EDI: Legal, Security and Privacy issues.

UNIT – V ADVERTISING AND THE MARKETING ON THE INTERNET:

The New Age of Information Search and Retrieval – Electronic Commerce Catalogs – Information filtering – Consumer – Data Interface – Emerging Tools. On Demand Education and Digital Copyrights: Computer based Education and Training – Technological Components of Education on demand. Software Agents:

Characteristics and Properties of Agents – The Technology behind Software Agents – Applets, Browsers and Software Agents.

UNIT – VI CURRENT CONTOURS (For continuous internal assessment only):

Contemporary Developments Related to the Course during the Semester Concerned

REFERENCES:

1. "Frontiers of Electronic Commerce", Ravikalakota & Andrew Whinston, Adison Wesley, 2000.
2. "Electronic Commerce", Pete Loshin & Paul A.Murphy, Second edition, Jaico Publishing House, 2000.
3. https://www.investopedia.com/terms/e/ecommerce.asp
4. https://www.techtarget.com/searchcio/definition/e-commerce
5. https://www.shopify.in/encyclopedia/what-is-ecommerce

COURSE OUTCOMES:

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

CO	COURSEC OUTOME	K LEVEL
CO1	Gain the understanding of the concepts of Electronic commerce and itsapplication;	K2
CO2	Classify different services providers and their services and tools	K4
CO3	Understand the ecommerce framework.	K2
CO4	Gain the knowledge on E-Payment system.	K2
CO5	Understand e-commerce transactions with respect to Internet.	K1,K2

SUBJECT CODE : P22CSE2A

PSO-PO-CO MAPPING MATRIX										
PO & PSO / CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03	PSO04	PSO05
CO01	3	2	3	3	3	3	2	3	3	3
CO02	2	3	2	2	2	3	2	2	3	2
CO03	3	3	2	2	3	2	3	2	2	2
CO04	2	2	3	2	2	2	2	2	2	2
CO05	2	2	1	3	2	3	2	2	2	3
TOTAL	12	12	11	12	12	13	11	11	12	12

First Year **NON MAJOR ELECTIVE I** **Semester II**

FUNDAMENTALS OF INFORMATION TECHNOLOGY

Code: **(Theory)** **Credit: 2**

COURSE OBJECTIVES:

ti

- To understand the revolution in computers and communications
- To know about various application software
- To understand the information systems and software development

UNIT – I INFORMATION TECHNOLOGY:

Introduction – Information systems – Definition of computer and system – Software and Data - IT in business and Industry – IT in the Home and at Play – It in Education and Training – IT in Entertainment and the Arts – IT in Science, Engineering, and Mathematics – Global Positioning System.

UNIT – II INTRODUCTION TO COMPUTERS:

History of computers, Types of computers, Characteristics of computers, Basic Anatomy of a computer, Applications of computer – Memory – Memory types.

UNIT – III Software:

Kinds of Software - The five types of Applications software - Word processing – Spreadsheets - Database software, Presentation graphics software - Communications software System Software – Operating system - functions

UNIT – IV COMPUTER NETWORKS:

Introduction – Definition Computer Networks - Types of Networks – Local Area Network – Metropolitan Area Network - Wide Area Network – Personal Area Network - internet – Intranet – firewalls - Network Topology – Bus – Ring – Hybrid – Star

UNIT – V BASIC INTERNET CONCEPTS:

Analog and Digital Signals - modems and communication Software, ISDN lines, and Cable Modems - Definition of Internet - The World Wide Web - Connecting to the Internet – Browsing the web – Web browser – Uniform Resource Locator (URL) – E-mail communication.

UNIT – VI CURRENT CONTOURS (For continuous internal assessment only):

Contemporary Developments Related to the Course during the Semester Concerned.

REFERENCES:

1. Dennis P.Curtin, Kim dolwy, KunL AWN, Xrhleen morin, Information

Technology, the breaking wave, TMH 2000.
2. Stacey C Sawyer, Brain K Williams, Sarah E Hutchinson Using Information Technology –Brief Version
3. A Practical Introduction to Computer and Communications Third Edition, McGraw Hill Companies 2011
4. James O'Brien – Introduction to Information systems. 16th edition, 2005.
5. The Internet Book: Everything You Need to Know About Computer Networking and How the Internet Works, Douglas E. Comer, Pearson, 2000
6. https://www.javatpoint.com/internet
7. http://www.steves-internet-guide.com/networking/

COURSE OUTCOMES:

At the end of the course, the students will be able:]

CO	COURSEC OUTOME	K LEVEL
CO1	To know the latest trends in information technology	K2
CO2	To understand the fundamentals of computers	K2
CO3	To gain knowledge about networks	K2
CO4	To acquire knowledge about different software	K2
CO5	To understand Internet basics	K1,K2

SUBJECT CODE : P22CSNME1

PSO-PO-CO MAPPING MATRIX										
PO & PSO / CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03	PSO04	PSO05
CO01	3	2	3	3	3	3	2	3	3	2
CO02	2	3	2	2	2	3	2	2	3	2
CO03	3	3	2	2	3	2	3	2	2	2
CO04	2	2	3	2	2	2	2	2	1	2
CO05	2	2	1	3	2	3	2	1	1	2
TOTAL	12	12	11	12	12	13	11	10	10	10

*****

Second Year	CORE COURSE V	Semester III
	BIG DATA ANALYTICS	
Code:	(Theory)	Credit: 5

COURSE OBJECTIVE:

1. To impart knowledge in Fundamentals of Big Data Analytics.
2. To make aware of technologies and databases.
3. To impart knowledge on Hadoop and Map Reduce Fundamentals

UNIT – I INTRODUCTION TO BIG DATA:

Data, Characteristics of data and Types of digital data: Unstructured, Semi-structured and Structured, Sources of data, Working with unstructured data, Evolution and Definition of big data, Characteristics and Need of big data, Challenges of big data, Data environment versus big data environment

UNIT – II BIG DATA ANALYTICS:

Overview of business intelligence, Data science and Analytics, Meaning and Characteristics of big data analytics, Need of big data analytics, Classification of analytics, Challenges to big data analytics, Importance of big data analytics, Basic terminologies in big data environment

UNIT – III BIG DATA TECHNOLOGIES AND DATABASES:

Introduction to NoSQL, Uses, Features and Types, Need, Advantages, Disadvantages and Application of NoSQL, Overview of NewSQL, Comparing SQL, NoSQL and NewSQL, Introduction to MongoDB and its needs, Characteristics of MongoDB, Introduction of apache cassandra and its needs, Characteristics of Cassandra

UNIT – IV HADOOP FOUNDATION FOR ANALYTICS:

History, Needs, Features, Key advantage and Versions of Hadoop, Essential of Hadoop ecosystems, RDBMS versus Hadoop, Key aspects and Components of Hadoop, Hadoop architectures

UNIT – V MAPREDUCE AND YARN FRAMEWORK:

Introduction to MapReduce, Processing data with Hadoop using MapReduce, Introduction to YARN, Components, Need and Challenges of YARN, Dissecting YARN, MapReduce application, Data serialization and Working with common serialization formats, Big data serialization formats

UNIT – VI CURRENT CONTOURS (For continuous internal assessment only):

Contemporary Developments Related to the Course during the Semester Concerned

REFERENCES:

1. Seema Acharya and Subhashini Chellappan, "Big Data and Analytics", Wiley India Pvt. Ltd., 2016
2. "Big Data" by Judith Hurwitz, Alan Nugent, Dr. Fern Halper and Marcia Kaufman, Wiley Publications, 2014.
3. "Big Data Imperatives: Enterprise Big Data Warehouse, BI Implementations and Analytics" by Soumendra Mohanty, Madhu Jagadeesh and Harsha Srivatsa, Apress Media, Springer Science + Business Media New York, 2013
4. Mining of Massive Datasets", Anand Rajaraman, Jure Leskovec, Jeffery D. Ullman, Springer, July 2013.
5. "Hadoop: The definitive Guide", Tom White, O'Reilly Media, 2010.
6. https://www.techtarget.com/searchbusinessanalytics/definition/big-data-analytics
7. https://www.sas.com/en_us/insights/analytics/big-data-analytics.html

COURSE OUTCOMES:

Upon completion of the course, the students are expected to:

CO	COURSEC OUTOME	K LEVEL
CO1	Understand the big data environment.	K2
CO2	Understand the concepts of analytics	K2
CO3	Understand the unstructured databases.	K2
CO4	Analyze the Big Data framework like Hadoop and NOSQL to efficiently storeand process Big Data to generate analytics.	K4
CO5	Reveal the MapReduce technologies.	K4

SUBJECT CODE : P22CSCC31

PSO-PO-CO MAPPING MATRIX										
PO & PSO / CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03	PSO04	PSO05
CO01	2	2	3	3	3	2	1	2	1	2
CO02	3	2	3	1	2	2	2	2	2	2
CO03	3	2	2	3	3	2	3	2	2	2
CO04	3	3	2	2	2	2	2	2	2	2
CO05	3	2	3	3	2	2	2	3	3	3
TOTAL	14	11	13	12	12	10	10	11	10	11

Second Year **CORE COURSE VI** **Semester III**

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Code: **(Theory)** **Credit: 5**

COURSE OBJECTIVES:

1. Understand the problem-solving methods using state space search
2. Apply the formal knowledge representation and reasoning for a problem
3. Implement and apply the supervised and unsupervised machine leaning algorithms

UNIT – I INTRODUCTION TO MACHINE LEARNING:

Introduction ,Components of Learning , Learning Models , Geometric Models, Probabilistic Models, Logic Models, Grouping and Grading, Designing a Learning System, Types of Learning, Supervised, Unsupervised, Reinforcement, Perspectives and Issues, Version Spaces, PAC Learning, VC Dimension.

UNIT – II SUPERVISED AND UNSUPERVISED LEARNING:

Decision Trees: ID3, Classification and Regression Trees, Regression: Linear Regression, Multiple Linear Regression, Logistic Regression, Neural Networks: Introduction, Perception, Multilayer Perception, Support Vector Machines: Linear and Non-Linear, Kernel Functions, K Nearest Neighbors. Introduction to clustering, K-means clustering, K-Mode Clustering.

UNIT – III ENSEMBLE AND PROBABILISTIC LEARNING:

Model Combination Schemes, Voting, Error-Correcting Output Codes, Bagging: Random Forest Trees, Boosting: Adaboost, Stacking. Gaussian mixture models - The Expectation-Maximization (EM) Algorithm, Information Criteria, Nearest neighbour methods - Nearest Neighbour Smoothing, Efficient Distance Computations: the KD-Tree, Distance Measures.

UNIT – IV REINFORCEMENT LEARNING AND EVALUATING HYPOTHESES:

Introduction, Learning Task, Q Learning, Non deterministic Rewards and actions, temporal-difference learning, Relationship to Dynamic Programming, Active reinforcement learning, Generalization in reinforcement learning. Motivation, Basics of Sampling Theory: Error Estimation and Estimating Binomial Proportions, The Binomial Distribution, Estimators, Bias, and Variance

UNIT – V INTRODUCTION OF AI:

Definition of AI- AI Problems – Underlying Assumption – Al technique – Level of the Model - Criteria for Success. Problems, Problem Spaces, Search: Defining the Problem as State Space Search - Production Systems - problem Characteristics – Production System Characteristics.

UNIT – VI CURRENT CONTOURS (For continuous internal assessment only):

Contemporary Developments Related to the Course during the Semester Concerned

REFERENCE BOOKS:

1. Ethem Alpaydin, "Introduction to Machine Learning", MIT Press, Prentice Hall of India, 3rd Edition2014.
2. Mehryar Mohri, Afshin Rostamizadeh, Ameet Talwalkar " Foundations of Machine Learning", MIT Press,2012.
3. Tom Mitchell, "Machine Learning", McGraw Hill, 3rdEdition, 1997.
4. MACHINE LEARNING - An Algorithmic Perspective, Second Edition, Stephen Marsland, 2015.
5. Stuart J. Russell and Norvig, Artificial Intelligence – A Modern Approach, Second Edition, Pearson Education, 2007
6. Elaine Rich, Kevin Knight, Shivashankar B Nair, *Artificial Intelligence,* Third Edition, Tata McGraw-Hill Education Private Limited, Seventh Reprint 2011.
7. K.Meena & R.Dhanapal, Artificial Intelligence and Expert Systems, International Books, Tlruchlrappalll,2001.(ISBN :81 - 900811 - 1 - x)
8. CharuC.Aggarwal,"DataClassificationAlgorithmsandApplications",CRCPress,2014.
9. Charu C. Aggarwal, "DATA CLUSTERING Algorithms and Applications", CRC Press, 2014.
10. Kevin P. Murphy "Machine Learning: A Probabilistic Perspective", The MIT Press, 2012
11. Vinod Chandra S.S and Anand Hareendran S.,Artificial Intelligence and Machine Learning, PHI Learning Private Limited, 2014
12. https://www.analyticsinsight.net/the-difference-between-artificial-intelligence-and-machine-learning/
13. https://marutitech.com/artificial-intelligence-and-machine-learning/

COURSE OUTCOMES:

CO	COURSEC OUTOME	K LEVEL
CO1	Recognize the characteristics of Machine Learning techniques that enable tosolve real world problems	**K2**
CO2	Recognize the characteristics of machine learning strategies	**K2**
CO3	Apply various supervised learning methods to appropriate problems	**K3**
CO4	Identify and integrate more than one techniques to enhance the performanceof learning	**K4,K5**
CO5	Understand basic AI Techniques	**K1,K2**

SUBJECT CODE : P22CSCC32

PSO-PO-CO MAPPING MATRIX										
PO & PSO CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03	PSO04	PSO05
CO01	2	2	1	1	2	3	2	2	2	2
CO02	3	2	3	1	1	2	3	2	2	2
CO03	2	2	3	2	2	2	2	1	2	2
CO04	3	2	2	2	2	3	3	2	2	2
CO05	3	2	2	2	2	3	1	2	3	2
TOTAL	13	10	11	8	6	13	11	9	11	10

*****

Second Year **CORE CHOICE COURSE III** **Semester III**

1. USER INTERFACE DESIGN AND DEVELOPMENT

Code: **(Theory)** **Credit: 4**

COURSE OBJECTIVES:

- To learn new emerging web technologies.
- To gain knowledge and skills required for web development careers.
- To develop skills in the use and application of specific methods in user experience design.

UNIT – I HTML, XML, CSS& RWD:

Introduction To HTML- DHTML , XML – Structuring XML document using DTD – Schemas – XML parsers – DOM – SAX presentation technologies – XSL – XFORMS – XHTML – Transformations – XSLT – XLINK – XPATH – XQuery. Responsive Web Design-Intro-Fluid Grid-Viewport-Media Queries-Images. Introduction To CSS-Syntax, Selectors-Types of style sheets.

UNIT – II CLIENT SIDE SCRIPTING:

Java Script – Advantages – Data types – Variables – Operators – Control statements – Functions – Objects and arrays – Windows and frames – Forms. AJAX – XML Http Request (XHR) – Create Object – Request – Response – Ready state.

UNIT – III SERVER SIDE SCRIPTING:

Introduction To PHP – Data Types – Control Structures – Arrays - Function – Html Form with PHP –Form Handling & Validation - File Handling – Cookies – Sessions – Filters – Exception Handling - Database Connectivity With MySQL.

UNIT – IV ANGULAR JS & JQUERY:

Angular JS Expression – Modules – Directives – Data Binding – Controllers – Scopes – Filters – Services – Tables – Events – Form – Validation. Query Syntax – Selects – Events – jQuery Effects – jQuery – jQuery HTML – jQuery Traversing.

UNIT – V UX & UI:

UX Introduction -Elements of UX Design- UX Design Process- Research Methods and Tools-Understanding User Needs and Goals. UX Design Process: Visual Design Principles-Information Design and Visualization-Interaction Design Prototyping Tools-Usability Test. UI Introduction-User Interface Components - Tools and Processes.

REFERENCES:

1. Jeffrey C. Jackson, Web Technologies: A Computer Science Perspective, Pearson Education, 2009.
2. Kogent Learning Solutions Inc., Web Technologies Black Book, Dreamtech Press, 2009.
3. Ken Williamson, Learning AngularJS: A Guide to AngularJS Development, O'Reilly, 2015.
4. Jon Duckett, JavaScript and JQuery: Interactive Front-End Web Development, John Wiley and Sons Inc., 2014.

5. CallumMacrae, Learning from JQuery, O'Reilly, 2013.
6. K.Meena, R.Slvakumar,A .B.Karthick Anand Babu, Web Programming with PHP and Mysql, Himalaya Publications. Mumbai, 2012.(ISBN :978- 93 - 5051 - 581• 5)
7. Steve Krug, Dont Make Me Think,2nd Edition, New Riders Publishing, USA, 2006.
8. https://docs.angularjs.org/tutorial
9. https://developer.mozilla.org/en-US/docs/Learn/JavaScript
10. https://www.javatpoint.com/jquery-tutorial

COURSE OUTCOMES:

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

CO	COURSEC OUTOME	K LEVEL
CO1	Work with XML technologies.	K3
CO2	Design web page to perform form validation using client-side scripting language.	K6
CO3	Implement new technologies such as Angular JS and JQuery.	K3
CO4	Develop web applications using server-side scripting language.	K6
CO5	Effectively select and utilize design thinking processes and UX/UI tools.	K3,K4

SUBJECT CODE : P22CSCC3A

PSO-PO-CO MAPPING MATRIX										
PO & PSO / CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03	PSO04	PSO05
CO01	3	2	2	2	3	2	3	2	2	2
CO02	3	3	2	2	2	1	2	3	3	3
CO03	2	3	2	2	3	2	2	1	3	3
CO04	2	3	2	2	2	3	2	2	2	2
CO05	3	2	2	2	2	3	2	2	2	2
TOTAL	13	13	10	10	12	11	11	10	12	12

Second Year	CORE PRACTICAL III MACHINE LEARNING (Practical)	Semester III
Code:		Credit: 2

Implement the following concepts using C/Java/Python

1. Cleaning and Pre-processing Data
2. Feature Extraction
3. Simple Linear Regression Models
4. K Nearest Neighbors
5. K-means clustering
6. Classification
7. Support Vector Machines

SUBJECT CODE : P22CSCC3P

PSO-PO-CO MAPPING MATRIX										
PO & PSO CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03	PSO04	PSO05
CO01	3	2	3	3	3	3	2	3	3	2
CO02	2	3	2	2	2	3	2	2	2	3
CO03	3	2	2	2	3	2	3	2	3	3
CO04	2	3	3	2	2	2	2	2	2	3
CO05	2	2	2	3	2	3	2	1	2	2
TOTAL	12	12	12	12	12	13	11	10	12	13

*****

Second Year | **CORE CHOICE PRACTICAL III** | **Semester III**

1. USER INTERFACE DESIGN AND DEVELOPMENT

Code: | **(Practical)** | **Credit: 2**

List of Exercises

1. Create an Internal and External Style sheet.
2. Working with XML and CSS.
3. Write a JavaScript code to perform form validation.
4. Working with AJAX.
5. Working with Angular JS Directives.
6. Working with Angular JS Expressions.
7. Working with jQuery Selectors.
8. Working with jQuery Events and Effects.
9. Program to perform PHP Form Validation.
10. Program to demonstrate PHP Form Handling.

SUBJECT CODE : P22CSCC3AP

PSO-PO-CO MAPPING MATRIX										
PO & PSO / CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03	PSO04	PSO05
CO01	3	2	3	3	3	3	2	3	3	3
CO02	2	3	2	2	2	3	2	2	2	3
CO03	3	2	3	2	3	2	3	2	3	2
CO04	2	2	3	3	3	2	2	2	2	2
CO05	3	3	1	3	2	3	2	2	2	2
TOTAL	13	12	12	13	13	13	11	11	12	12

*****

Second Year **ELECTIVE COURSE III** **Semester III**

2. BLOCK CHAIN TECHNOLOGY

Code: **(Theory)** **Credit: 4**

COURSE OBJECTIVES:

- To understand the history, types and applications of Blockchain
- To acquire knowledge about cryptography and consensus algorithms.
- Deploy projects using Web3j and design blockchain based applications.

UNIT – 1 INTRODUCTION TO BLOCKCHAIN:

Distributed DBMS – Limitations of Distributed DBMS, Introduction to Block chain – History, Definition, Distributed Ledger, Blockchain Categories – Public, Private, Consortium, Blockchain Network and Nodes, Peer-to-Peer Network, Mining Mechanism, Generic elements of Blockchain, Features of Blockchain, and Types of Blockchain.

UNIT – II BLOCKCHAIN ARCHITECTURE:

Operation of Bitcoin Blockchain, Blockchain Architecture – Block, Hash, Distributer P2P, Structure of Blockchain- Consensus mechanism: Proof of Work (PoW), Proof of Stake (PoS), Byzantine Fault Tolerance (BFT), Proof of Authority (PoA) and Proof of Elapsed Time (PoET)

UNIT – III BLOCKCHAIN-BASED FUTURES SYSTEM:

Project presentation- Futures smart contract: Blockchain oracles- Web3j: Setting up the Web3J- Installing web3j- Wallet creation, Java client: The wrapper generator- Initializing web3j- Setting up Ethereum accounts- Deploying the contract

UNIT – IV BLOCKCHAINS IN BUSINESS AND CREATING ICO:

Public versus private and permissioned versus permission less blockchains- Privacy and anonymity in Ethereum- Why are privacy and anonymity important? - The Ethereum Enterprise Alliance- Blockchainas-a-Service- Initial Coin Offering (ICO): Project setup for ICO implementation- Token contracts- Token sale contracts-Contract security and testing the code.

UNIT – V DISTRIBUTED STORAGE IPFS AND SWARM:

Ethereum Virtual Machine- Swarm and IPFS: Installing IPFS, Hosting our frontend: Serving your frontend using IFPS, Serving your frontend using Swarm, IPFS file uploader project: Project setup the web page

UNIT – VI CURRENT CONTOURS (For continuous internal assessment only):

Contemporary Developments Related to the Course during the Semester Concerned

REFERENCES:

1. Imran Bashir, "Mastering Blockchain: Distributed Ledger Technology, decentralization, and smart contracts explained", 2nd Edition, Packt Publishing Ltd, March 2018.
2. Bellaj Badr, Richard Horrocks, Xun (Brian) Wu, "Blockchain By Example: A developer's guide to creating decentralized applications using Bitcoin, Ethereum, and Hyperledger", Packt Publishing Limited, 2018.
3. Andreas M. Antonopoulos, "Mastering Bitcoin: Unlocking Digital Cryptocurrencies", O'Reilly Media Inc, 2015.
4. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, "Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction", Princeton University Press, 2016.
5. https://www.simplilearn.com/tutorials/blockchain-tutorial/blockchain-technology
6. https://www.ibm.com/in-en/topics/what-is-blockchain
7. https://www.investopedia.com/terms/b/blockchain.asp

COURSE OUTCOMES:

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

*****

CO	COURSEC OUTOME	K LEVEL
CO1	Contentedly discuss and describe the history, types and applications ofBlockchain	**K1,K2**
CO2	Gains familiarity with cryptography and Consensus algorithms.	**K2**
CO3	Create and deploy projects using Web3j.	**K6**
CO4	Implement an ICO on Ethereum	**K3**
CO5	Design blockchain based application with Swarm and IPFS	**K6**

SUBJECT CODE : P22CSE3B

PSO-PO-CO MAPPING MATRIX										
PO & PSO / **CO**	**PO01**	**PO02**	**PO03**	**PO04**	**PO05**	**PSO01**	**PSO02**	**PSO03**	**PSO04**	**PSO05**
CO01	**3**	**2**	**3**	**2**	**3**	**2**	**2**	**3**	**2**	**2**
CO02	**2**	**3**	**2**	**3**	**2**	**3**	**3**	**2**	**2**	**3**
CO03	**3**	**2**	**3**	**2**	**3**	**2**	**3**	**2**	**2**	**2**
CO04	**3**	**2**	**3**	**3**	**2**	**2**	**2**	**2**	**2**	**3**
CO05	**3**	**2**	**2**	**3**	**2**	**3**	**2**	**2**	**2**	**2**
TOTAL	**14**	**11**	**13**	**13**	**12**	**12**	**12**	**11**	**10**	**12**

Second Year **NON MAJOR ELECTIVE II** **Semester III**

FUNDAMENTALS OF INTERNET

Code: **(Theory)** **Credit:2**

COURSE OBJECTIVES:

- Study the basic concepts of Internet
- Understand the services provided by the Internet
- Acquire the knowledge about E-Commerce

UNIT – I THE INTERNET: INTRODUCTION: From Computers to the Internet - Advantages of the Internet – Major Internet Services – Hardware and Software in the Internet Age. Evolution and Growth of the Internet: Birth of the Internet – Current Networking Technologies – Next Generation Networking.

UNIT – II GETTING ONLINE: Types of Internet Accounts – Selecting Internet Service Providers – Electronic Mail: Advantages of E-mails – E-mail addresses – Mail transfer protocols – Working of E-mail system. World Wide Web: Architecture of the World Wide Web – Types of websites – Uniform Resource Locator – Domain Name System – Web Pages and Web Links – Visiting Web Pages – Using Internet Explorer – Searching the Web – Google and Yahoo Search Engines.

UNIT – III HOSTING AND PROMOTING WEBSITES: Structure of Websites – Web Development tools – Microsoft Front Page –Adobe Dreamweaver – Visual Studio. NET – Hosting Websites – Getting a Domain /name – Visitor Analysis and Statistics – Website Promoting methods.

UNIT – IV ELECTRONIC COMMERCE: E-Business and E-Commerce – Types of business in the internet – MCommerce - Marketing Strategies on the Web – Making Payments in Virtual Stores – Shopping in Virtual Stores –Cookies and E-Commerce – Major issues of E-commerce and M-Commerce – Future of Ecommerce

UNIT – V BLOGS AND SOCIAL NETWORKING: Blogs – Uses of Blogs – Blogs System Components – Steps for Blogging – Building a Blog site – Social Networking – Etiquette in networking sites. Internet Security: Importance of Internet Security – Internet Threats – Identity theft and Cybersquatting – Hacking – Spamming and Spoofing – Phishing and Pharming - Firewalls and Intrusion Prevention Systems –Internet Security Precautions.

Unit – VI Current Contours (for Continuous Internal Assessment Only): Contemporary Developments Related to the Course during the Semester Concerned.

REFERENCES:

1. The Internet A User's Guide Second Edition by K.L. James – PHI Learning Private Limited
2. Internet, World Wide Web, How to program, 4th Edition, Paul Deital, Harvey M Deitel,Pearson
3. Learning Internet & Email, 4th Revised Rdition, Ramesh Bangia, Khanna Book Publishing Co Pvt Ltd.

4. Internet & Ecommerce, C. Nellai Kannan, NELS Publications.
5. https://www.tutorialspoint.com/e_commerce/index.htm
6. https://www.javatpoint.com/blog

COURSE OUTCOMES:
At the end of the course, the students will be able:

CO	COURSEC OUTOME	K LEVEL
CO1	**To acquire knowledge about Domain name system**	K1,K2
CO2	**To understand E-Commerce**	K2
CO3	To know the blogs	K2
CO4	To understand the fundamentals of social networks	K2
CO5	**To Gain the knowledge about Internet threats**	K1,K2

SUBJECT CODE : P22CSNME2

PSO-PO-CO MAPPING MATRIX										
PO & PSO / CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03	PSO04	PSO05
CO01	3	2	3	3	3	3	2	3	3	3
CO02	2	3	2	2	2	3	2	2	3	2
CO03	3	3	2	2	3	2	3	2	2	2
CO04	3	3	3	3	2	2	3	2	2	3
CO05	2	2	2	3	2	3	2	2	2	2
TOTAL	13	13	12	13	12	13	12	11	12	12

CORE COURSE I

MATHEMATICAL FOUNDATION FOR COMPUTER SCIENCE

Objective :

To learn the basis of the mathematical applications for developing the program.

Unit I

Propositions - evaluation - precedence rules -tautologies - reasoning using equivalence transformation - laws of equivalence - substitution rules - a natural deduction system. Deductive proofs - inference rules - proofs - sub proofs.

Unit II

Introduction - Cryptography – Ceaser Cyphor Coding - Matrix encoding - scrambled codes - Hamming metric - Hamming distance - Error detecting capability of an encoding.

Unit III

Assignment problem and its solution by Hungarian method. Project Scheduling by PERT - CPM: Phases of project scheduling - Arrow diagram - Critical path method - Probability and Cost Considerations in project scheduling - Crahing of Networks.

Unit IV

Testing of hypothesis : Tests based on normal population - Applications of chi-square, Student's-t, F-distributions - chi-square Test - goodness of fit - Test based on mean, means, variance, correlation and regression of coefficients.

Unit V

Graph - Directed and undirected graphs - Subgraphs - Chains, Circuits, Paths, Cycles - Connectivity - Relations to partial ordering - adjacency and incidence matrices - Minimal paths - Elements of transport network - Trees - Applications.

Text Books

1. "The Science of Programming", David Gries. Narosa Publishing House, New Delhi, 1993.
2. "Application Oriented Algebra", James L. Fisher, Dun Donnelly Publisher, 1977.
3. "Operation Research - An Introduction", Hamdy A.Taha, Macmillan Publishing Co., 4th Edn., 1987.
4. "Fundamentals of Mathematical Statistics", Gupta,S.C. and V.K.Kapoor, Sultan Chand & Sons, New Delhi, 8th Edn., 1983.
5. "Fundamentals of Applied Statistics", Gupta.S.C. and V.K.Kapoor, Sultan Chand & Sons, New Delhi, 2nd Edn., 1978.

References

1. "Discrete Mathematics", Seymour Lipschutz and Marc Laris Lipson, Second edition, Schuam's Outlines by Tata McGraw- Hill publishing Company Limited, New Delhi 1999.
2. "Operations Research", Kanti Swarup, P.K.Gupta and Man Mohan, Sultan Chand & Sons, New Delhi, 1994.
3. "Introductory Mathematical Statistics", Erwin Kryszig, John Wiley & Sons, New York, 1990.
4. "Probability and Statistics Engineering and Computer Science", Milton, J.S. and J.C.Arnold, McGraw Hill, New Delhi, 1986.

SUBJECT CODE :P16CS11

PSO-PO-CO MAPPING MATRIX								
PO & PSO / CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03
CO01	3	2	3	3	3	3	2	3
CO02	2	3	2	2	2	3	2	2
CO03	3	2	2	2	3	2	3	1
CO04	2	2	3	2	2	2	2	1
CO05	2	2	1	3	2	3	2	1
TOTAL	12	11	11	12	12	13	11	8

*****

CORE COURSE II

WEB TECHNOLOGIES

Objectives :

To provide fundamental concept of Internet, JavaScript, XML, JSP, ASP with a view to developing professional software development skills.

UNIT I

Internet Basics: Basic Concepts – Internet Domains – IP Address – TCP/IP Protocol – The WWW – The Telnet –– Introduction to HTML: Web server - Web client / browser - Tags – Text Formatting – Lists – Tables – Linking Documents - Frames.

UNIT II

JavaScript: JavaScript in Web Pages – The Advantages of JavaScript – Writing JavaScript into HTML – Syntax – Operators and Expressions – Constructs and conditional checking – Functions – Placing text in a browser – Dialog Boxes – Form object's methods – Built in objects – user defined objects.

UNIT III

XML: Comparison with HTML – DTD – XML elements – Content creation – Attributes –Entities – XSL – XLINK – XPATH – XPOINTER – Namespaces – Applications – integrating XML with other applications.

UNIT IV

JSP Fundamentals: Basics – Directive basics – Page directive – The taglib directive – The include directive – JSP Standard Actions – Java Beans – Error Handling.

UNIT V

ASP: Introduction to ASP – Objects – Components – Working with HTML forms – Connecting to Microsoft SQL Server & MS–Access Database – SQL statements with connection object – Working with record sets.

Text Books

1. "Web Enabled Commercial Application Development Using HTML, DHTML, JavaScript, Perl CGI", Ivan Bayross, BPB Publication. **UNIT I & II**
2. "XML Bible", Elliotte Rusty Harold, 2nd Edition, Wrox Publication. **UNIT III**
3. "Beginning Java Server Pages", Vivek Chopra, Sing Li, Rupert Jones, Jon Eaves, John T. Bell, Wrox Publications. **UNIT IV**
4. "Practical ASP", Ivan Bayross, BPB Publication. **UNIT V**

SUBJECT CODE :P16CS12

PSO-PO-CO MAPPING MATRIX								
PO & PSO / CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03
CO01	3	2	2	2	2	2	3	2
CO02	2	3	3	2	2	2	2	2
CO03	2	2	2	3	2	3	2	2
CO04	3	3	2	2	2	3	2	2
CO05	2	2	3	3	2	2	2	2
TOTAL	12	12	12	12	10	12	11	10

*****

CORE COURSE III

DESIGN AND ANALYSIS OF ALGORITHMS

Objectives :

To study the concepts of algorithms and analysis of algorithms using divide and conquer, greedy method, dynamic programming, backtracking, and branch andbound techniques

UNIT I

Introduction: Algorithm Definition – Algorithm Specification – Performance Analysis. Elementary Data Structures: Stacks and Queues – Trees – Dictionaries – Priority Queues – Sets and Disjoint Set Union – Graphs

UNIT II

Divide and Conquer: The General Method – Defective Chessboard – Binary Search – Finding The Maximum And Minimum – Merge Sort – Quick Sort – Selection - Strassen's Matrix Multiplication.

UNIT III

The Greedy Method: General Method - Container Loading - Knapsack Problem - Tree Vertex Splitting – Job Sequencing With Deadlines - Minimum Cost Spanning Trees - Optimal Storage On Tapes – Optimal Merge Patterns - Single Source Shortest Paths.

UNIT IV

Dynamic Programming: The General Method – Multistage Graphs – All-Pairs Shortest Paths – Single-Source Shortest Paths - Optimal Binary Search Trees - String Editing - 0/1 Knapsack - Reliability Design - The Traveling Salesperson Problem - Flow Shop Scheduling. Basic Traversal and Search Techniques: Techniques for Binary Trees – Techniques for Graphs – Connected Components and Spanning Trees – Biconnected Components and DFS.

UNIT V

Backtracking: The General Method – The 8-Queens Problem – Sum of Subsets – Graph Coloring – Hamiltonian Cycles – Knapsack Problem Branch and Bound: The Method - 0/1 Knapsack Problem.

Text Book

Ellis Horowitz, Satraj Sahni and Sanguthevar Rajasekaran, Fundamentals of Computer Algorithms, Universities Press, Second Edition, Reprint 2009.

References

1. Data Structures Using C - Langsam, Augenstien, Tenenbaum, PHI
2. Data structures and Algorithms, V.Aho, Hopcropft, Ullman , LPE
3. Introduction to design and Analysis of Algorithms - S.E. Goodman, ST. Hedetniem- TMH

SUBJECT CODE: P16CS13

PSO-PO-CO MAPPING MATRIX								
PO & PSO / CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03
CO01	3	2	3	3	3	3	2	3
CO02	2	3	2	2	2	3	2	2
CO03	3	2	2	2	3	2	3	1
CO04	2	2	3	2	2	2	2	1
CO05	2	2	1	3	2	3	2	1
TOTAL	12	11	11	12	12	13	11	8

*****

CORE COURSE IV DISTRIBUTED

OPERATING SYSTEMS

Objectives :

To study the concepts of distributed computing systems and cryptography.

Unit I

Fundamentals: What is Distributed Operating System – Evolution of Distributed Computing System – Distributed Computing System Models – Why are Distributed Computing Systems gaining popularity – What is a Distributed Computing System
– Issues in Designing Distributed Computing System – Introduction to Distributed Computing Environment. Introduction to Computer Networks – Network types – LAN –WAN – Communication protocols – Internetworking – ATM Technology

Unit II

Message Passing: Introduction – Desirable features – Issues in PC Message Passing – Synchronization – Buffering – Multidatagram Messages – Encoding and Decoding – Process Addressing – Failure Handling – Group Communication

Unit III

Distributed Shard Memory: Introduction – General Architecture of DSM system – Design and Implementation Issues of DSM – Granularity – Structure of Shared Memory –Replacement Strategy – Thrasing – Heterogeneous DSM – Advantages Synchronization: Introduction – Clock Synchronization – Event Ordering – Mutual Exclusion – Deadlock – Election Algorithm

Unit IV

Distributed File System: Introduction – Desirable features – File Models – File Accessing Models – File Sharing Semantics – File Caching Schemes – File Replication – Fault Tolerance – Atomic Transactions – Design Principles

Unit V

Security: Introduction – Potential Attacks to Computer System – Cryptography – Authentication – Access Control – Digital Signatures – Design Principles

Text Book :

Distributed Operating Systems – Concepts and Design, Pradeep K Sinha, PHI, 2003.

References:

Distributed Operating Systems 1e, Andrew S Tanenbaum, PHI.

SUBJECT CODE: P16CS14

PSO-PO-CO MAPPING MATRIX								
PO & PSO / CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03
CO01	2	2	3	1	1	2	1	2
CO02	1	3	2	2	3	2	3	1
CO03	2	2	1	3	1	1	3	2
CO04	3	1	2	1	2	3	2	1
CO05	2	1	2	2	3	2	1	2
TOTAL	10	9	10	9	10	10	10	8

*****

CORE PRACTICAL -I

WEB TECHNOLOGIES LAB

Objectives :

To provide fundamental concept of Internet, JavaScript, XML, JSP, ASP with a view to Developing professional software development skills.

1. Write a XML program for job listing in HTML.
2. Write a JavaScript code block, which checks the contents entered in a form's text element. If the text entered is in the lower case, convert to upper case.
3. Write a JavaScript code block, which validates a username and password.
   a) If either the name or password field is not entered display an error message.
   b) The fields are entered do not match with default values display an error message.
   c) If the fields entered match, display the welcome message.
4. Write a JavaScript code to display the current date and time in a browser.
5. Write a JSP Program for user authentication.
6. Write a JSP Program for a simple shopping cart.
7. Write a JSP Program to prepare a bio data and store it in database.
8. Write an ASP Program using Response and Request Object.
9. Write an ASP Program using AdRotator Component.
10. Write an ASP program using database connectivity for student's record.

SUBJECT CODE: P16CS15P

PSO-PO-CO MAPPING MATRIX								
PO & PSO / CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03
CO01	2	2	2	3	2	2	3	2
CO02	2	2	2	3	3	2	3	2
CO03	3	2	2	2	2	2	2	2
CO04	2	2	2	2	3	3	2	2
CO05	3	2	2	2	2	3	2	2
TOTAL	12	10	10	12	12	12	12	10

*****

CORE COURSE V

OOAD & UML

Objective :

To give a detailed knowledge on Structured approach to system construction, Various object oriented methodologies, Object oriented analysis, Object oriented design and UML examples.

Unit I

Structured approach to system construction : SSADM/SADT - An overview of object oriented systems development & Life cycle

Unit II

Various object oriented methodologies – Introduction to UML

Unit III

Object oriented analysis – Use cases- Object classification, relationships, attributes, methods

Unit IV

Object oriented design – Design axioms – Designing classes – Layering the software design :- data access layer, User interface layer, Control/business logic layer

Unit V

UML - Examples on :Behavioral models – Structural models – Architectural models from real world problems.

TEXT BOOK:

1. **Bahrami Ali**, Object oriented systems development, Irwin McGrawHill, 2005 (First 4 units covered here).
2. **Booch Grady, Rumbaugh James, Jacobson Ivar**, The Unified modeling language – User Guide, Pearson education, 2006 (ISBN 81-7758-372-7) (Unit: -5 covered here).

SUBJECT CODE: P16CS21

PSO-PO-CO MAPPING MATRIX								
PO & PSO / CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03
CO01	2	2	3	2	2	2	2	2
CO02	3	2	1	2	1	2	1	2
CO03	3	2	1	2	1	2	2	2
CO04	2	2	1	2	3	2	1	2
CO05	2	2	2	2	3	2	1	2
TOTAL	12	10	8	10	10	10	7	10

*****

CORE COURSE VI

DISTRIBUTED TECHNOLOGIES

Objectives :

This course aims to build concepts regarding the fundamental principles of distributed systems. The design issues and distributed operating system concepts are covered.

Unit I

Introduction to distributed Computing – Challenges involved in establishing remote connection – Strategies involved in remote computation – Current Distributed computing practices through Dot Net and Java technologies.

Unit II

Advanced ADO, NET – Disconnected Data Access – Gridview, Details View, Form View controls – Crystal Reports – Role of ADO, NET in Distributed Applications.

Unit III

Advanced ASP, NET – AdRotator, Multiview, Wizard and Image Map Controls – Master Pages – Site Navigation – Web Parts – Uses of these controls and features in Website development.

Unit IV

Advanced features of ASP.NET – Security in ASP, NET – State Management in ASP, NET – Mobile Application development in ASP, NET – Critical usage of these features in Website development.

Unit V

Web services – Role of Web services in Distributed Computing – WSDL, UDDI, SOAP concepts involved in Web Services – Connected a Web Service to a Data Base – Accessing a Web Service through n ASP, NET application.

Text Book

1. Walther, ASP, NET 3.5, SAMS Publication, 2005.

SUBJECT CODE: P16CS22

PSO-PO-CO MAPPING MATRIX								
PO & PSO / CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03
CO01	2	2	3	1	1	2	1	2
CO02	1	3	2	2	3	2	3	1
CO03	2	2	1	3	1	1	3	2
CO04	3	1	2	1	2	3	2	1
CO05	2	1	2	2	3	2	1	2
TOTAL	10	9	10	9	10	10	10	8

*****

CORE PRACTICAL II
DISTRIBUTED TECHNOLOGIES LAB

Objectives :

To provide fundamental concept of Internet, JavaScript, XML, JSP, ASP with a view to developing professional software development skills

1. Create a table and insert a few records using Disconnected Access.
2. Develop a project to update and delete few records using Disconnected Access.
3. Develop a project to view the records using GridView, DetailsView, FormView Controls.
4. Develop a project to generate a crystal report from an existing database.
5. Design a web page that makes uses of Ad Rotator Control.
6. Design a web page involving Multi View or Wizard Control.
7. Make use of Image Control involving two hot spots in a web page.
8. Design a simple web site that makes use of Master Pages.
9. Establish the security features in a simple web site with five pages.
10. Use state management concepts in a mobile web application.
11. Develop a web service that has an ASP.NET client.
12. Develop a web service to fetch a data from a table and send it across to the client.

SUBJECT CODE: P16CS23P

PSO-PO-CO MAPPING MATRIX								
PO & PSO / CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03
CO01	2	2	3	3	1	3	2	1
CO02	1	3	2	2	3	2	3	1
CO03	2	2	1	3	1	1	3	2
CO04	1	3	2	1	2	3	2	2
CO05	2	3	2	2	3	2	1	2
TOTAL	8	13	10	11	10	11	11	8

*****

CORE COURSE VII

DATA MINING AND WARE HOUSING

Objective :

On successful completion of the course the students should have: Understood data mining techniques- Concepts and design of data warehousing.

UNIT I

Introduction – What is Data mining – Data Warehouses – Data Mining Functionalities – Basic Data mining tasks – Data Mining Issues – Social Implications of Data Mining– Applications and Trends in Data Mining.

UNIT II

Data Preprocessing : Why preprocess the Data ? –Data Cleaning - Data Integration and Transformation – Data Reduction – Data cube Aggregation – Attribute Subset Selection Classification: Introduction – statistical based algorithms – Bayesian Classification. Distance based algorithms – decision tree based algorithms – ID3.

UNIT III

Clustering: Introduction - Hierarchical algorithms – Partitional algorithms – Minimum spanning tree – K-Means Clustering - Nearest Neighbour algorithm. Association Rules: What is an association rule? – Methods to discover an association rule–APRIORI algorithm – Partitioning algorithm .

UNIT IV

Data Warehousing: An introduction – characteristics of a data warehouse – Data marts – other aspects of data mart .Online analytical processing: OLTP & OLAP systems.

UNIT V

Developing a data warehouse : Why and how to build a data warehouse – Data warehouse architectural strategies and organizational issues – Design consideration – Data content – meta data – distribution of data – tools for data warehousing – Performance considerations

TEXT BOOKS

1. Jiawei Han and Miceline Kamber , “Data Mining Concepts and Techniques “ , Morgan Kaulmann Publishers, 2006. (Unit I – Chapter 1 -1.2, 1.4 , Chapter 11-11.1) (Unit II – Chapter 2 - 2.1,2.3, 2.4, 2.5.1,2.5.2)
2. Margaret H Dunham , “Data mining Introductory & Advanced Topics”, Pearson Education , 2003.(Unit I – Chapter 1 -1.1 , 1.3, 1.5) , (UNIT II – Chapter 4 – 4.1, 4.2, 4.3, 4.4) (UNIT III – Chapter 5 – 5.1,5.4, 5.5.1, 5.5.3,5.5.4, Chapter 6 –

6.1,6.3.

3. C.S.R.Prabhu, "Data Warehousing concepts, techniques, products & applications", PHI, Second Edition.) (UNIT IV & V)

REFERENCES:

1. Pieter Adriaans, Dolf Zantinge, "Data Mining" Pearson Education, 1998.
2. Arun K Pujari, "Data Mining Techniques",Universities Press(India) Pvt, 2003.
3. S.Rajashekharan, G A Vijaylakshmi Bhai,"Neural Networks,Fuzzy Logic,and Genetic Algorithms synthesis and Application", PHI
4. Margaret H.Dunham," Data Mining Introductory and Advanced topics",Pearson Eductaionn 2003.

SUBJECT CODE: P16CS31

PSO-PO-CO MAPPING MATRIX								
PO & PSO / CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03
CO01	2	3	3	2	2	1	2	2
CO02	3	2	2	2	1	2	2	2
CO03	2	2	2	2	2	1	2	2
CO04	2	2	2	2	2	3	3	2
CO05	2	2	2	2	2	2	2	2
TOTAL	11	11	11	10	9	9	11	10

*****

CORE COURSE VIII

COMPILER DESIGN

OBJECTIVES :

On successful completion of the subject the students should have Understood the different phases of compiler and needs of the compiler.

UNIT I

Introduction to compilers – Analysis of source program – Phase of compiler – Cousins of compilers – Grouping of phases – Simple one pass compiler: overview – Syntax definition Lexical analysis: removal of white space and comments – Constants – Recognizing identifiers and keywords – Lexical analysis – Role of a lexical analyzer – Input buffering –Specification of tokens – Recognition tokens.

UNIT II

Symbol tables: Symbol table entries – List data structures for symbol table – - Hash tables – Representation of scope information – Syntax Analysis: Role of parser – Context free grammar – Writing a grammar – Top down parsing – Simple bottom up parsing – Shift reducing parsing.

UNIT III

Syntax directed definition: Construction of syntax trees – Bottom up evaluation of S-Attributed definition – L-Attributed definitions – Top down translation - Type checking: Type systems – Specifications of simple type checker.

UNIT IV

Run-time environment: Source language issues – Storage organizations – Storage allocation strategies - Intermediate code generation: Intermediate languages – Declarations – Assignment statements.

UNIT V

Code generation: Issue in design of code generator – The target machine – Runtime storage management – Basic clocks and flow graphs - Code optimization: Introduction – Principle source of code optimization – Optimization of basic blocks

Text Books:

1. AHO, ULLMAN, "**COMPILERS, PRINCIPLES AND TECHNIQUES AND TOOLS",** PEARSON EDUCATION – 2001 6TH EDITION.

SUBJECT CODE: P16CS32

PSO-PO-CO MAPPING MATRIX								
PO & PSO / CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03
CO01	3	2	2	1	1	2	1	1
CO02	2	3	3	3	3	3	3	2
CO03	3	3	3	3	2	3	3	2
CO04	2	3	3	1	2	3	3	2
CO05	2	1	2	2	3	1	2	2
TOTAL	12	12	13	10	11	12	12	9

*****

CORE PRACTICAL - III

DATA MINING LAB

Objective : To get hands on experience in developing applications using data mining tool.

Practical	Practical List
Exercise 1	Preprocessing a. Datatype Conversion b. Data Transformation
Exercise 2	Filters- **Practical** a. Replace Missing Values b. Add Expression
.	Feature Selection Select Attributes- **Practical** a. Filter b. Wrapper c. Dimensionality Reduction
Exercise 4	Supervised Technique Classifier - Function - **Practical** a. Multilayer Perceptron Tree - **Practical**J48
Exercise 5	Classifier- Bayes –**Practical** **a.** Naive Bayes Rule- **Practical** b. ZeroR
Exercise 6	Unsupervised Techniques Clustering- Theory Partitioned – Algorithm – Practical Hierarchical Algorithm – Practical Semi Supervised Algorithm – Practical
Exercise 7	Association Rule Mining A-Priori –Algorithm –Practical Predictive A-Priori –Practical
Exercise 8	Experimenter Dataset – Test – Practical Algorithm based –Test –Practical
Exercise 9	Knowledge Flow Feature Selection – Practical Clustering –Practical
Exercise 10	Knowledge Flow Classification – Practical

SUBJECT CODE: P16CS33P

PSO-PO-CO MAPPING MATRIX								
PO & PSO CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03
CO01	3	2	3	2	2	2	3	2
CO02	2	3	3	3	2	3	2	2
CO03	2	2	2	3	3	2	2	2
CO04	3	3	2	2	2	2	2	2
CO05	3	2	2	2	2	1	2	1
TOTAL	13	12	12	12	11	10	11	9

*****

CORE COURSE IX

CLOUD COMPUTING

Objective:

To provide understanding on concepts & technologies associated with Cloud Computing.

UNIT I FOUNDATIONS : Introduction to Cloud Computing :

Cloud Computing in a Nutshell – Roots of Cloud Computing – Layers and types of Clouds – Desired features of a Cloud – Cloud Infrastructure Management – Challenges and Risks – Migrating into a Cloud: - Introduction – Broad Approaches – The Seven step model – Enriching the 'Integration as a Services' Paradigm for the Cloud Era: - Introduction – The Evolution of SaaS – The Challenges of SaaS Paradigm – Approaching the SaaS Integration Enigma – New Integration Scenarios – The Integration Methodologies – SaaS Integration Services – The Enterprise Cloud Computing Paradigm: - Introduction – Background – Issues – Transition Challenges – The Cloud Supply Chain.

UNIT II INFRASTRUCTURE AS A SERVICE : Virtual Machine Provisioning and Migration Services:

Introduction – Background – Manageability – Migration Services – Management of Virtual Machines for Cloud Infrastructures: - Anatomy of Cloud Infrastructures – Distributed Management of Virtual Infrastructures – Scheduling techniques for Advance Reservation of Capacity – Enhancing Cloud Computing Environments Using a Cluster as a Service: - Introduction – Related Work – RVWS Design – The Logical Design – Secure Distributed Data Storage in Cloud Computing: - Introduction – Cloud Storage from LANs to WANs – Technologies for Data Security – Challenges.

UNIT III PLATFORM AND SOFTWARE AS SERVICE (PAAS/IAAS) Aneka Integration of Private and Public Clouds :

Introduction– Technologies and Tools – Aneka Cloud Platform - Aneka Resource Provisioning Service – Hybrid Cloud Implementation – CometCloud: An Autonomic Cloud Engine: - Introduction – CometCloud – Architecture – Autonomic Behavior of CometCloud – Overview of CometCloud-based Applications – Implementation and Evaluation

UNIT IV PLATFORM AND SOFTWARE AS SERVICE (PAAS/IAAS) TSystems Cloud-based Solutions for Business Applications:

Introduction – Enterprise Demand of Cloud Computing – Dynamic ICT Service – Importance of Quality and Security in Clouds – Dynamic Data CentreProducing Business-ready; Dynamic ICT Services – The MapReduce Programming Model and Implementations: - Introduction – MapReduce Programming Model – MapReduce implementations for the Cloud.

UNIT V MONITORING AND MANAGEMENT: An Architecture for Federated Cloud Computing

Introduction – A typical Usecase – The Basic Principles of Cloud Computing – A Federated Cloud Computing Model – Security Considerations – Service Providers Perspective of SLA Management in Cloud Computing: - Traditional Approaches to SLO Management – Types of SLA – Life Cycle of SLA – SLA Management in Cloud –Automated Policy-based Management – Performance Prediction for HPC on Clouds: - Introduction – Background – Grid and Cloud – Performance related issues of HPC in the Cloud.

Text Book:

Rajkumar Buyya, James Broberg, Andrzej Goscinsky, "Cloud Computing Principles and Paradigms", Wiley India Pvt. Ltd., 2011.

Reference Books:

1. Barrie Sosinsky, "Cloud Computing Bible", 1st Edition, Wiley India Pvt. Ltd., New Delhi, 2011.
2. Michael Miller, "Cloud Computing", 1st Edition, Pearson Education Inc., New Delhi,2008.

SUBJECT CODE: P16CS41

PSO-PO-CO MAPPING MATRIX								
PO & PSO / CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03
CO01	3	2	2	1	-	3	2	2
CO02	3	3	2	2	-	3	1	1
CO03	3	2	2	1	-	3	2	1
CO04	3	3	2	2	-	3	1	1
CO05	3	3	2	1	-	2	2	1
TOTAL	15	13	10	7	0	14	8	6

*****

CORE PRACTICAL X

WIRELESS SENSOR NETWORKS

Objective:

On Successful completion of the course the students should have understanding wireless sensor nodes, networks and tools.

UNIT I OVERVIEW OF WIRELESS SENSOR NETWORKS:

Challenges for Wireless Sensor Networks, Enabling Technologies For Wireless Sensor Networks.

UNIT II ARCHITECTURES :

Single-Node Architecture - Hardware Components, Energy Consumption of Sensor Nodes , Operating Systems and Execution Environments, Network Architecture - Sensor Network Scenarios, Optimization Goals and Figures of Merit, Gateway Concepts.

UNIT III NETWORKING SENSORS :

Physical Layer and Transceiver Design Considerations, MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols And Wakeup Concepts - S-MAC , The Mediation Device Protocol, Wakeup Radio Concepts, Address and Name Management, Assignment of MAC Addresses, Routing Protocols- Energy-Efficient Routing, Geographic Routing.

UNIT IV INFRASTRUCTURE ESTABLISHMENT:

Topology Control, Clustering, Time synchronization, Localization and Positioning, Sensor Tasking and Control.

UNIT V SENSOR NETWORK PLATFORMS AND TOOLS:

Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node-level software platforms, Node-level Simulators, State-centric programming.

TEXT BOOKS

1. Holger Karl & Andreas Willig, “Protocols And Architectures for Wireless Sensor Networks" , John Wiley, 2005.
2. Feng Zhao & Leonidas J. Guibas, “Wireless Sensor Networks- An Information Processing Approach", Elsevier, 2007.

REFERENCES

1. Kazem Sohraby, Daniel Minoli, & Taieb Znati, “Wireless Sensor Networks-Technology, Protocols, And Applications”, John Wiley, 2007.
2. Anna Hac, “Wireless Sensor Network Designs”, John Wiley, 2003.

SUBJECT CODE: P16CS42

PSO-PO-CO MAPPING MATRIX								
PO & PSO / CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03
CO01	2	2	2	2	2	3	2	3
CO02	2	2	2	2	2	3	2	3
CO03	2	3	2	3	2	3	2	2
CO04	3	3	3	3	2	2	3	2
CO05	3	2	3	2	3	2	2	2
TOTAL	12	12	12	12	11	13	11	12

*****

CORE PRACTICAL IV

OPEN SOURCE LAB

Objectives:

To provide fundamental concept of Internet, JavaScript, XML, JSP, ASP with a view to developing professional software development skills.

1. Write a server side PHP program that displays marks, total, grade of a student in tabular format by accepting user inputs for name, number and marks from a HTML form.
2. Write a PHP program that adds products that are selected from a web page to a shopping cart.
3. Write a PHP program to access the data stored in a mysql table.
4. Write a PHP program interface to create a database and to insert a table into it.
   i). Write a PHP program using classes to create a table.
   ii). Write a PHP program to upload a file to the server.

5. Write a PHP program to create a directory, and to read contents from the directory.
6. Write a shell program to find the details of an user session.
7. Write a shell program to change the extension of a given file.
8. Create a mysql table and execute queries to read, add, remove and modify a record from that table.

SUBJECT CODE: P16CS43P

PSO-PO-CO MAPPING MATRIX								
PO & PSO / CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03
CO01	3	2	3	2	2	2	3	2
CO02	2	3	3	3	2	3	2	2
CO03	2	2	2	3	3	2	2	2
CO04	3	3	2	2	2	2	2	2
CO05	3	2	2	2	2	1	2	1
TOTAL	13	12	12	12	11	10	11	9

*****

PROJECT

Objective:

The student can get the knowledge to prepare the document , to implement tools for the specific problem and learn the industrial need programs for their placement .

PROJECT WORK

SL	Area of Work	Maximum marks
1.	PROJECT WORK: (i) Plan of the Project	20
	(ii) Execution of the plan / Collection of data /Organization of materials/ Fabrication Experimental study / Hypothesis, Testing etc., and Presentation of the report.	45
	(iii) Individual Initiative	15
2.	VIVA VOCE EXAMINATION	20
	TOTAL	100

Note : PASSING MINIMUM – 50 MARKS

SUBJECT CODE: P16CSPW

PSO-PO-CO MAPPING MATRIX								
PO & PSO CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03
CO01	3	2	2	2	2	3	2	3
CO02	3	3	2	2	3	3	2	3
CO03	3	3	2	2	3	2	2	2
CO04	3	2	2	3	3	3	2	2
CO05	3	3	3	2	2	3	3	3
TOTAL	15	13	11	11	13	14	11	13

*****

ELECTIVE COURSE - I

MOBILE COMMUNICATION

Objective:

On successful completion of this subject, the students should have understood Wireless networks WAP architecture

Unit I

Introduction: Applications-Mobile and Wireless Devices – Simplified Reference Model – Need for Mobile Computing – Wireless Transmission – Multiplexing – Spread Spectrum and cellular systems – Medium Access Control – Comparisons

Unit II

Telecommunications System: Telecommunication System– GSM – Architecture – Protocols – Hand over - Security – UMTS and IMT 2000 – UMTS System Architecture-UTRAN-Core Network-Handover- Satellite System

Unit III

Wireless LAN : IEEE S02.11 –System Architecture- Protocol Architecture-Medium Access Control Layer-MAC Frame-MAC Management—Roaming-Bluetooth:Architecture-Link Manager Protocol- Security -and Link Management.

Unit IV

Mobile IP: Goals – Packet Delivery – Strategies – Registration – Tunneling and Reverse Tunneling – Adhoc Networks – Routing Strategies

Unit V

WIRELESS APPLICATION PROTOCOL: Wireless ApplicationProtocol (WAP) – Architecture – XML – WML Script – Applications

Text Books

1. J.Schiller, Mobile Communication, Addison Wesley, 2000.

References

1. William C.Y.Lee, Mobile Communication Design Fundamentals, John Wiley, 1993.
2. William Stallings, Wireless Communication and Networks, Pearson Education, 2003.
3. Singhal, WAP-Wireless Application Protocol, Pearson Education, 2003.

SUBJECT CODE: P16CSE1A

PSO-PO-CO MAPPING MATRIX								
PO & PSO / CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03
CO01	3	2	3	3	3	3	2	3
CO02	2	3	2	2	2	3	2	2
CO03	3	2	2	2	3	2	3	1
CO04	2	2	3	2	2	2	2	1
CO05	2	2	1	3	2	3	2	1
Total	12	11	11	12	12	13	11	8

*****

ELECTIVE COURSE - II

ARTIFICIAL INTELLIGENCE

Objective:

On Successful completion of the course the students should have: understood the AI & Expert Systems.- Learnt the Heuristic techniques and reasoning

UNIT I

Introduction: AI Problems - Al techniques - Criteria for success. Problems, Problem Spaces, Search: State space search - Production Systems

UNIT II

Heuristic Search techniques: Generate and Test - Hill Climbing- Best-First - Means-end analysis. Knowledge representation issues: Representations and mappings -Approaches to Knowledge representations -Issues in Knowledge representations - Frame Problem.

UNIT III

Using Predicate logic: Representing simple facts in logic - Representing Instance and Is a relationships - Computable functions and predicates - Resolution.

UNIT IV

Representing knowledge using rules: Procedural Vs Declarative knowledge – Logic programming - Forward Vs Backward reasoning - Matching - Control knowledge.

UNIT V

Game playing – The minimax search procedure – Expert System - Perception and Action

TEXT BOOKS

1. Elaine Rich and Kevin Knight," Artificial Intelligence", Tata McGraw Hill Publishers company Pvt Ltd, Second Edition, 1991.
   Unit1: Chapter 1(1.1,1.3.1.5), Chapter 2(2.1,2.2)
   Unit2: Chapter 3(3.1,3.2,3.3,3.6), Chapter 4(4.1,4.2,4.3,4.4).
   Unit3: Chapter 5(5.1,5.2,5.3,5.4).
   Unit4: Chapter 6.
   Unit5: Chapter 12(12.1,12.2),Chapter 20 and Chapter 21.

SUBJECT CODE: P16CSE2B

PSO-PO-CO MAPPING MATRIX								
PO & PSO / CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03
CO01	2	2	-	-	1	3	2	2
CO02	3	2	3	-	1	2	3	2
CO03	2	2	3	2	2	2	2	-
CO04	3	1	2	1	1	3	3	1
CO05	3	2	2	2	1	3	1	2
TOTAL	13	9	10	5	6	13	11	7

ELECTIVE - III

PARALLEL PROCESSING

Objective:

To study the Parallel computer Architecture, theories of parallel computing, interconnection networks and applications of cost effective computer systems.

UNIT I

Introduction to Parallel Processing – Evolution of Computer Systems – Parallelism in Uniprocessor Systems – Parallel Computer Structures – Architectural Classification Schemes– Parallel Processing Applications.

UNIT II

Memory and Input-Output Subsystems – #Hierarchical Memory Structure# – Virtual Memory System – Memory Allocation and Management – Cache Memories and Management – Input-Output Subsystems.

UNIT III

Principles of Pipelining and Vector Processing – Pipelining : An Overlapped Parallelism – Instruction and Arithmetic Pipelines – Principles of Designing Pipelined Processors – Vector Processing Requirements.

UNIT IV

Vectorization and Optimization methods – Parallel Languages for Vector Processing – Design of Vectorizing Compiler – Optimization of Vector Functions – SIMD Array Processors – SIMD Interconnection Networks

UNIT V

Multiprocessors Architecture and Programming – Functional Structures – Interconnection Networks - Parallel Memory Organizations – Multiprocessor Operating Systems – Language Features to Exploit Parallelism – Multiprocessor Scheduling Strategies.

Text Book:

Kai Hwang and Faye A. Briggs,Computer Architecture and Parallel Processing,McGraw Hill International Edition, 1985. [Chapters : 1, 2, 3, 4.5.1 – 4.5.3, 5.1, 5.2, 5.4, 6.3, 7.1, 7.2.1, 7.2.2, 7.2.3, 7.3.1, 7.3.3, 7.4, 7.5.1, 8.3]

UNIT I Chapter 1 Section 1.1 – 1.5
UNIT II Chapter 2 Sections 2.1 – 2.5
UNIT III Chapter 3 Sections 3.1 – 3.4
UNIT IV Chapter 4 Sections 4.5 , Chapter 5 Sections 5.1 ,5.2 , 5.4
UNIT V Chapter 7 7.1 – 7.4, 7.5-7.5.1, Chapter 8 Sections 8.3

Books for Reference:

1. Richard Kain, Advanced Computer Architecture, PHI, 1999.
2. V. Rajaraman and C. Siva Ram Murthy, Parallel Computers, Architecture and Programming, PHI, 2000.

SUBJECT CODE: P16CSE3A

PSO-PO-CO MAPPING MATRIX								
PO & PSO / CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03
CO01	3	2	2	2	2	3	2	2
CO02	3	3	2	2	1	3	2	1
CO03	3	3	2	2	1	2	2	1
CO04	3	2	2	1	1	3	2	1
CO05	3	3	2	2	2	3	3	3
Total	15	13	10	9	7	14	11	8

*****

ELECTIVE - IV

NETWORK SECURITY

Objective:

To impart knowledge related to the various concepts, methods of Network Security using cryptography basics, program security, database security, and security in networks.

Unit I

Overview-Symmetric Ciphers: Classical Encryption Techniques

Unit II

Symmetric Ciphers: Block ciphers and the Data Encryption Standards Public-key Encryption and Hash Functions: Public-Key Cryptography and RSA

Unit III

Network Security Practices: Authentication applications-Electronic Mail Security

Unit IV

Network Security Practices: IP Security-Web Security

Unit V

System Security: Intruders-Malicious Software-Firewalls

Text Book:

1. William Stallings, Cryptography and Network Security-Principles and Practices, Prentice-Hall, Third edition, 2003 **ISBN:** 8178089025

References:

1. Johannes A. Buchaman, Introduction to cryptography, Springer-Verlag 2000.
2. AtulKahate, Cryptography and Network Security, Tata McGraw Hill. 2007

SUBJECT CODE: P16CSE4A

PSO-PO-CO MAPPING MATRIX								
PO & PSO / CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03
CO01	3	2	-	1	2	3	2	2
CO02	2	2	1	1	2	2	3	-
CO03	1	-	2	2	1	2	3	2
CO04	1	2	2	2	1	2	2	2
CO05	3	1	2	1	2	1	1	2
TOTAL	10	7	7	7	8	10	11	8

*****

ELECTIVE - V

BIG DATA ANALYTICS

Objective:

To impart knowledge in Fundamentals, Big Data Analytics, Technologies and databases, Hadoop and Map Reduce Fundamentals

Unit I

Introduction to big data: Data, Characteristics of data and Types of digital data: Unstructured, Semi-structured and Structured, Sources of data, Working with unstructured data, Evolution and Definition of big data, Characteristics and Need of big data, Challenges of big data, Data environment versus big data environment

Unit II

Big data analytics: Overview of business intelligence, Data science and Analytics, Meaning and Characteristics of big data analytics, Need of big data analytics, Classification of analytics, Challenges to big data analytics, Importance of big data analytics, Basic terminologies in big data environment

Unit III

Big data technologies and Databases: Introduction to NoSQL, Uses, Features and Types, Need, Advantages, Disadvantages and Application of NoSQL, Overview of NewSQL, Comparing SQL, NoSQL and NewSQL, Introduction to MongoDB and its needs, Characteristics of MongoDB, Introduction of apache cassandra and its needs, Characteristics of Cassandra

Unit IV

Hadoop foundation for analytics: History, Needs, Features, Key advantage and Versions of Hadoop, Essential of Hadoop ecosystems, RDBMS versus Hadoop, Key aspects and Components of Hadoop, Hadoop architectures

Unit V

HadoopMapReduce and YARN framework: Introduction to MapReduce, Processing data with Hadoop using MapReduce, Introduction to YARN, Components, Need and Challenges of YARN, Dissecting YARN, MapReduce application, Data serialization and Working with common serialization formats, Big data serialization formats

Text Book

Seema Acharya and Subhashini Chellappan, “Big Data and Analytics”, Wiley India Pvt. Ltd., 2016

Reference Books

1. 1.“Big Data” by Judith Hurwitz, Alan Nugent, Dr. Fern Halper and Marcia Kaufman, Wiley Publications, 2014.
2. 2.“Big Data Imperatives : Enterprise Big Data Warehouse, BI Implementations and Analytics” by Soumendra Mohanty, Madhu Jagadeesh and Harsha Srivatsa, Apress Media, Springer Science + Business Media New York, 2013
3. “Mining of Massive Datasets”, Anand Rajaraman, Jure Leskovec, Jeffery D. Ullman, Springer, July 2013.
4. “Hadoop: The definitive Guide”, Tom White, O'Reilly Media, 2010.

SUBJECT CODE: P16CSE5A

PSO-PO-CO MAPPING MATRIX								
PO & PSO CO	PO01	PO02	PO03	PO04	PO05	PSO01	PSO02	PSO03
CO01	2	2	3	3	3	2	1	1
CO02	3	2	3	1	2	2	2	2
CO03	3	2	2	3	3	2	3	2
CO04	3	3	2	2	2	1	2	2
CO05	3	2	3	3	2	2	2	3
TOTAL	14	11	13	12	12	9	10	10

*****