

Sadakathullah Appa College

(Autonomous)

(Reaccredited by NAAC at an 'A' Grade and ISO 9001:2015 Certified Institution)

Rahmath Nagar, Tirunelveli – 627 011, Tamil Nadu.

PG & RESEARCH DEPARTMENT OF COMPUTER SCIENCE



CBCS SYLLABUS

For

M.Sc. Computer Science

(Applicable for students admitted in June 2019 and onwards)

**(As per the Resolutions of the Academic Council Meetings
held on 03-03-2018, 17-10-2018 and 02-03-2019).**

CONTENTS

| Sl. No. | Subject Title | Subject Code | Page No. |
|----------------|---|---------------------|-----------------|
| 1 | Design and Analysis of Algorithm | 18PCCS11 | 3 |
| 2 | Linux Programming | 18PCCS12 | 4 |
| 3 | Python Programming | 18PCCS13 | 5 |
| 4 | A) Cloud Computing | 18PECS1A | 6 |
| 5 | B) Ad-Hoc and Sensor Networks | 18PECS1B | 7 |
| 6 | Linux Programming Lab | 18PCCS1P1 | 9 |
| 7 | Python Programming Lab | 18PCCS1P2 | 10 |
| 8 | Open Source Technology | 18PCCS21 | 11 |
| 9 | Advanced Database Management System | 18PCCS22 | 12 |
| 10 | Internet of Things | 18PCCS23 | 13 |
| 11 | A) Security Practices | 18PECS2A | 14 |
| 12 | B) Cyber Security | 18PECS2B | 15 |
| 13 | Open Source Technology Lab | 18PCCS2P1 | 16 |
| 14 | Advanced Database Management System Lab | 18PCCS2P2 | 16 |
| 15 | Data Mining Concepts and Techniques | 18PCCS31 | 17 |
| 16 | Software Testing | 18PCCS32 | 18 |
| 17 | Digital Image Processing | 18PCCS33 | 20 |
| 18 | A) Mobile Computing | 18PECS3A | 21 |
| 19 | B) Social Computing | 18PECS3B | 22 |
| 20 | Data Mining Lab | 18PCCS3P1 | 23 |
| 21 | Image Processing Lab | 18PCCS3P2 | 23 |
| 22 | Big Data Analytics | 18PCCS41 | 24 |
| 23 | Soft Computing | 18PCCS42 | 25 |
| 24 | Project | 18PCCS43 | 26 |
| 25 | A) Artificial Intelligence | 18PECS4A | 27 |
| 26 | B) Human Computer Interface | 18PECS4B | 28 |
| 27 | Web Programming Lab | 18PCCS4P1 | 29 |
| 28 | Big Data Analytics Lab | 18PCCS4P2 | 30 |
| 29 | Internet Concepts and Web Design | 18PICS21 | 31 |
| 30 | Desktop Publishing | 18PICS31 | 32 |

**POST GRADUATE DEPARTMENT OF COMPUTER SCIENCE
CBCS SYLLABUS M.Sc. COMPUTER SCIENCE (2018 - 2021)
COURSE STRUCTURE (CBCS)**

(Applicable for students admitted in June 2019 and onwards)

| I SEMESTER | | | II SEMESTER | | |
|------------------------|------------|-----------|--------------------|------------|-----------|
| COURSE | H/W | C | COURSE | H/W | C |
| DSC 1 | 6 | 4 | DSC 4 | 5 | 4 |
| DSC 2 | 6 | 4 | DSC 5 | 5 | 4 |
| DSC 3 | 6 | 4 | DSC 6 | 5 | 4 |
| DSE 1 | 4 | 4 | DSE 2 | 4 | 4 |
| P-I | 4 | 2 | P-III | 4 | 2 |
| P-II | 4 | 2 | P-IV | 4 | 2 |
| | | | IDC-I | 3 | 3 |
| TOTAL | 30 | 20 | TOTAL | 30 | 23 |
| III SEMESTER | | | IV SEMESTER | | |
| DSC 7 | 5 | 4 | DSC 10 | 5 | 4 |
| DSC 8 | 5 | 4 | DSC 11 | 5 | 4 |
| DSC 9 | 5 | 4 | DSC 12- Project | 8 | 8 |
| DSE 3 | 4 | 4 | DSE 4 | 4 | 4 |
| P-V | 4 | 2 | P-VII | 4 | 2 |
| P-VI | 4 | 2 | P-VIII | 4 | 2 |
| IDC 2 | 3 | 3 | | | |
| TOTAL | 30 | 23 | TOTAL | 30 | 24 |
| I - IV SEMESTER | | | | | |
| MOOC* | | 2# | | | |

| DISTRIBUTION OF HOURS, CREDITS, NO. OF PAPERS, & MARKS | | | | |
|---|--------------|----------------|----------------------|--------------|
| SUBJECT | HOURS | CREDITS | NO. OF PAPERS | MARKS |
| DSC THEORY + PROJECT | 66 | 52 | 12 | 1200 |
| DSC PRACTICALS | 32 | 16 | 8 | 400 |
| DSE | 16 | 16 | 4 | 400 |
| IDC | 6 | 6 | 2 | 200 |
| MOOC* | | 2# | 1 | |
| TOTAL | 120 | 90+2# | 27 | 2200 |

**COURSE STRUCTURE - POST GRADUATE DEPARTMENT OF COMPUTER SCIENCE
CBCS Syllabus – M.Sc., Computer Science (2019-2020 onwards)**

| SEM | P | Title of the paper | S. Code | H/W | C | Marks | | |
|-------------|----------------------------------|--|--------------|------------|-------------------------|-------|-------|-------------|
| | | | | | | I | E | T |
| I | DSC1 | Design and Analysis of Algorithm | 18PCCS11 | 6 | 4 | 25 | 75 | 100 |
| | DSC2 | Linux Programming | 18PCCS12 | 6 | 4 | 25 | 75 | 100 |
| | DSC3 | Python Programming | 18PCCS13 | 6 | 4 | 25 | 75 | 100 |
| | DSE-1 | A) Cloud Computing | 18PECS1A | 4 | 4 | 25 | 75 | 100 |
| | | B) Ad-Hoc and Sensor Networks | 18PECS1B | | | | | |
| | P-I | Linux Programming Practicals | 18PCCS1P1 | 4 | 2 | 40 | 60 | 100/2 |
| P-II | Python Programming Practicals | 18PCCS1P2 | 4 | 2 | 40 | 60 | 100/2 | |
| II | DSC4 | Open Source Technology | 18PCCS21 | 5 | 4 | 25 | 75 | 100 |
| | DSC5 | Advanced Database Management System | 18PCCS22 | 5 | 4 | 25 | 75 | 100 |
| | DSC6 | Internet of Things | 18PCCS23 | 5 | 4 | 25 | 75 | 100 |
| | DSE-2 | A) Security Practices | 18PECS2A | 4 | 4 | 25 | 75 | 100 |
| | | B) Cyber Security | 18PECS2B | | | | | |
| | P-III | Open Source Technology Practicals | 18PCCS2P1 | 4 | 2 | 40 | 60 | 100/2 |
| | P-IV | Advanced Database Management System Practicals | 18PCCS2P2 | 4 | 2 | 40 | 60 | 100/2 |
| IDC-1 | Internet Concepts and Web Design | 18PICS21 | 3 | 3 | 25 | 75 | 100 | |
| III | DSC7 | Data Mining Concepts and Techniques | 18PCCS31 | 5 | 4 | 25 | 75 | 100 |
| | DSC8 | Software Testing | 18PCCS32 | 5 | 4 | 25 | 75 | 100 |
| | DSC9 | Digital Image Processing | 18PCCS33 | 5 | 4 | 25 | 75 | 100 |
| | DSE-3 | A) Mobile Computing | 18PECS3A | 4 | 4 | 25 | 75 | 100 |
| | | B) Social Computing | 18PECS3B | | | | | |
| | P-V | Data Mining Practicals | 18PCCS3P1 | 4 | 2 | 40 | 60 | 100/2 |
| | P-VI | Image Processing Practicals | 18PCCS3P2 | 4 | 2 | 40 | 60 | 100/2 |
| IDC-2 | Desktop Publishing | 18PICS31 | 3 | 3 | 25 | 75 | 100 | |
| IV | DSC10 | Big Data Analytics | 18PCCS41 | 5 | 4 | 25 | 75 | 100 |
| | DSC11 | Soft Computing | 18PCCS42 | 5 | 4 | 25 | 75 | 100 |
| | DSC12 | Project | 18PCCS43 | 8 | 8 | | | 100 |
| | DSE-4 | A) Artificial Intelligence | 18PECS4A | 4 | 4 | 25 | 75 | 100 |
| | | B) Human Computer Interface | 18PECS4B | | | | | |
| | P-VII | Web Programming Practicals | 18PCCS4P1 | 4 | 2 | 40 | 60 | 100/2 |
| P-VIII | Big Data Analytics Practicals | 18PCCS4P2 | 4 | 2 | 40 | 60 | 100/2 | |
| I-IV | | Massive Open Online Course * | | - | 2 [#] | | | |
| | | | Total | 120 | 90+2[#] | | | 2200 |

* As per the guidelines of the UGC all the UG and the PG students shall enrol for one Massive Open Online Course offered through SWAYAM, NPTEL, etc.

Two extra credits will be given on completion of the course.

| I SEMESTER | | | |
|----------------------|---|-----------------------|-------------------|
| DSC 1 | DESIGN AND ANALYSIS OF ALGORITHM | | 18PCCS11 |
| Hrs / Week: 6 | Hrs / Sem: 90 | Hrs / Unit: 18 | Credits: 4 |

OBJECTIVES

- To analyze the asymptotic performance of algorithms, and demonstrate a familiarity with major algorithms and data structures.
- To apply important algorithmic design paradigms and methods of analysis

UNIT I INTRODUCTION

Notion of an Algorithm – Fundamentals of Algorithmic Problem Solving – Important Problem Types – Fundamentals of the Analysis of Algorithm Efficiency – Analysis Framework – Asymptotic Notations and its properties.

UNIT II BRUTE FORCE AND DIVIDE-AND-CONQUER

Brute Force - Closest-Pair and Convex-Hull Problems-Exhaustive Search -Travelling Salesman Problem - Knapsack Problem – Assignment problem. Divide and conquer methodology – Merge sort – Quick sort – Binary search.

UNIT III DYNAMIC PROGRAMMING AND GREEDY TECHNIQUE

Computing a Binomial Coefficient – Warshall’s and Floyd’ algorithm – Optimal Binary Search Trees – Knapsack Problem and Memory functions. Greedy Technique– Prim’s algorithm- Kruskal's Algorithm-Huffman-Trees.

UNIT IV ITERATIVE IMPROVEMENT

The Simplex Method-The Maximum-Flow Problem – Maximum Matching in Bipartite Graphs- The Stable marriage Problem.

UNIT V COPING WITH THE LIMITATIONS OF ALGORITHM POWER

Limitations of Algorithm Power-Lower-Bound Arguments-Decision Trees- Coping with the Limitations - Backtracking – n-Queens problem – Hamiltonian Circuit Problem –Branch and Bound – Assignment problem – Knapsack Problem – Travelling Salesman Problem.

TEXT BOOK(S):

Anany Levitin, “Introduction to the Design and Analysis of Algorithms”, Third Edition, Pearson Education, 2012.

REFERENCE(S):

1. 1.Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, “Introduction to Algorithms”, Third Edition, PHI Learning Private Limited, 2012.
2. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, “Data Structures and Algorithms”, Pearson Education, Reprint 2006.
3. 3.Donald E. Knuth, “The Art of Computer Programming”, Volumes 1& 3 Pearson Education, 2009. Steven S. Skiena, “The Algorithm Design Manual”, Second Edition, Springer, 2008.
4. <http://nptel.ac.in/>

| I SEMESTER | | | |
|---------------|-------------------|----------------|------------|
| DSC 2 | LINUX PROGRAMMING | 18PCCS12 | |
| Hrs / Week: 6 | Hrs / Sem: 90 | Hrs / Unit: 18 | Credits: 4 |

OBJECTIVES

- To control the resources with various commands and to understand File systems and File structures.
- To understand the client, server programming

UNIT-I: LINUX INTRODUCTION

Linux history –Features –Types – Installing Linux: Installation – System Configuring for Installation –Upgradation –Setting up disk partition –Adding new partition –Editing a Partition –Deleting a Partition –Linux hard disk layouts –Boot sector –Boot process

UNIT-II: LINUX COMMANDS AND TEXT EDITORS

Basic Linux Commands:ls, dircommands, date, cut, paste, sort, join – Using the File System –File & Directory Permissions –Text Editors: vi and Emacs

UNIT-III: GUI BASED LINUX

GNOME Architecture-GNOME Desktop-Programming in GNOME using GTK-Applications in GNOME

UNIT-IV: LINUX SHELL PROGRAMMING

Shell Scripting –Variables –Basic Control structures –Loops – Command Line Arguments

UNIT-V: SYSTEM ADMINISTRATION COMMANDS

Gawk –System Administration Basics: User and group administration –Starting and stopping the system - password recovery-user management

TEXT BOOK(S):

1. Vijay shekar, Red Hat Linux- Study Guide, First Edition: 2006, Firewall Media. Print ISBN: 81-7008-862-3
2. Mark G.Sobell, *A Practical Guide to Linux (R) Commands editors and shell programming*, 1st Edition: Prentice Hall PTR, July 2005.Print
3. Neil Mathew, Richard Stones, *Beginning Linux Programming*, 4th Edition: WTECH, 2008.Print ISBN: 8126515716.
4. Richard Peterson, *Linux: The complete Reference*, 6th Edition: McGraw-Hill Osborne Media, November 2007.Print

REFERENCE BOOK(S):

1. Bill Ball, Hoyt Dulf, *Linux Unleashed*, 1st Edition, Indiana, SAMS Publishing, 2000.Print
2. Peter Norton, *Linux Complete Reference*, 7th Edition, USA, BPB Publications, SYBEX Inc, 1999.Print

WEBSITE(S):

1. nptel.iitkac.in/courses/webcourse-contents/IISc-BANG/
2. <https://www.mooc-list.com/tags/linux>
3. <http://www.kegel.com/linux/traing.html>
4. <http://www.lancom-tech.com/hello-lnux-inst-supp-matls.html>
5. <http://www.isd.mel.nist.gov/projects/rtlinux/rtutorial/doc/basics.html>
6. <http://www.gtk.org/tutorial/>

| I SEMESTER | | | |
|----------------------|---------------------------|-----------------------|-------------------|
| DSC 3 | PYTHON PROGRAMMING | | 18PCCS13 |
| Hrs / Week: 6 | Hrs / Sem: 90 | Hrs / Unit: 18 | Credits: 4 |

OBJECTIVES

- To understand the concepts of list and tuple.
- To know the concepts of network programming.

UNIT I WELCOME TO PYTHON

Welcome to Python - What is Python – History of Python – Features of Python – Installing Python – Running Python - Comments - Operators - Variables and Assignment - Python Objects - Standard Types - Other Built-in Types - Internal Types - Standard Type Operators - Standard Type Built-in Functions - Categorizing the Standard Types - Unsupported Types

UNIT II INTRODUCTION TO NUMBERS

Introduction to Numbers – Integers - Floating Point Real Numbers - Complex Numbers – Operators - Built-in Functions - Sequences – Strings - Strings and Operators - String-only Operators - Built-in Functions - String Built-in Methods - Special Features of Strings

UNIT III LISTS, TUPLES, LOOPS

Lists – Operators - Built-in Functions - List Type Built-in Methods - Special Features of Lists - Tuples - Tuple Operators and Built-in Functions - Special Features of Tuples - Conditionals and Loops - if statement - else statement - else if statement - while statement - for statement - break statement - continue statement - pass statement - else statement

UNIT IV EXPRESSIONS

Regular Expressions – Introduction – Special symbols and characters for Regular Expressions – Regular Expressions and Python – Network Programming – Introduction – Network programming in Python – Sockets : Communication end points

UNIT V GUI PROGRAMMING

GUI Programming with TKinter – Introduction TKinter and Python Programming – Tkinter examples – Related modules and other GUIs – Web programming – Web surfing with Python – Advanced web clients.

TEXT BOOK(S):

Chun, J Wesley, CORE Python Programming, 2 nd Edition, Pearson, 2007 Reprint 2010.

UNIT I: Chapter 1, 2, 4 UNIT II: Chapter 5, 6 UNIT III: Chapter 6, 8

UNIT IV: Chapter 15, 16 UNIT V: Chapter 18, 19

REFERENCE(S):

Jeffrey Elkner, Chris Meyers Allen Downey, Learning with Python, Dreamtech Press, 2015

| I SEMESTER | | | |
|---------------------|------------------------|-----------------------|-------------------|
| DSE-1A | CLOUD COMPUTING | | 18PECS1A |
| Hrs / Week:4 | Hrs / Sem: 60 | Hrs / Unit: 12 | Credits: 4 |

OBJECTIVES

- To study the basics of cloud computing and different Cloud Computing services
- To understand the key concepts of virtualization, Cloud Implementation, Programming and Mobile cloud computing

UNIT-I: UNDERSTANDING CLOUD COMPUTING

Cloud computing-cloud types-the cloud cube model-deployment models – servicemodels - characteristics of cloud computing:Benefits of Cloud Computing- Disadvantages of Cloud Computing-assessing the role of open standards.

UNIT-II: CLOUD ARCHITECTURE

The cloud computing stack – composability – infrastructure – platforms – virtual appliances – communication protocols –Connecting to the cloud: The Jolicloud net book OS – Chromium OS the browser as an operating system.

UNIT-III: DEVELOPING CLOUD SERVICES

Infrastructure as a service (IaaS) – IaaS workloads- Platform as a service (PaaS) – Software as a service (SaaS)– Identity as a service (IDaaS) – Compliance as a service(CaaS).

UNIT-IV: VIRTUALIZATION AND CLOUD APPLICATIONS

Virtualization technologies – load balancing and virtualization – advanced load balancing – the Google cloud – Google Analytics – Google translate- Google Toolkit –Google APIs-Windows Azureservice – Windows Azure App fabric.

UNIT-V: CLOUD STORAGE

Cloud storage – unmanaged cloud storage – managed cloud storage – creating cloud storage systems – working with Amazon storage systems: Amazon Elastic compute cloud(EC2)- Amazon simple storage system(S3) – Amazon Elastic block store(EBS)- cloud front-security issues

TEXT BOOK(S)

Barrie Sosinsky, *Cloud Computing Bible*, New Delhi: Wiley India Pvt. Ltd, 2012.Print Chapters: 1,3,4,5 (pgs:94-99), 8(pgs:162-173), 10(pgs:201-216), 15(pgs:316-321), 9(pgs:185-199).

REFERENCE BOOK(S)

1. Haley Beard,,*Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs*, Emereo Pvt. Limited, July 2008.Print
2. Michael Miller, *Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online*, Second Edition, Que Publishing, August 2008.Print

WEBSITE(S) :

1. www.infoworld.com/d/cloud-computing/
2. <http://cecs.wright.edu/~pmateti/Courses/2350/Labs/Cloud/CloudComputing.html>
3. <https://www.windowsazure.com/en-us/>

| I SEMESTER | | | |
|---------------------|-----------------------------------|-----------------------|-------------------|
| DSE-1B | AD-HOC AND SENSOR NETWORKS | | 18PECS1B |
| Hrs / Week:4 | Hrs / Sem: 60 | Hrs / Unit: 12 | Credits: 4 |

OBJECTIVES

- To study the protocols and functionalities of ad-hoc networks.
- To understand various application development based on ad hoc networking and learn about the security issues in ad-hoc and sensors networks.

UNIT I ADHOC NETWORKS & COMMUNICATION PROTOCOLS

Fundamentals Of WLANs – IEEE 802.11 Architecture - Self Configuration and Auto Configuration-issues in Ad-Hoc Wireless Networks – MAC Protocols for Ad-Hoc Wireless Networks – Contention Based Protocols.

UNIT II ADHOC NETWORK ROUTING AND MANAGEMENT

Routing in Ad-Hoc Networks- Introduction -Topology based versus Position based Approaches – Proactive Routing - DSDV, WRP, TBRPF Reactive Routing – DSR,AODV, Hybrid Routing Approach ZRP, CBRP.

UNIT III SENSOR NETWORK COMMUNICATION PROTOCOLS

Introduction – Architecture - Single Node Architecture – Sensor Network Design Considerations – Energy Efficient Design Principles for WSN" s – Protocols for WSN – Physical Layer - Transceiver Design Considerations – MAC Protocols for wireless sensor network – IEEE 802.15.4 Zigbee – Link Layer and Error Control Issues.

UNIT IV SENSOR NETWORK MANAGEMENT AND PROGRAMMING

Sensor Management - Topology Control Protocols and Sensing Mode Selection Protocols - Time Synchronization - Localization and Positioning – Operating Systems and Sensor Network Programming – Sensor Network Simulators.

UNIT V ADHOC AND SENSOR NETWORK SECURITY

Security in Ad-Hoc and Sensor Networks – Key Distribution and Management – Software based Anti-tamper Techniques – Water Marking techniques – Defense against Routing Attacks - Secure Adhoc Routing Protocols.

TEXT BOOK(S):

1. Amiya Nayak, Ivan Stojmenovic, : Wireless Sensor and Actuator Networks : Algorithm and Protocols for Scalable Coordination and Data communication John Wiley & Sons 2010
2. C.Siva Ram Murthy and B.S.Manoj, “Ad Hoc Wireless Networks – Architectures and Protocols”, Pearson Education, 2011.

REFERENCE(S):

1. Adrian Perrig, J. D. Tygar, "Secure Broadcast Communication: In Wired and Wireless Networks", Springer, 2006.

2. Carlos De Morais Cordeiro, Dharma Prakash Agrawal, "Ad Hoc and Sensor Networks: Theory and Applications", Second Edition, World Scientific Publishing, 2011.
3. C.K.Toh, "Ad Hoc Mobile Wireless Networks", Pearson Education, 2007
4. ErdalÇayırıcı ,Chunming Rong, "Security in Wireless Ad Hoc and Sensor Networks", John Wiley and Sons, 2009
5. Feng Zhao and Leonidas Guibas, "Wireless Sensor Networks", Morgan Kaufman Publishers, 2004. 8. Feng Zhao, Leonidas Guibas, " Wireless Sensor Networks : An information processing Approach " , Elsevier 2004.
6. Holger Karl, Andreas willig, "Protocols and Architectures for Wireless Sensor Networks", John Wiley & Sons, Inc .2007.
7. Kazem Sohraby, Daniel Minoli, TaiebZnati , Wireless Sensor Networks: Technology, Protocols and Applications, Wiley Interscience A John Wiley & sons, Inc., Publication 2007.
8. WaltenequsDargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks Theory and Practice", John Wiley and Sons, 2010

| I SEMESTER | | |
|---------------------|------------------------------|-------------------|
| P-1 | LINUX PROGRAMMING LAB | 18PCCS1P1 |
| Hrs / Week:4 | Hrs / Sem: 60 | Credits: 2 |

OBJECTIVES

- To learn shell script and sed concepts.
 - To learn file management and permission advance commands.
 - To learn awk, grap, perl scripts.
- 1) Write a shell script that accept a file name starting and ending line numbers as arguments and display all the lines between given line.
 - 2) Write a shell script that delete all lines containing a specified word .
 - 3) Write ashell script that displays a list of all the files in the current directory.
 - 4) Write a shell script that receives any number of file names as arguments checks if every argument supplied is a file or a directory and report.
 - 5) Write a shell script that accept a list of file names as arguments count and report the occurrence of each word.
 - 6) Write a shell script to find the factorial of given integer.
 - 7) Write a shell script that list the all files in a directory.
 - 8) Write aawk script to find the number of characters, words and lines in a file? linked list respectively.
 - 9) Write a C Program that makes a copy of a file using standard I/O and system calls?
 - 10)Implement in C the following Unix commands using system calls
 - A) cat B)mv

| I SEMESTER | | |
|---------------------|-------------------------------|-------------------|
| P-2 | PYTHON PROGRAMMING LAB | 18PCCS1P2 |
| Hrs / Week:4 | Hrs / Sem: 60 | Credits: 2 |

OBJECTIVES

- To study the basics of Python programming.
 - To study about decision making, Functions and Files Handling in Python.
1. Program to demonstrate arithmetic operations.
 2. Program using numbers and operators.
 3. Program to demonstrate string manipulation.
 4. Program using user defined functions.
 5. Program using lists.
 6. Program using tuples.
 7. Program using conditional statement.
 8. Program using looping statement.
 9. Program using continue, pass and else statement.
 10. Program to demonstrate the use of regular expressions.
 11. Program to demonstrate exception handling.
 12. Program to demonstrate network programming.
 13. Program to demonstrate GUI programming with Tkinter.
 14. Program using web programming.
 15. Program using advanced web clients.

| II SEMESTER | | | |
|---------------------|-------------------------------|-----------------------|-------------------|
| DSC 4 | OPEN SOURCE TECHNOLOGY | | 18PCCS21 |
| Hrs / Week:5 | Hrs / Sem:75 | Hrs / Unit: 15 | Credits: 4 |

OBJECTIVES

- To provide knowledge about FOSS.
- To study programming languages like PHP, Ruby and Rails.
- To learn the Open Source database like MongoDB.

UNIT I INTRODUCTION

Introduction to Open Sources – Free Software Vs Open Source Software – Public Domain Software – Open Source Vs Closed Source - Need of Open Sources – Advantages of Open Sources – Application of Open Sources – Open Source Ethics – Social and Financial Impacts of Open source Technology – Open Source Development model Licenses and Patent, Important FOSS Licenses (Apache, BSD, GPL, LGPL), Copyrights – Copyleft.

UNIT II OPEN SOURCE PROGRAMMING LANGUAGES

PHP: Introduction – Programming in web environment – variables – constants – data types – operators – Statements – Functions – Arrays – OOP – String Manipulation and regular expression – File handling and data storage – PHP and SQL database – PHP and LDAP – PHP Connectivity – Sending and receiving E-mails – Debugging and error handling – Security – Templates.

UNIT III OPEN SOURCE DATABASE

Documents Database- MongoDB- Installation – crud operations- insert, modify, remove & query documents- 2-phase commits- Data models- Administration-security – aggregation- Indexes- Mongo shell – operators- couch DB over MongoDB.

UNIT IV RAILS

Introduction - DRY - COC - MVC - REST - Migrations - Active Record Validations - Active Record Associations - Active Record Query Interface - Layouts and Rendering - Action Controller - Rails Routing.

UNIT V RUBY

History and Design of Ruby – Classes, Objects and Variables – Containers, Blocks and Iterators – Standard Types – Methods – Expressions – Exceptions – Modules – Input and Output – Threads and Processes – Ruby and Web – Reflection – ObjectSpace – Distributing Ruby. Open source tools and technologies web server: Apache Web server – Working with Web Server – Configuring and Using apache web services.

REFERENCE(S):

1. Fadi. P. Deek and James A. M. McHugh, Open Source Technology and Policy, Cambridge University Press.
2. Kristina Chodorow and Michael Dirolf, “MongoDB: The Definitive Guide”, O’Reilly, 2010.
3. Rasmus Lerdorf and Kevin Tatroe, “Programming PHP”, O’Reilly, 2013.
4. Bruce A Tate and Curt Hibbs, “Ruby on Rails: Up and Running”, O’Reilly Media, 2008.
5. Carlson and Leonard Richardson, “Ruby Cookbook”, O’Reilly Media, 2008.
6. Peter Wainwright, “Professional Apache”, Wrox Press, 2002. 15MXDI HUMAN COMPUTER

| II SEMESTER | | | |
|---------------------|--|-----------------------|-------------------|
| DSC-5 | ADVANCED DATABASE MANAGEMENT SYSTEM | | 18PCCS22 |
| Hrs / Week:5 | Hrs / Sem:75 | Hrs / Unit :15 | Credits: 4 |

OBJECTIVES

- To present an introduction to database management systems.
- To understand how to organize, maintain and retrieve the information from a DBMS efficiently.

UNIT I RELATIONAL MODEL

Introduction - Structure of Relational Data Base - Relational Algebra. ER Model - Basic Concepts - Conversion of ER Model into Relations - ER Diagram Symbols. EER Model - Subclasses - Entity Types and Superclasses.

UNIT II DATA BASE DESIGN

Functional Dependency and Decomposition - Functional Dependency - Decomposition. Normalization - Introduction - Normalization - Normal Forms - BCNF - 4 NF - 5 NF.

UNIT III QUERY PROCESSING AND OPTIMIZATION

Introduction - Query Processing - Syntax Analyzer - Query Decomposition - Query Optimization. Transaction Processing and Concurrency Control: Transaction Concepts - Concurrency Control.

UNIT IV DATA BASE RECOVERY AND SECURITY

Introduction - Database Recovery Concepts - Types of Database Failures - Types of Database Recovery - Recovery Techniques - Buffer Management. Goals of Database Security - Discretionary Access Control - Mandatory Access Control - Firewalls - Statistical Database Security - Data Encryption.

UNIT V DATA BASE TECHNOLOGIES

Introduction - Parallel Databases - Architecture of Parallel Databases - Key Elements of Parallel Database Processing - Distributed Data Bases - Architecture of Distributed Data Bases - Distributed Data Base System Design - Recovery Control in Distributed Databases. Internet Databases - Digital Libraries - Multimedia Databases - Mobile Databases - Spatial Databases.

TEXT BOOK(S):

1. S.K. Singh, "Database Systems Concepts, Design and Applications", Pearson Education Pte. Ltd., New Delhi: 2006.
2. C.J. Date and others, "An Introduction to Database Systems", Eighth Edition, Pearson Education Pte. Ltd., New Delhi: 2006.
3. Abraham Silberschatz, "Database Systems", McGraw Hill International, 1997.

REFERENCE(S):

1. Paneerselvam R, "Database management systems", PHI, 2005.
2. Narang Rajesh, "Database management systems", PHI, 2005.
3. ISRD Group, "Introduction to database management systems", TMG, 2006.
4. Ramakrishnan, Gehrke, "Database management systems", 3/E, TMG, 2003.

| II SEMESTER | | | |
|---------------------|---------------------------|-----------------------|-------------------|
| DSC 6 | INTERNET OF THINGS | | 18PCCS23 |
| Hrs / Week:5 | Hrs / Sem: 75 | Hrs / Unit: 15 | Credits: 4 |

OBJECTIVES

- To understand the fundamentals of Internet of Things, learn about the basic of IOT protocols, a small low cost embedded system using Raspberry Pi.
- To apply the concept of Internet of Things in the real world scenario.

UNIT I THE INTERNET OF THINGS

An Overview –The Internet of Things – The Technology of the Internet of Things - Enchanted objects. Design Principles for Connected Devices: Calm and Ambient Technology – metaphor – Privacy – Web thinking for connected Devices.

UNIT II INTERNET PRINCIPLES

Internet Communications overview – IP – TCP – TCP/IP – UDP. IP Addresses: DNS – Static and Dynamic IP Address Assignment – MAC Addresses – TCP and UDP Ports – Application Layer Protocols. Prototyping: Sketching – Familiarity – Prototypes and Production – Open Source versus Closed Source.

UNIT III PROTOTYPING EMBEDDED DEVICES

Electronics - Embedded Computing Basics – Arduino -Raspberry Pi - Beagle Bone Black - Electric Imp. Prototyping the Physical Design: Non digital Methods - Laser Cutting - 3D printing - CNC Milling - Repurposing/Recycling.

UNIT IV PROTOTYPING ONLINE COMPONENTS

API - Writing a New API - Real-Time Reactions - Other Protocols. Techniques for Writing Embedded Code: Memory Management - Performance and Battery Life – Libraries - Debugging.

UNIT V BUSINESS MODELS

History of Business Models – Model – Internet of Starting up – Lean Startups. Moving to Manufacture: Designing Kits - Designing Printed circuit boards – Certification – Costs - Scaling Up Software. Ethics: Privacy – Control – Environment – Solutions.

TEXT BOOK(S)

Adrian McEwen and Hakim Cassimally, “Designing the Internet of Things”, Wiley, 2014.

REFERENCE(S)

1. Ovidiu Vermesan and Peter Friess, “Internet of Things – From Research and Innovation to Market Deployment”, River Publishers, 2014.
2. Peter Waher, “Learning Internet of Things”, Packt Publishing, 2015.
3. Donald Norris, “The Internet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi and BeagleBoneBlack”, McGraw Hill, 2015.

| II SEMESTER | | | |
|---------------------|---------------------------|-----------------------|-------------------|
| DSE-2A | SECURITY PRACTICES | | 18PECS2A |
| Hrs / Week:4 | Hrs / Sem:60 | Hrs / Unit: 12 | Credits: 4 |

OBJECTIVES

- To be exposed to the concepts of Cyber Security and Encryption concepts.
- To perform a detailed study of privacy and storage security and related issues.

UNIT I SYSTEM SECURITY

Building a secure organization- A Cryptography primer- detecting system Intrusion- Preventing system Intrusion- Fault tolerance and Resilience in cloud computing environments- Security web applications, services and servers.

UNIT II NETWORK SECURITY

Internet Security - Botnet Problem- Intranet security- Local Area Network Security - Wireless Network Security - Wireless Sensor Network Security- Cellular Network Security- Optical Network Security- Optical wireless Security.

UNIT III SECURITY MANAGEMENT

Information security essentials for IT Managers- Security Management System - Policy Driven System Management- IT Security - Online Identity and User Management System - Intrusion and Detection and Prevention System.

UNIT IV CYBER SECURITY AND CRYPTOGRAPHY

Cyber Forensics- Cyber Forensics and Incidence Response - Security e-Discovery - Network Forensics - Data Encryption- Satellite Encryption - Password based authenticated Key establishment Protocols.

UNIT V PRIVACY AND STORAGE SECURITY

Privacy on the Internet - Privacy Enhancing Technologies - Personal privacy Policies - Detection of Conflicts in security policies- privacy and security in environment monitoring systems. Storage Area Network Security - Storage Area Network Security Devices - Risk management - Physical Security Essentials.

REFERENCE(S):

1. John R.Vacca, Computer and Information Security Handbook, Second Edition, Elsevier 2013.
2. Michael E. Whitman, Herbert J. Mattord, Principal of Information Security, Fourth Edition, Cengage Learning, 2012.
3. Richard E.Smith, Elementary Information Security, Second Edition, Jones and Bartlett Learning, 2016

| II SEMESTER | | | |
|---------------------|-----------------------|-----------------------|-------------------|
| DSE-2B | CYBER SECURITY | | 18PECS2B |
| Hrs / Week:4 | Hrs / Sem: 60 | Hrs / Unit: 12 | Credits: 4 |

OBJECTIVES

- To understand the difference between threat, risk, attack and vulnerability.
- To identify how threats materialize into attacks and the motivation behind them.

UNIT I INTRODUCTION TO CYBER SECURITY

Introduction -Computer Security - Threats -Harm - Vulnerabilities - Controls - Authentication - Access Control and Cryptography - Web—User Side - Browser Attacks - Web Attacks Targeting Users - Obtaining User or Website Data - Email Attacks

UNIT II SECURITY IN OPERATING SYSTEM & NETWORKS

Security in Operating Systems - Security in the Design of Operating Systems -Rootkit - Network security attack- Threats to Network Communications - Wireless Network Security - Denial of Service - Distributed Denial-of-Service.

UNIT III DEFENCES: SECURITY COUNTER MEASURES

Cryptography in Network Security - Firewalls - Intrusion Detection and Prevention Systems - Network Management - Databases - Security Requirements of Databases - Reliability and Integrity - Database Disclosure - Data Mining and Big Data.

UNIT IV PRIVACY IN CYBERSPACE

Privacy Concepts -Privacy Principles and Policies -Authentication and Privacy - Data Mining -Privacy on the Web - Email Security - Privacy Impacts of Emerging Technologies - Where the Field Is Headed.

UNIT V MANAGEMENT AND INCIDENTS

Security Planning - Business Continuity Planning - Handling Incidents - Risk Analysis - Dealing with Disaster - Emerging Technologies - The Internet of Things - Economics - Electronic Voting - Cyber Warfare- Cyberspace and the Law - International Laws - Cyber crime - Cyber Warfare and Home Land Security.

TEXT BOOK(S):

1. Charles P. Pfleeger Shari Lawrence Pfleeger Jonathan Margulies, Security in Computing, 5th Edition , Pearson Education , 2015
2. George K.Kostopoulos, Cyber Space and Cyber Security, CRC Press, 2013.

REFERENCE(S):

1. Martti Lehto, Pekka Neittaanmäki, Cyber Security: Analytics,Technology and Automation edited, Springer International Publishing Switzerland 2015
2. Nelson Phillips and Enfinger Stuart, Computer Forensics and Investigations, Cengage Learning, New Delhi, 2009.

| II SEMESTER | | |
|----------------------|-----------------------------------|-------------------|
| P-III | OPEN SOURCE TECHNOLOGY LAB | 18PCCS2P1 |
| Hrs / Week: 4 | Hrs / Sem: 60 | Credits: 2 |

OBJECTIVE

- To provide practical experience in software development using open source tools like PHP and Ruby.
1. Write a program to Addition of two numbers using php.
 2. Write a program to show data types in php.
 3. Write a program to using class in php.
 4. Write a php program to connect to database.
 5. Write a program using function in ruby
 6. Write a program using arguments in ruby
 7. Write a program to remove funny character from a file using ruby
 8. Write a program to find a URL and print the web page to the screen using ruby

REFERENCES

<https://www.fischer.org/tips/Languages/Ruby/>

| II SEMESTER | | |
|----------------------|--|-------------------|
| P-IV | ADVANCED DATABASE MANAGEMENT SYSTEM LAB | 18PCCS2P2 |
| Hrs / Week: 4 | Hrs / Sem: 60 | Credits: 2 |

OBJECTIVES

- To understand the basic concepts and applications of Object Oriented database.
 - To understand and work on areas like Storage, Retrieval, Multi valued attributes, Triggers and other complex objects.
1. Creation of a database and writing SQL queries to retrieve information from database.
 2. Performing Insertion, Deletion, Modifying, Altering, Updating and Viewing records based on conditions.
 3. Creation of Views, Synonyms, Sequence, Indexes, Save point.
 4. Creating an Employee database to set various constraints.
 5. Creating relationship between the databases.
 6. Write a PL/SQL block that handles all types of exceptions.
 7. Creation of Procedures.
 8. Creation of database triggers and functions

| III SEMESTER | | | |
|---------------------|--|-----------------------|-------------------|
| DSC 7 | DATA MINING CONCEPTS AND TECHNIQUES | | 18PCCS31 |
| Hrs / Week:5 | Hrs / Sem: 75 | Hrs / Unit: 15 | Credits: 4 |

OBJECTIVES

- To Understand the value of data mining in solving real world.
- To Understand the algorithms commonly used in data mining tools and ability to apply data mining tools to real world problems.

UNIT I INTRODUCTION

Data mining – Data mining functionalities – kinds of patterns can be mined – classification – major issues. Data warehouse –A multidimensional data model – Data warehouse architecture – Data warehouse implementation – From data warehouse to data mining.

UNIT II DATA PROCESSING

Data preprocessing – Data cleaning – Data Integration and Transformation – Data Reduction –Discretization and concept hierarchy generation – Data mining primitives – Data mining Task

UNIT III ASSOCIATION RULES

Association Rule Mining – Mining single dimensional Boolean association rules from transactional databases –. Classification and prediction – Issues regarding classification and prediction – Bayesian classification Classification by Back propagation – classification based on concepts from association rule mining

UNIT IV DATA MINING TECHNIQUES

Cluster Analysis-A categorization of Major clustering methods-Partitioning methods Hierarchical methods -Grid based methods - Model based clustering methods Density - based methods.

UNIT V APPLICATIONS

Applications and Trends in Data Mining – Data mining system Products and Research prototypes – Additional themes on Data mining – Social Impacts of Data Mining – Trends in Data mining Mining Spatial Databases – Mining Timeseries and sequence data – Mining the World wide web.

TEXT BOOK(S):

1. Jiwei Han, Michelen Kamber, “Data Mining Concepts and Techniques”, Morgan Kaufmann Publishers an Imprint Of Elsevier, 2001.(Chapters 1,2,3,4.1, 6.1 ,6.2, 7,8, 9.2, 9.4, 9.6, 10)

REFERENCE(S):

1. Arun K.Pujari, Data Mining Techniques, Universities Press(India) Limited, 2001.
2. George M. Marakas, Modern Data warehousing, Mining and Visualization: core concepts, Printice Hall, First Edition, 2002.
3. PangNing Tan, Michael Steinbach, Vipin Kumar, Introduction to Data Mining, Pearson,2008.
4. Soman K. P, Shyam Diwakar, V. Ajay, Data Mining, Prentice Hall, 2008.

| III SEMESTER | | | |
|---------------------|-------------------------|-----------------------|-------------------|
| DSC 8 | SOFTWARE TESTING | | 18PCCS32 |
| Hrs / Week:5 | Hrs / Sem: 75 | Hrs / Unit: 15 | Credits: 4 |

OBJECTIVES

- To learn about White box testing and Black Box testing methods and techniques.
- To study about quality Assurance models.

UNIT I: PRINCIPLES OF TESTING AND SOFTWARE LIFE CYCLE MODELS

Principles of Testing – Software Testing Standards - Phases of Software Project - Quality, Quality Assurance and Quality Control - Testing, Verification and Validation- Process model to represent different phases- Life Cycle Models

UNIT II: WHITE BOX, BLACK BOX AND INTEGRATION TESTING

Overview of White Box Testing– Classification - Static Testing methods – Structural Testing Classification - Challenges in White Box Testing – Overview of Black Box Testing -- Need for Black Box Testing – Scope of Black Box Testing -- Implementation Techniques

UNIT III: INTEGRATION, SYSTEM AND ACCEPTANCE TESTING

Overview of Integration Testing – Integration Testing Methodologies – Testing as a Phase of Testing – Scenario Testing – Defect Bash – System Testing Overview – Need for System Testing – Functional versus Non-Functional Testing – Techniques for Functional System Testing – Non-Functional Testing –Acceptance Testing – Summary of Testing Phases

UNIT IV: PERFORMANCE AND REGRESSION TESTING

Introduction -- Factors Governing Performance Testing – Methodology for Performance Testing – Tools for Performance Testing – Challenges – Overview of Regression Testing – Types of Regression Testing – Scope of Regression Testing – Methodology for Regression Testing

UNIT V: TEST MANAGEMENT AND AUTOMATION

Introduction – Test Planning – Test Management – Test Process – Test Reporting –Best Practices – Test Automation Overview – Terms used in Automation – Skills needed for Automation – Scope of Automation –Design and Architecture for Automation – Generic requirements for test

Tool/Framework– Process Model for Automation – Selecting a Test Tool –
Automation for Extreme Programming Model – Challenges

TEXTBOOK(S):

1. Srinivasan Desikan&Gopaldaswamy Ramesh, (2007). *Software Testing Principles and Practices*, (5th Impression), Delhi: Pearson Education. Print.(Chapters: 1 to 8,15,16)

REFERENCE(S):

1. Dinesh Maidasani, (2007). *Software Testing*, (1st ed.), New Delhi: Firewall Media. Print.
2. Ilene Burnstein, (2007). *Practical Software Testing*, (3rd reprint), New Delhi: Springer (India) Private Limited. Print.
3. V. K. Jain, (2010). *Introduction to Software Testing and Analysis*, (Vol. I), New Delhi: Atlantic publishers & distributors (P) Ltd. Print.

WEBSITE(S):

1. <http://softwaretestingfundamentals.com/>
2. www.softwaretestingstandard.org/
3. https://www.tutorialspoint.com/software_testing/software_testing_iso_standards.htm (Software Testing Standards)
4. <https://www.guru99.com/junit-tutorial.html>
5. https://www.tutorialspoint.com/junit/junit_execution_procedure.htm
6. <http://nunit.org/docs/2.5.4/quickStart.html>

| III SEMESTER | | | |
|---------------------|---------------------------------|-----------------------|-------------------|
| DSC 9 | DIGITAL IMAGE PROCESSING | | 18PCCS33 |
| Hrs / Week:5 | Hrs / Sem:75 | Hrs / Unit: 15 | Credits: 4 |

OBJECTIVES

- To learn and understand the fundamentals of digital image processing, and various image Transforms.
- To learn Image Enhancement Techniques, Image restoration Techniques, image compression and Segmentation used in digital image processing.

UNIT I INTRODUCTION TO IMAGE PROCESSING

Digital Image Processing – Mat Lab Working Environment – Image Representation – reading images – Displaying images – Writing images – Data classes – Image types – Converting between data classes and image types – Array indexing – M-Function Programming

UNIT II SPATIAL DOMAIN AND FREQUENCY DOMAIN PROCESSING

Intensity Transformation functions – Histogram processing and function plotting – spatial filtering – 2-D Discrete Fourier transformation – filtering in the frequency domain – generating and sharpening frequency domain filters

UNIT III IMAGE RESTORATION AND COLOR IMAGE PROCESSING

Model of the image degradation / restoration process – Noise models – Periodic Noise Reduction using frequency domain filtering – direct inverse filtering – wiener filtering – constrained least square filtering – Lucy – Richardson algorithm – color image representation

UNIT IV IMAGE COMPRESSION AND MORPHOLOGICAL IMAGE PROCESSING

Coding redundancy - Spatial redundancy – psycho visual redundancy – JPEG compression - Morphological image processing – dilation and erosion – morphological reconstruction

UNIT V IMAGE SEGMENTATION AND REPRESENTATION

Point , Line, Edge Detection – Hough Transform – Thresholding – Region based Segmentation – Watershed Transform – Representation – Boundary Descriptors – Regional Descriptors.

TEXT BOOK(S):

1. Rafael C.Gonzalez, Richard E. Woods, Steven L. Eddins, Digital Image Processing using MATLAB, Pearson Education Inc, New Delhi, 2007.

REFERENCE(S):

1. Chanda. B. Dutta Majumder, D. Digial Image Processing and Analysis, Prentice Hall of India, New Delhi, 2007.
2. Gonzalez, R.C., Wintz P Digital Image Processing, Addison-wesley Longman Publishing Co, New Delhi – 1987
3. Scott E. Umbaug, Computer Vision and Image Processing, Prentice Hall International, New Delhi, 1998.

| III SEMESTER | | | |
|----------------------|-------------------------|-----------------------|-------------------|
| DSE-3A | MOBILE COMPUTING | | 18PECS3A |
| Hrs / Week: 4 | Hrs / Sem: 60 | Hrs / Unit: 12 | Credits: 4 |

OBJECTIVES

- To learn about the concepts and principles of mobile computing;
- To explore both theoretical and practical issues of mobile computing;
- To develop skills of finding solutions and building software for mobile computing applications

UNIT I: INTRODUCTION TO MOBILE COMPUTING

Mobility of bits and bytes – Wireless the beginning – Developing mobile Computing application – Mobile computing architecture – GSM – Architecture-Entities – Call Routing in GSM – PLMN Interfaces.

UNIT II: INTRODUCTION TO DIGITAL TRANSMISSION

Digital to Digital Conversion – Line Coding – line coding schemes – Block coding – Scrambling – Analog-to – Digital Conversion - Pulse code modulation –delta modulation – Transmission modes – Parallel Transmission – Serial Transmission.

UNIT III WAP & 3G

Introduction to WAP – MMS, GPRS Application; CDMA and 3G: Spread Spectrum technology CDMA Vs GSM – wireless data – third generation networks – application on 3G

UNIT IV: WIRELESS LAN, INTERNET NETWORKS AND INTERNET WORKING

Introduction – Wireless LAN advantages IEEE802.11 standards wireless LAN architecture – mobility in wireless LAN - Wireless LAN security – Fundamentals of call processing – Intelligence in the networks – SS#7 – INCM – softswitch – programmable networks – Technologies and interfaces for IN.

UNIT V: PROTOCOLS SUPPORTING MOBILITY

Mobile network layer protocols such as mobile IP –Dynamic Host Configuration Protocol (DHCP)-Mobile transport layer protocols such mobile TCP, indirect –TCP – Wireless Application Protocol (WAP).

TEXTBOOK(S):

1. Asoke K Talukder& Roopa R Yavagal, Mobile Computing, Tata McGraw-Hill Publishing Company Limited, 2002, Chapters 4,5 ,Chapters 1,2,8,9,10,11
2. J.Schiller, Mobile Communications, ISBN:0-321-12381-6, Addison-Wesley, 2003,
3. Behrouz AForouzan, Data Communications and Networking, Tata McGraw-Hill Publishing Company Limited, 2002, Chapters 4.

REFERENCE(S):

1. T.S. Rappaport, Wireless communications, Principle and Practice, Pearson, 2002.
2. A.S.Tanenbaum, Computer Networks, 4th edition, Publisher: Prentice Hall PTR; ISBN: 0130661023; August, 2002.

REFERENCE SITES:

1. www.dcg.ethz.ch
2. www.informatik.uni-goettingen.de
3. www.ebookee.net

| III SEMESTER | | | |
|----------------------|-------------------------|-----------------------|-------------------|
| DSE-3B | SOCIAL COMPUTING | | 18PECS3B |
| Hrs / Week: 4 | Hrs / Sem: 60 | Hrs / Unit: 12 | Credits: 4 |

OBJECTIVES

- To create original social application, critically applying appropriate theories and effective practices in a reflexive and creative manner.
- To critically analysis social software in term of its technical, social, legal , ethical and functional feature.

Unit I BASIC CONCEPTS

Networks and Relations: Relations and Attributes, Analysis of Network Data, Interpretation of network data -New Social Learning – Four Changes that Shift Work - Development of Social Network Analysis: Sociometric analysis and graphtheory, Interpersonal Configurations and Cliques – Analysing Relational Data.

Unit II SOCIAL LINK

Individual Actors, Social Exchange Theory, Social Forces, Graph Structure, Agent Optimization Strategies in Networks – Hierarchy of Social Link Motivation- Social Context.

Unit III SOCIAL MEDIA

Trends in Computing – Motivations for Social Computing – Social Media: Social relationships, Mobility and Social context – Human Computation – Computational Models- Business use of social Media.

Unit IV SOCIAL INFORMATION FILTERING

Mobile Location Sharing – Location based social media analysis – Social Sharing and Social Filtering – Automated recommender Systems – Traditional and Social Recommender Systems.

Unit V SOCIAL NETWORK STRATEGY

Application of Topic Models – Opinions and Sentiments – Recommendation Systems – Language Dynamics and influence in online communities–Psychometric analysis – Case Study: Social Network Strategies for surviving the zombie apocalypse.

REFERENCE(S):

1. Tony Bingham, Marcia Conner, “The New Social Learning, Connect. Collaborate. Work”, 2nd Edition, ATD Press, ISBN-10:1-56286-996-5, 2015.
2. Nick Crossley, Elisa Bellotti, Gemma Edwards, Martin G Everett, Johan Koskinen, Mark Tranmer, “Social Network Analysis for Ego-Nets”, SAGE Publication, 2015.
3. Zafarani, Abbasi and Liu, Social Media Mining: An Introduction, Cambridge University Press, 2014.
4. John Scott, “Social Network Analysis”, Third Edition, SAGE Publication, 2013
5. Jennifer Golbeck, “Analyzing the Social Web”, Elsevier Publication, 2013.
6. Huan Liu, John Salerno, Michael J. Young, “Social computing and Behavioral Modeling”, Springer Publication, 2009.
7. Christina Prell, “Social Network Analysis: History, Theory and Methodology”, 1st Edition, SAGE Publications Ltd, 2012

| III SEMESTER | | |
|---------------------|------------------------|-------------------|
| P-V | DATA MINING LAB | 18PCCS3P1 |
| Hrs / Week:4 | Hrs / Sem: 60 | Credits: 2 |

OBJECTIVES

- To introduce data mining techniques including predictive, descriptive and visualization modeling.
 - To focus on the main process of data mining such as data preparation, classification, clustering, association analysis and pattern evaluation.
1. Build Data Warehouse and Explore WEKA
 2. Perform data preprocessing tasks and Demonstrate performing association rule mining on data sets
 3. Demonstrate performing classification on data sets
 4. Demonstrate performing clustering on data sets
 5. Demonstrate performing Regression on data sets
 6. Sample Programs using Hospital Management System

| III SEMESTER | | |
|---------------------|-----------------------------|-------------------|
| P-VI | IMAGE PROCESSING LAB | 18PCCS3P2 |
| Hrs / Week:4 | Hrs / Sem: 60 | Credits: 2 |

OBJECTIVE

- To implement the methods and algorithm for image processing in MatLab.
1. Point processing in spatial domain
 - a. Negation of an image
 - b. Thresholding of an image
 - c. Contrast Stretching of an image
 2. Bit Plane Slicing
 3. Histogram Equalization
 4. Histogram Specification
 5. Zooming by interpolation and replication
 6. Filtering in spatial domain
 - a. Low Pass Filtering
 - b. High Pass Filtering
 - c. Median filtering
 7. Edge Detection using derivative filter mask
 - a. Prewitt
 - b. Sobel
 - c. Laplacian
 8. Data compression using Huffman coding
 9. Filtering in frequency domain
 - a. Low pass filter
 - b. High pass filter
 10. Hadamard transform

| IV SEMESTER | | | |
|---------------------|---------------------------|-----------------------|-------------------|
| DSC-10 | BIG DATA ANALYTICS | | 18PCCS41 |
| Hrs / Week:5 | Hrs / Sem:75 | Hrs / Unit: 15 | Credits: 4 |

OBJECTIVES

- To understand the Big Data Platform and its Use cases.
- To provide an overview of Apache Hadoop, MongoDB.

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 HADOOP 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

TEXT BOOK(S):

1. Seema Acharya and Subhashini Chellappan, "Big Data and Analytics", Wiley India Pvt. Ltd., 2016

REFERENCE(S):

1. "Big Data" by Judith Hurwitz, Alan Nugent, Dr. Fern Halper and Marcia Kaufman, Wiley Publications, 2014.
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.

| IV SEMESTER | | | |
|--------------|----------------|----------------|------------|
| DSC 11 | SOFT COMPUTING | | 18PCCS42 |
| Hrs / Week:5 | Hrs / Sem:75 | Hrs / Unit: 15 | Credits: 4 |

OBJECTIVES:

- To introduce a relatively new computing paradigm for creating intelligent machines useful for solving complex real world problems.
- To insight into the tools that make up the soft computing techniques fuzzy logic, artificial neural networks and hybrid systems Techniques.

UNIT I ARTIFICIAL NEURAL NETWORK

Introduction – Neural Networks – Application Scope of Neural Networks – Fundamental Concept – Basic Models of Artificial Neural Network – Important Terminologies of ANNs – Hebb Network – Perceptron Networks – Adaptive Linear Neuron (Adaline) – Multiple Adaptive Linear Neurons – Back-Propagation Network

UNIT II ASSOCIATIVE MEMORY NETWORKS

Introduction – Auto associative Memory Network – Hetero associative Memory Network – Bidirectional Associative Memory (BAM) – Hopfield Networks – Unsupervised Learning Networks :Kohonen Self-Organizing Feature Maps – Learning Vector Quantization – Counter Propagation Networks – Adaptive Resonance Theory Network.

UNIT III GENETIC ALGORITHM

Introduction – Biological Background – Basic Terminologies in Genetic Algorithm – Operators in Genetic Algorithm: Encoding – Selection – Crossover (Recombination) – Mutation – Stopping Condition for Genetic Algorithm Flow – Constraints in Genetic Algorithm – Problem Solving Using Genetic Algorithm – Classification of Genetic Algorithm : Messy Genetic Algorithms – Hybrid Genetic Algorithms.

UNIT IV FUZZY LOGIC

Introduction to Fuzzy logic – Classical Sets (Crisp Sets) - Fuzzy Sets – Classical Relations and Fuzzy Relations : Introduction – Cartesian Product of Relation – Classical Relation – Fuzzy Relations – Features of the Membership Functions – Fuzzification – Methods of Membership Value Assignments

UNIT V DEFUZZIFICATION AND DECISION MAKING

Defuzzification : Introduction – Lambda-Cuts for Fuzzy Sets(Alpha-Cuts) - – Lambda-Cuts for Fuzzy Relations – Defuzzification Methods – Fuzzy Decision Making : Introduction – Individual Decision Making – Multiperson Decision Making – Multiobjective Decision Making – Multiattribute Decision Making – Fuzzy Bayesian Decision Making

TEXT BOOK(S):

1. S.N Sivanandam S.N Deepa “Principles of Soft Computing”, Wiley –India, 2007.
2. Timothy J.Ross, “Fuzzy Logic with Engineering Application “, McGraw Hill, 2000.

REFERENCE(S):

1. S.Rajasekaran G.A.Vijayalakshmi Pai “Neural networks, Fuzzy logic, and Genetic algorithm” , synthesis and Applications
2. James A. Freeman, David M. Skapura, Neural Networks, Algorithms, Applications, and Programming Techniques.

| IV SEMESTER | | |
|--------------------|---------------------|------------------|
| DSC-12 | PROJECT | 18PCCS43 |
| Hrs/Week:8 | Hrs/Sem: 120 | Credits:8 |

OBJECTIVE:

Every PG student is required to prepare the project subject related – based on the guidelines of his/her project guide.

The following are the guidelines to be adhered to

- The project should be an individual one
- The language for the project is **English**
- The Minimum number of pages should be **60**
- Project observations, suggestions and conclusion shall be formed as part of the project.
- The Project will be evaluated both by the Internal as well as External Examiner each for 100 marks. The distribution of mark should be **60 marks for the Project Report and 40 marks for the Viva-voce Examination**. The Division of marks for the Project Report is as mentioned below:

| Particulars | Internal Examiner | External Examiner |
|--|--------------------------|--------------------------|
| Wording of Title | 5 | 5 |
| Objectives/ Formulation including Hypothesis | 5 | 5 |
| Review of Literature | 10 | 10 |
| Relevance of Project to Social Needs | 5 | 5 |
| Methodology/ Technique/ Procedure Adopted | 20 | 20 |
| Summary/ Findings/ Conclusion | 5 | 5 |
| Bibliography/ Annexure/ Foot notes | 10 | 10 |
| Total | 60 | 60 |

The average mark of Internal and External Examiner is considered as marks of Dissertation report.

| IV SEMESTER | | | |
|---------------------|--------------------------------|-----------------------|-------------------|
| DSE-4A | ARTIFICIAL INTELLIGENCE | | 18PECS4A |
| Hrs / Week:4 | Hrs / Sem:60 | Hrs / Unit: 12 | Credits: 4 |

OBJECTIVES

- To study the concept of Artificial Intelligence.
- To learn the methods of solving problems using Artificial Intelligence and Introduce the concepts of expert system and Machine Learning.

UNIT I ARTIFICIAL INTELLIGENCE

What is Artificial Intelligence? The AI Problems – The Underlying Assumptions – What is an AI Technique? Problem spaces and search – Defining the Problems as a State Space Search – Production Systems – Problem Characteristics – Production System Characteristics – Issues in the Design of Search Programmes.

UNIT II KNOWLEDGE REPRESENTATION

Generate and Test – Hill Climbing – Best-First Search – Problem Reduction – Constraint Satisfaction – Means End Analysis-Knowledge Representation issues: Representation and Mappings – Approaches to Knowledge Representation – Issues in Knowledge Representation – The Frame Problem

UNIT III PREDICATE LOGIC

Using predicate logic – Representing Simple facts in Logic – Representing Instance and Is a relationships – Computable functions and Predicates – Resolutions – Natural Deductions – Representing Knowledge Using Rules: Procedural versus Declarative Knowledge – Forward versus Backward Reasoning – Matching – Control Knowledge

UNIT IV REASONING

Symbolic Reasoning under uncertainty – Introduction to Non Monotonic Reasoning – Logics for Non Monotonic Reasoning – Implementation issues – Implementation : Breadth – First Search – Statistical reasoning – Bayesian Networks – Fuzzy Logic- Learning: What is learning? – Rote Learning – Learning by taking advice

UNIT V EXPERT SYSTEM

Connectionist Models – Introduction – Hopfield Networks – Learning in Neural Networks – Applications of Neural Networks – Expert Systems – Representing and Using Domain Knowledge – Expert System Shells – Explanation – Knowledge acquisition

TEXT BOOK(S):

11. Artificial Intelligence, Elaine Rich, Kevin Knight, Shivas Shankar B Nair, TataMcGraw Hill Publishing Ltd., - New Delhi, Third Edition, 2009.

REFERENCE(S):

1. Introduction to Artificial Intelligence and Expert Systems, Dan W.Patterson, Prentice Hall of India, New Delhi, 1992
2. Artificial Intelligence, A Modern Approach, Stuart J. Russell and Peter Norvig, Pearson Education, reprint 2003.
3. Introduction to Expert Systems, 3/e, Peter Jackson, Pearson Education, Reprint 2003
4. Artificial Intelligence, A New Synthesis, Nils J. Nilsson Harcourt Asia Pvt. Ltd., 1998

| IV SEMESTER | | | |
|---------------------|---------------------------------|-----------------------|-------------------|
| DSE-4B | HUMAN COMPUTER INTERFACE | | 18PECS4B |
| Hrs / Week:4 | Hrs / Sem: 60 | Hrs / Unit: 12 | Credits: 4 |

OBJECTIVES

- To learn the Foundations Of Human Computer Interface.
- To understand the awareness of Mobile HCI and guidelines for User Interface.

Unit I FOUNDATIONS

Human: Human memory – Emotion – Individual differences – Psychology and the design of interactive systems – Computer: Devices used for Text entry, display, virtual reality and 3D interactions – Positioning & pointing – physical controls, sensors and special devices – memory – processing and networks. Interactions: Models of interactions - Framework – interaction styles – context of interactions -elements of WIMP interface.

Unit II INTERACTION DESIGN BASICS

Paradigms of interactions – process of design – HCI in software process – software life cycle – usability engineering – interactive design and prototyping – design rules: principles to support usability – standards – guidelines and rules for heuristics – HCI patterns – implementation support – evaluation technique – user support.

Unit III IMPLEMENTATION AND EVALUATION

Elements of windowing systems – Toolkits – User interface systems – Goals of evaluation – evaluation through expert system, user participation – choosing evaluation method – universal design principles – multi-modal interaction – design focus – user support.

Unit IV MODELS AND THEORIES-1

Cognitive models : Goals and task hierarchies – linguistic models – challenge of display based systems- physical and device models – cognitive architecture – socio organizational issues and stakeholder requirements: organizational issues – capturing requirements.

Unit V MODELS AND THEORIES-2

Communication and collaboration models: face to face communication – conversion – text based communication – group working – task analysis: task decomposition – knowledge based analysis – dialog notations and design – models of systems – models of rich interactions.

REFERENCE(S):

1. Julie A. Jacko, “Human Computer Interaction Handbook: Fundamentals, Evolving Technologies, and Emerging Applications”, 3rd edition, CRC Press, ISBN 9781439829431, 2012.
2. Yvonne Rogers, Helen Sharp, Jenny Preece, “Interaction Design: Beyond Human computer Interaction”, 3rd edition, Wiley, ISBN-10: 0470665769, 2011.
3. Dix A, Human – Computer Interaction. Harlow, England: Prentice Hall, ISBN- 10:0130461091, 2004.

| IV SEMESTER | | |
|---------------------|----------------------------|-------------------|
| P-VII | WEB PROGRAMMING LAB | 18PCCS4P1 |
| Hrs / Week:4 | Hrs / Sem:60 | Credits: 2 |

OBJECTIVES:

- To understand the technologies used in Web Programming.
 - To know the importance of object-oriented aspects of Scripting.
1. Develop and demonstrate a XHTML document that illustrates the use of external style sheet, ordered list, table, borders, padding, color, and the tag.
 2. Develop and demonstrate a XHTML file that includes Javascript script for the following problems:
 - a) Input : A number n obtained using prompt Output : The first n Fibonacci numbers
 - b) Input : A number n obtained using prompt Output : A table of numbers from 1 to n and their squares using alert
 3. Develop and demonstrate a XHTML file that includes Javascript script that uses functions for the following problems:
 - a) Parameter: A string
Output: The position in the string of the left-most vowel
 - b) Parameter: A number
Output: The number with its digits in the reverse order
 4. Design an XML document to store information about a student in an arts and science college affiliated to MSU. The information must include USN, Name, Name of the College, Branch, Year of Joining, and e-mail id. Make up sample data for 3 students. Create a CSS style sheet and use it to display the document.
 5. Write a Perl program to display various Server Information like Server Name, Server Software, Server protocol, CGI Revision etc.
 6. Write a Perl program to accept the User Name and display a greeting message randomly chosen from a list of 4 greeting messages.

| IV SEMESTER | | |
|---------------------|-------------------------------|-------------------|
| P-VIII | BIG DATA ANALYTICS LAB | 18PCCS4P2 |
| Hrs / Week:4 | Hrs / Sem:60 | Credits: 2 |

OBJECTIVES:

- To introduce the tools required to manage and analyze big data like Hadoop, NoSql.
- To impart knowledge of MapReduce paradigm to solve complex problems Map-Reduce.

Hadoop

1. Install, configure and run Hadoop and HDFS
2. Implement word count / frequency programs using MapReduce
3. Implement an MR program that processes a weather dataset

R

4. Implement Linear and logistic Regression
5. Implement SVM / Decision tree classification techniques
6. Implement clustering techniques
7. Visualize data using any plotting framework
8. Implement an application that stores big data in Hbase / MongoDB / Pig using Hadoop / R.

**IDC SUBJECTS OFFERED BY DEPARTMENT OF COMPUTER SCIENCE
TO OTHER MAJOR STUDENTS**

| II SEMESTER | | | |
|--------------------|---|--------------------|------------------|
| IDC-1 | INTERNET CONCEPTS AND WEB DESIGN | | 18PICS21 |
| Hrs/Week: 3 | Hrs/Sem: 45 | Hrs/Unit: 9 | Credits:3 |

OBJECTIVES

- To understand about Internet Tools and E-Mail structure.
- To develop web pages using HTML.

UNIT-I: THE INTERNET

Introduction – Evolution of Internet – Basic Internet Terms – Website – Browser- URL – ISP – Webserver – Download and Upload – Online and Offline - Getting Connected to Internet – Internet Applications.

UNIT-II: INTERNET TOOLS

Introduction – Web Browser – Browsing Internet Using IE – E-mail – E-mail Address Structure – Checking E-mails – Sending E-mails – E-mail Attachments – How E-mail Works - Netiquette - Search Engines Instant Messaging.

UNIT-III :HISTORY OF HTML

History of HTML-HTML document-HEAD and BODY sections-Title, Prologue,Links-Comment line-Designing the BODY section-Aligning the headings-HR tag-Paragraphs-Tab settings-Images and Pictures-Embedding PNG format images.

UNIT-IV :ORDERED AND UN ORDERED LISTS

Ordered and Un Ordered lists-Nested Lists-Headings in a list-Table Handling-Table Creation in HTML-Width of the table and Cells-Cell spanning-Coloring cells-column specification.

UNIT-V :FRAMES

Frames - Frameset definitions-Frame definitions- Nested Framesets-Forms-Action attribute-Method attribute-Enctype attribute-Check Boxes-Radio Buttons - Text Fields - Text Areas – Password-Submit and Reset buttons-Drop down list-sample forms.

TEXT BOOK(S):

1. Introduction to Information Technology,ITL Education Solutions Limited Pearson Education
Unit I – Chapter 15
Unit II – Chapter 16
2. World Wide Web with HTML, Dr. C.Xavier., Tata McGraw – Hill Publishing Company.

| III SEMESTER | | | |
|---------------------|---------------------------|----------------------|-------------------|
| IDC-2 | DESKTOP PUBLISHING | | 18PICS31 |
| Hrs / Week:3 | Hrs / Sem : 45 | Hrs / Unit: 9 | Credits: 3 |

OBJECTIVE

- To provide DTP Operators include Publishing, Graphic Design, Advertising, Printing and Advertising medium.

UNIT I- Introduction

Introduction to PageMaker - Layout window – Document setup –Basic page Maker function: Open, new, close, print, save and save as – Working with text: text tool, Text block – Editing Text – Formatting a Text: Character formatting, paragraph formatting

UNIT II – Drawing Tools

Lines – Boxes- Ellipses- Polygons- Selecting- Deleting- Moving- Resizing elements- Selecting Multiple Elements- Grouping and Ungrouping- Manipulating Elements using Control Palettes – Cut ,Copy and Paste

UNIT III - Working With Graphics

Graphics Tool, Masking, Rotation, Flipping, Cropping, positioning and scaling, Fill option. Arrange the object, Grouping, locking, Frame concept polygon setting and Text wrap properties Master Pages: Header and Footer and Template files - Story Editor: Find & Replace. Spell checker – Book Creation – TOC creation

UNIT IV- Introduction to photo Shop

Layout -basic functions: New, Open, close, save, save as and setup – painting tools: Air brush, paint brush, line pen, eraser, eye dropper, and gradient and paint bucket tools-Background eraser tool.

UNIT V - Photoshop Text Tools

Text Tools-Entering text-Selecting text-Checking for spelling errors – Zoom tool, Hand tool, selection tools: Move and sponge tools- Vignettes and edge effects. Manipulating Images: Changing the canvas size- Rotating and Flipping images – Blurring and Sharpening images – Color Replacement Tool.

TEXT BOOK(S):

1. Mastering Page Maker6 for windows 95 – by Rebecca Bridges Altman & Rick Altman Chapters: 1 - 7,8(Text Blocks)10 - 11, 13 - 15.
2. Pagemaker in easy steps – by Scott Basham Chapter 3
3. Photoshop 4 Studio skills by steven Moniz Chapters 1 - 6,10,12,13.