SCHEME & SYLLABUS
MCA

(Choice Based Credit System)

Department of Computer Science and Applications
UICAIS
Sant Baba Bhag Singh University
Batch: 2022-2024

ABOUT THE DEPARTMENT

The Department of Computer Science and Applications strives for excellence in creating, applying and imparting knowledge in computer science through comprehensive educational programs, research & dissemination through scholarly publications and service to professional societies, the community, the state and the nation. The department imparts quality education ranging from the expertise in traditional software development to the modern computing technologies.

SALIENT FEATURES OF THE DEPARTMENT

- Research oriented curriculum designed to enable students to acquire all the skills needed to collect and analyze the data.
- The Institute drawing upon its strength of highly qualified well trained faculty, state of art infrastructure and innovative teaching methodology.
- Elective courses that brides the gap between industry requirements and academia.
- Hands on experience in most of the courses of computer applications so as to impart practical knowledge in the relevant field.
- To keep the students at par with the emerging technologies prevailing in the market, the institute is furnished with various specialized research labs and software labs.

MCA (MASTER OF COMPUTER APPLICATIONS)

The program is designed to build programing skills for developing efficient and resource optimized software/website/cloud/mobile applications.

VISION

To prepare well groomed & technically proficient computer professionals to meet up with the demands of challenging industry and societal needs

MISSION

- To establish industry-academia interaction to facilitate the students to work proficiently in the industrial environment.
- To empowering the youth in rural communities with computer education.
- Adopt the best pedagogical methods and provide the best facility, infrastructure and an ambience conducive to imbibe technical knowledge and practicing ethics.

ELIGIBILITY CRITERIA

Pass BCA/ Bachelor Degree in Computer Science Engineering or equivalent degree or passed B.Sc./ PGDCA/ B.Com./ B.A. with Mathematics at 10+2 level or at graduation level (**with additional bridge courses** as per the norms of the concerned University) obtained at least 55% marks (45% marks in case of candidates belonging to reserved category).

DURATION

2 Years

CAREER PATHWAYS

The program is designed to meet the growing requirement of qualified professionals not only in IT industry but also in other industries. MCA post graduates are hired both by Government and Private firms. They can take-up career as a Programmer, Software - Tester, Analyst, Engineer, Administrator and more. The growing number of educational institutes also offers a large number of opportunities for computer professionals to work as lecturers.

- **Corporate Jobs**

  Multiple options or sub-pathways designed according to the competency of the students to prepare them for specific sectors/job profiles as per needs of industry.

- **Government Jobs**

  Courses to prepare students for Civil services, Public Sector Undertakings and jobs in the Government sector.

- **Higher Studies**

  This pathway prepares students for competitive examinations such as GATE, UGC-NET, CAT, MAT etc. and helps in their progression in higher studies / research.

- **Entrepreneurship**

  To set up new ventures

PROGRAMME EDUCATIONAL OBJECTIVE (PEO)

PEO 1: To progress their career productively in software industry, academia, research, entrepreneurial pursuit, government, consulting firms and other Information Technology enabled services.

PEO 2: To achieve peer-recognition; as an individual or in a team; by adopting ethics and professionalism and communicate effectively to excel well in cross culture and inter-disciplinary teams.

PEO 3: To continue a lifelong professional development in computing that contributes in self and societal growth.

PROGRAMME OUTCOMES (PO)

PO1: Computational Knowledge - Apply knowledge of computing, Mathematics, Principles of Accounting, Management and Fundamentals of Software Engineering appropriate to the discipline.

PO2: Problem Analysis – Identify and analyze problems and formulate the requirements appropriate to its solution.

PO3: Design Development of Solutions – Design, implement and evaluate a computer based system to meet the desired needs.

PO4: Conduct Investigations of Complex Computing Problems – Conduct investigations and experiments to analyze and interpret data of complex applications to find valid solutions.

PO5. Modern Tool Usage – Select and apply current trends, techniques and modern tools that suit the computing requirements like UML diagrams.

PO6. Professional Ethics - Understand professional, ethical, security and social issues, work with appropriate societal and environmental considerations.

PROGRAMME SPECIFIC OUTCOMES (PSO)

PSO1: Solve and work with a professional context pertaining to ethics, social, cultural and cyber regulations

PSO2: Involve in perennial learning for a continued career development and progress as a computer professional

PSO3: Function effectively both as a team leader and team member on multi disciplinary projects to demonstrate computing and management skills

PSO4: Communicate effectively and present technical information in oral and written reports

PSO5: Utilize the computing knowledge efficiently in projects with concern for societal, environmental, and cultural aspects

PSO6: Function competently as an individual and as a leader in multidisciplinary projects.

INTRODUCTION

The CBCS provides an opportunity for the students to choose courses from the prescribed courses comprising core, elective/minor or skill based courses. The courses can be evaluated following the grading system, which is considered to be better than the conventional marks system. The basic idea is to look into the needs of the students so as to keep up-to-date with development of higher education in India and abroad. CBCS aims to redefine the curriculum keeping pace with the liberalization and globalization in education. CBCS allows students an easy mode of mobility to various educational institutions spread across the world along with the facility of transfer of credits earned by students.

Curriculum Structure: MCA degree programme will have a curriculum with Syllabi consisting of following type of courses:

A. Core Courses: A course, which should be studied compulsorily by a candidate as a necessary requirement is termed as a core course.

- **Major:** Compulsory Course
- **Minor:** Use their minor course to focus or specialized certain area
- **Skill/ Vocational:** Skill Enhancement
- **Interdisciplinary Course :** Introduce for other course

B. Elective Course: Generally a course which can be chosen from a pool of courses and which may be very specific or specialized or advanced or supportive to the discipline/ subject of study or which provides an extended scope or which enables an exposure to some other discipline/subject/domain or nurtures the candidate's proficiency/skill is called an Elective Course.

- **Discipline Specific Elective (DSE) Course:** Elective courses may be offered by the main discipline/subject of study is referred to as Discipline Specific Elective. The University/Institute may also offer discipline related Elective courses of interdisciplinary nature (to be offered by main discipline/subject of study).
- **Dissertation/Project:** An elective course designed to acquire special/advanced knowledge, such as supplement study/support study to a project work, and a candidate studies such a course on his own with an advisory support by a teacher/faculty member is called dissertation/project.

C. **Major Specific Elective courses (MSE):** Elective courses offered under the major: Management/ Economics/History/Sociology/Political science/Philosophy/Public administration shall be referred to as major specific electives.

D. **Open Elective Courses (OE):** Open electives courses offered under the related stream/disciplines (Languages/Performing and visual arts) and those under the unrelated streams/disciplines (Physical and chemical sciences/Mathematical, Management and computational sciences) to seek exposure beyond main discipline of choice shall be referred to as open elective courses.

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(Program Code-039)

20	OE	DSE	CSA674	Mobile Computing and Wireless Network	2	34,35
21	OE	DSE	CSA676	Search Engine Optimization	2	36
22	OE	DSE	CSA678	Natural Language Processing	2	37,38
23	OE	DSE	CSA680	Computer and Information Security	2	39,40
24	Major	Core	CSA751	Programming with Python	3	42,43
25	Major	Core	CSA753	Advanced Data Structure	3	44,45
26	Major	Core	CSA755	Socket Programming	3	46
27	Major	Core	CSA757	IPR	3	47,48
28	Major	Core	CSA759	Programming with Python Lab	3	49
29	Major	Core	CSA761	Advanced Data Structures Lab	3	50,51
30	OE	SEC	CSA763	Computational Intelligence	3	52,53
31	OE	SEC	CSA765	System Analysis and Design	3	54,55
32	OE	SEC	CSA767	MOOC	3	56
33	OE	SEC	CSA769	Design and Analysis of Algorithm	3	57,58
34	OE	DSE	CSA771	Mobile Architecture and Security	3	59,60
35	OE	DSE	CSA773	E-Commerce and Content Management System	3	61,62
36	OE	DSE	CSA775	Computer Vision	3	63,64
37	OE	DSE	CSA777	Network and Web Security	3	65,66
38	VA	VA	CSA055	PC Assembly and Hardware	3	67
39	VA	VA	CSA057	Digital Marketing with Google Certification	3	68
40	Major	Core	CSA752	Research Work (Industrial Training)	4	70

Course Scheme MCA
1st Semester

I. Theory Subjects

S No.	Course Type as per NEP	Course Type as per UGC	Course Code	Course Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	Major	Core	CSA651	Mathematical Foundations of Computer Science	3:1:0	3:1:0	4	4
2	Major	Core	CSA653	Linux with Shell Programming	4:0:0	4:0:0	4	4
3	Major	Core	CSA655	Theory of Computation	4:0:0	4:0:0	4	4
4	Major	Core	CSA657	Optimization Techniques	4:0:0	4:0:0	4	4

II. Practical Subjects

S No.	Course Type as per NEP	Course Type as per UGC	Course Code	Course Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	Major	Core	CSA659	Linux with Shell Programming Lab	0:0:4	0:0:2	4	2
2	Major	Core	CSA661	Seminar	0:0:4	0:0:2	4	2
3	Major	Core	CSA663	Research Project	0:0:4	0:0:2	4	2

Total Credits: 22

Total Contact Hours: 28

Course Scheme MCA
2nd Semester

I. Theory Subjects

S No.	Course Type as per NEP	Course Type as per UGC	Course Code	Course Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	Major	Core	CSA652	Advanced JAVA	3:0:0	3:0:0	3	3
2	Major	Core	CSA654	Research Methodology Tools	3:0:0	3:0:0	3	3
3	Major	Core	CSA656	MATLAB Tools	3:0:0	3:0:0	3	3
4	OE	SEC			3:0:0	3:0:0	3	3
5	OE	DSE			3:0:0	3:0:0	3	3
6	Minor (ID)	AECC	EVS003	Natural Hazards & Disaster Management System	3:0:0	3:0:0	3	3

II. Practical Subjects

S No.	Course Type as per NEP	Course Type as per UGC	Course Code	Course Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	Major	Core	CSA658	Advanced JAVA Lab	0:0:4	0:0:2	4	2
2	Major	Core	CSA660	MATLAB Tools Lab	0:0:4	0:0:2	4	2
3	Major	Core	CSA662	Research Methodology Tools Lab	0:0:4	0:0:2	4	2
4	IT	IT	CSA664	Six Weeks Industrial/	NA	NA	NA	2

				Institutional Training				

Total Credits: 26

Total Contact Hours: 30

IV. Open Elective Subjects-1 (3 Credits)

S. No.	Course Type as per NEP	Course Type as per UGC	Course Code	Course Title
1	OE	SEC	CSA666	Cloud Computing Concepts
2	OE	SEC	CSA668	Big Data Analysis
3	OE	SEC	CSA670	Ruby Programming
4	OE	SEC	CSA672	Data Warehouse and Data Mining

V. Open Elective Subjects-2 (3 Credits)

S. No.	Course Type as per NEP	Course Type as per UGC	Course Code	Specialization	Course Title
1	OE	DSE	CSA674	Mobile Computing (Part-I)	Mobile Computing and Wireless Network
2	OE	DSE	CSA676	Web Development (Part-I)	Search Engine Optimization
3	OE	DSE	CSA678	Artificial Intelligence (Part-I)	Natural Language Processing
4	OE	DSE	CSA680	Information Security (Part-I)	Computer and Information Security

Course Scheme MCA
3rd Semester

I. Theory Subjects

S. No	Course Type as per NEP	Course Type as per UGC	Course Code	Course Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	Major	Core	CSA751	Programming with Python	3:0:0	3:0:0	3	3
2	Major	Core	CSA753	Advanced Data Structure	3:0:0	3:0:0	3	3
3	Major	Core	CSA755	Socket Programming	3:0:0	3:0:0	3	3
4	Major	Core	CSA757	IPR	3:0:0	3:0:0	3	3
5	VA	VA			3:0:0	3:0:0	3	3
6	OE	SEC			3:0:0	3:0:0	3	3
7	OE	DSE			4:0:0	4:0:0	4	4

II. Practical Subjects

S. No	Course Type as per NEP	Course Type as per UGC	Course Code	Course Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	Major	Core	CSA759	Programming with Python Lab	0:0:4	0:0:2	4	2
2	Major	Core	CSA761	Advanced Data Structure Lab	0:0:4	0:0:2	4	2

Total Credits: 26
Total Contact Hours: 30

III. Open Elective Subjects (4 Credits)

S. No.	Course Type as per NEP	Course Type as per UGC	Course Code	Course Title
1	OE	SEC	CSA763	Computational Intelligence
2	OE	SEC	CSA765	System Analysis and Design
3	OE	SEC	CSA767	MOOC
4	OE	SEC	CSA769	Design and Analysis of Algorithm

V. Discipline Elective Subjects (4 Credits)

S. No.	Course Type as per NEP	Course Type as per UGC	Course Code	Specialization	Course Title
1	OE	DSE	CSA771	Mobile Computing (Part-II)	Mobile Architecture and Security
2	OE	DSE	CSA773	Web Development (Part-II)	E-Commerce and Content Management System
3	OE	DSE	CSA775	Artificial Intelligence (Part-II)	Computer Vision
4	OE	DSE	CSA777	Information Security (Part-II)	Network and Web Security

V. Value-Added Course (3 Credits)

S. No.	Course Type as per NEP	Course Type as per UGC	Course Code	Course Title
1.	VA	VA	CSA055	PC Assembly and Hardware
2.	VA	VA	CSA057	Digital Marketing with Google Certification

Course Scheme MCA
4th Semester

S. No.	Course Type as per NEP	Course Type as per UGC	Course Code	Course Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours
1	Major	Core	CSA752	Research Work (Industrial Training)	NA	16	24

Total Contact Hours: 24

*The 6 month industrial training must be undertaken in reputed industry for whole semester. The student must submit a Mid Term report after three months. The student will submit Training Report along with training certification from industry. A presentation at the end of semester will be given by the student in front of Faculty of concerned department.

Summary of Scheme

Sem	L	T	P	Project/ Training /Seminar	Contact hrs per week	Credits
1	15	1	12		22	28
2	18	0	12		30	26
3	22	0	8		30	26
4				Training and Project	24	16
Total	**55**	**1**	**32**		**106**	**96**


SBBSU
UNIVERSITY

First Semester

Course Code	**CSA651**
Course Title	**Mathematical Foundations of Computer Science**
Type of Course	Major
L T P	3:1:0
Credits	4
Course Prerequisites	Basic understanding of mathematics
Course Objective (CO)	The students will be better learn the concepts of graph, matrix etc.
Course Outcomes (CO)	The students will able to: 1. Inculcate critical thinking to carry out scientific investigation objectively without being biased with preconceived notions. 2. Equip the student with skills to analyze problems, formulate a hypothesis, evaluate and validate results, and draw reasonable conclusions thereof. 3. Prepare students for pursuing research or careers in industry in mathematical sciences and allied fields. 4. Imbibe effective scientific and/or technical communication in both oral and writing.

SYLLABUS

UNIT I

A general introduction, simple and multi graphs, directed and undirected graphs, Eulerian and Hamiltonian Graphs, Shortest path algorithms, Chromatic number, Bipartite graph, graph coloring.

UNIT II

Sets and Relations: Definition of sets, subsets, complement of a set, universal set, intersection and union of sets, De-Morgan's laws, Cartesian products, Equivalent sets, Countable and uncountable sets, min-set, Partitions of sets, Relations: Basic definitions, graphs of relations, properties of relations

UNIT III

Algebra of logic, Propositions, Connectives, Tautologies and contradiction, Equivalence and implication, Principle of Mathematical induction, quantifiers.

UNIT IV

Introduction of a Matrix, its different kinds, matrix addition and scalar multiplication, multiplication of matrices, transpose etc. Square matrices, inverse and rank of a square matrix, solving simultaneous equations using Gauss elimination, Gauss Jordan Methods, Matrix Inversion method.

RECOMMENDED BOOKS

Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	Discrete Mathematical structures for Computer Sciences	Publications. Kolman and Busby	PHI
2	Discrete Mathematical Structures for Computer Science	B Kolman& R.C	McGraw-Hill

Course Code	**CSA653**
Course Title	**Linux with Shell Programming**
Type of Course	Major
L T P	4:0:0
Credits	4
Course Prerequisites	NA
Course Objective (CO)	The main objective of this course is to provide knowledge about fundamentals of the Bourne again shell (bash), shell programming, pipes, input and output redirection Control structures, arithmetic in shell interrupt processing, functions, debugging shell scripts.
Course Outcomes (CO)	The students will able to: 1. Understand the technical details of DOS, Windows and UNIX, LINUX operating system. 2. Ability to use various Linux commands that are used to manipulate system operations at admin level and a prerequisite to pursue job as a Network administrator. 3. Ability to develop IPC-API's that can be used to control various processes for synchronization. 4. Know and configure the various internet services

SYLLABUS

UNIT I

Introduction:Introduction: Basic OS functions, resource abstraction, types of operating systems– multiprogramming systems, batch systems, time sharing systems; operating systems for personal computers & workstations, process control & real time systems.

Operating System Organization: Processor and user modes, kernels, system calls and system programs.

Linux: The Operating System: Linux Distributions, Difference Between Linux and Windows, Separation of the GUI and the Kernel, Understanding Linux Kernel, Installing Linux in a Server Configuration, Booting and Shutting Down Process, Concept of Root, Basic commands, working with vi Editor, Understanding files and File System:

UNIT II

Linux commands: PATH, man, echo, printf, script, passwd, uname, who, date, stty, pwd, cd, mkdir, rmdir, ls, cp, mv, rm, cat, more, wc, lp, od, tar, gzip, file handling utilities, security by file permissions, process utilities, disk utilities, networking commands, unlink, du, df, mount, umount, find, unmask, ulimit, ps, w, finger, arp, ftp, telnet, rlogin.Text Processing utilities and backup utilities , tail, head , sort, nl, uniq, grep, egrep, fgrep, cut, paste, join, tee, pg, comm, cmp, diff, tr, awk, cpio.

UNIT III

Introduction to Shells: Linux Session, Standard Streams, Redirection, Pipes, Tee Command,

Command Execution, Command-Line Editing, Quotes, Command Substitution, Job ControlAliases, Variables, Predefined Variables, Options, Shell/Environment Customization. Filters: Filters and Pipes, Concatenating files, Display Beginning and End of files, Cut and Paste, Sorting, Translating Characters, Files with Duplicate Lines, Count Characters, Words or Lines, Comparing Files.

Process and Signals: Process, process identifiers, process structure: process table, viewing processes, system processes, process scheduling, starting new processes: waiting for a process, zombie processes, orphan process, fork, vfork, exit, wait, waitpid, exec, signals functions, unreliable signals, interrupted system calls, kill, raise, alarm, pause, abort, system, sleep functions, signal sets. File locking: creating lock files, locking regions, use of read and write with locking, competing locks, other lock commands, deadlocks

UNIT IV

DNS: Installing a DNS Server, Configuring a DNS Server, DNS Records Types, Setting Up BIND Database Files, The DNS Toolbox, Configuring DNS Clients.

Web Server: Understanding the HTTP Protocol, Installing the Apache HTTP Server, Starting Up and Shutting Down Apache, Configuring Apache E-Mail Server: Understanding SMTP, Installing the Postfix Server, Configuring the Postfix Server, Running the Server, POP and IMAP Basics, Installing the UW-IMAP and POP3 Server.

Samba Server: The Mechanics of SMB, Samba Administration, Using SWAT, Creating a Share, Mounting Remote Samba Shares, Creating Samba Users, Using Samba to Authenticate Against a Windows Server.

Introduction to Sockets: Socket, socket connections, socket attributes, socket addresses, socket, connect, bind, listen, accept, socket communications

RECOMMENDED BOOKS

SR.NO	NAME	AUTHOR(S)	PUBLISHER
1	Linux Administration: A Beginner's Guide	Wale Soyinka	McGrawHill
2	UNIX and Linux system administration Handbook	Evi Nemeth, Garth Snyder, et. al	Pearson Education
3	Linux All-In-One for Dummies,	Emmett Dulaney,	Wiley India

Course Code	**CSA655**
Course Title	**Theory of Computation**
Type of Course	Major
L T P	4:0:0
Credits	4
Course Prerequisites	Basic knowledge of Discrete mathematics and System programming.
Course Objectives (CO)	This course provides the basic knowledge of concepts in automata theory and theory of computation. Allows the students to design grammars and recognizers for different formal languages.
Course Outcomes (CO)	The students will able to: 1. Discuss key notions of computation, such as algorithm, computability, decidability, reducibility, and complexity, through problem solving. 2. Explain the models of computation, including formal languages, grammars and automata, and their connections. 3. State and explain the church-turing thesis and its significance. 4. Analyze and design finite automata, pushdown automata, turing machines, formal languages, and grammars.

SYLLABUS

UNIT I

Mathematical preliminaries & Notation: Sets, Cartesian product (cross product of two sets), various operations on sets, Relation and Functions, Graphs and Trees.

Introduction to theory of computation: Significance of theoretical computer science, Mathematical model of computer and programming languages, Automata, historical aspect of automata, application of Automata theory.

UNIT II

Finite Automata: Components of Automata, types of Automata, Deterministic Automata, Non-Deterministic Automata, Representation of Finite Automata, Deterministic Finite Automata (DFA), Representation of Deterministic Finite Automata using Transition Graphs, Transition diagraphs, Transition Tables, Languages generated by Deterministic Automata, Moore & Mealy Machines

UNIT III

Basics of Languages: Informal & formal definitions. Alphabets, Strings, Languages, Grammar, automata and other related definitions, various operation on languages: - union, concatenation, negation, reverse, star closure, Positive closure properties, Regular Expressions, Grammar:

Informal and formal definitions. Illustrations for generating grammar for various languages

UNIT IV

Grammar:Types of grammars, Classification of Chomsky Hierarchy, Phase structured grammars, context free grammar, context sensitive grimmer, regular grammar. Pushdown Automata: Definition and Representation of Pushdown automata, Non Deterministic Pushdown automata, operations on Pushdown automata, Turing machine: Basic Model,

definition and representation of Turing Machine, Application of Turing Machine.

RECOMMENDED BOOKS			
Sr.No.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Introduction to Automata Theory, Languages and Computation	J. E. Hopcroft and J. D	Pearson Education
2	Elements of the Theory of Computation	H. R. Lewis and C. H. Papadimitriou	Pearson Education
3	Introduction to languages and the Theory of Computation	J. C. Martin	Tata Mc-Graw Hill

Course Code	**CSA657**
Course Title	**Optimization Techniques**
Type of Course	Major
L T P	4:0:0
Credits	4
Course Prerequisites	Basic knowledge of Mathematics and Computer
Course Objective (CO)	This course aims to give students in depth information about Optimization and Linear Programming
Course Outcomes (CO)	The students will able to: 1. Understand the importance of optimization techniques& acquire skills to develop linear programming mathematical models to real world problems. 2. Recognize, formulate and giving optimal solution to a Transportation problem and Assignment problems. 3. Analyse& Solve Simple Game Theory Problems. 4. Learn modern techniques of Optimization.

SYLLABUS

UNIT I

Introduction: Introduction to Optimization Techniques, Origin & Development of O.R., Nature & Characteristic Features of O.R., Models & Modeling in Operation Research. Methodology of O.R. Linear Programming - Mathematical Model, Assumptions of Linear Programming, Graphical Method, Principles of Simplex Method and its Applications, Duality, Dual Simplex Method- Primal Dual Relationship and Sensitivity Analysis.

UNIT II

Transportation Problem: Transportation Problem, Mathematical model of Transportation Problem, Methods of finding Initial solution (North west corner rule, Least cost method, Vogel's Approximation method), Test for Optimality in TP using MODI method (uv -method).

UNIT III

INTRODUCTION TO NLP:-Definition of NLP, Convex Programming Problems, Quadratic Programming Problems, Wolfe"s Method for Quadratic Programming, Kuhn-Tucker Conditions, Geometrical Interpretation of KT-Conditions, KT-Points etc. Dynamic Programming: Bellman"s Principle of optimality of Dynamic Programming, Multistage decision problem and its solution by Dynamic Programming with finite number of stages, Solution of linear programming problems as a Dynamic Programming problem

UNIT IV

Modern methods of Optimization: Genetic Algorithms, Simulated Annealing, Ant colony optimization, Tabu search, Neural-Network based Optimization, Fuzzy optimization techniques and Applications. Use of Matlab to solve optimization problems.

RECOMMENDED BOOKS

SR.NO	NAME	AUTHOR(S)	PUBLISHER
1	Computer Based Optimization	Saroj Kumar, Pooja	Thakur Publishers

	Techniques	Puri	
2	Linear Programming, and MassachusettSystems	Hadley, G.	Addison-Wesley
3	Operation Research	Swarup K etal	S. Chand

CSA659 Linuxwith Shell Programming Lab

L T P

0 0 4

Learning Objective: To become familiar with the operation of Linux andAcquire knowledge about the basic concept of writing commands in Linux.

1. Installation of Linux operating system.
    a. Partitioning drives
    b. Configuring boot loader (GRUB/LILO)
    c. Network configuration
    d. Setting time zones
    e. Creating password and user accounts
    f. Installing and removing packages
    g. Shutting down
2. Working with basic commands.
3. Linux system administration
    a. Becoming super user
    b. Temporarily changing user identity with su command
    c. Using graphical administrative tools
    d. Administrative commands
    e. Administrative configuration files
4. Configuring NICs with Network Device Configuration Utilities (ip and ifconfig).
5. Install and configuring a DNS Server with a domain name of your choice.
6. Install and configuring DHCP server and client.
7. Install and configuring Mail Server.

Write a shell script to create a file. Follow the instructions
(i) Input a page profile to yourself, copy it into other existing file;
(ii) Start printing file at certain line
(iii) Print all the difference between two file, copy the two files.
(iv) Print lines matching certain word pattern.
5. Write shell script for-
(i) Showing the count of users logged in,
(ii) Printing Column list of files in your home directory
(iii) Listing your job with below normal priority
(IV) Continue running your job after logging out.
6. Write a shell script to change data format. Show the time taken in execution of this script.
7. Write a shell script to print files names in a directory showing date of creation & serial

number of the file.
8. Write a shell script to count lines, words and characters in its input (do not use wc).
9. Write a shell script to print end of a Glossary file in reverse order using Array. (Use awk tail)
10. Write a shell script to check whether Ram logged in, Continue checking further after every 30 seconds till success.
11. Write a shell script to compute gcd lcm & of two numbers. Use the basic function to find gcd& LCM of N numbers.
12. Write a shell script to find whether a given number is prime. Take a large number such as 15 digits or higher and use a proper algorithm

CSA661 Seminar

L T P
0 0 4

The students have to give seminar on the following topics. The students will prepare presentation on the following given topics and each students have to give presentation on different topic.

1. Cluster Computing
2. Google Driver Less Car
3. Cloud Storage
4. Security and Privacy in Social Networks
5. Optical Storage Technology
6. 3D Optical Storage Technology
7. Web Image Re-Ranking Using Query-Specific Semantic Signatures
8. Semantic Web
9. Big Data To Avoid Weather Related Flight Delays
10. Electronic Paper Display
11. RFID Based Library Management System
12. Solid Waste Management
13. Touchless Touchscreen Technology
14. i-Twin Limitless Pendrive Technology
15. Internet Of Things IOT Based Intelligent Bin for Smart Cities
16. Scram Jet Engine for Hypersonic Flight
17. Clinical Information System
18. Clinic Management System
19. Internet Of Things IoT
20. Internet Of Things IOT Based Intelligent Bin for Smart Cities
21. Patient Monitoring System
22. Patient Monitoring System,Patient Monitoring System Using Zigbee || Patient Monitoring System With SMS || IP Based Patient Monitoring System || GSM Based Patient Monitoring System || Wireless Patient Monitoring System || Remote Patient Monitoring System ||
23. Network Security And Cryptography
24. Ambient Backscatter
25. Buck Boost Converter

CSA663 Research Project

L T P
0 0 4

The Project work constitutes a major component in most professional programmes. It needs to be carried out with due care, and should be executed with seriousness by the students. The project work is not only a partial fulfilment of the MCA requirements, but also provides a mechanism to demonstrate your skills, abilities and specialisation. The project work should compulsorily include the software development. Physical installations or configuring the LAN/WAN or theoretical projects or study of the systems, which doesn't involve s/w development, are strictly not allowed.

Students are eligible to submit the project proposals after entering into the 3rd semester of MCA, as per the calendar of the project.

OBJECTIVES: The objectives of the project is to help the student develop the ability to apply theoretical and practical tools/techniques to solve real life problems related to industry, academic institutions and research laboratories. After the completion of this project work, the student should be able to:

- Describe the Systems Development Life Cycle (SDLC).
- Evaluate systems requirements.
- Complete a problem definition
- Evaluate a problem definition.
- Determine how to collect information to determine requirements.
- Perform and evaluate feasibility studies like cost-benefit analysis, technical feasibility, time
- Feasibility and Operational feasibility for the project. Work on data collection methods for fact finding.
- Construct and evaluate data flow diagrams.
- Construct and evaluate data dictionaries.
- Evaluate methods of process description to include structured English, decision tables
- Decision trees. Evaluate alternative tools for the analysis process.

- Create and evaluate such alternative graphical tools as systems flow charts and state transition
- Diagrams. Decide the S/W requirement specifications and H/W requirement specifications.
- Plan the systems design phase of the SDLC.
- Distinguish between logical and physical design requirements.
- Design and evaluate system outputs.
- Design and evaluate systems inputs.
- Design and evaluate validity checks for input data.
- Design and evaluate user interfaces for input.
- Design and evaluate file structures to include the use of indexes.
- Estimate storage requirements.
- Explain the various file update processes based on the standard file organizations.
- Decide various data structures
- Construct and evaluate entity-relationship (ER) diagrams for RDBMS related projects.
- Perform normalization for the un-normalized tables for RDBMS related projects.
- Decide the various processing systems to include distributed, client/server, online and others.
- Perform project cost estimates using various techniques.
- Schedule projects using both GANTT and PERT charts.
- Documentation requirements and prepare and evaluate systems documentation.
- Systems implementation and its key problems.
- To decide the future scope and further enhancement of the system.

Type of the Project:

The majority of the students are expected to work on a real-life project preferably in some industry/ Research and Development Laboratories/Educational Institution/Software Company.

Students are encouraged to work in the areas listed at the end (Refer page no.15). However, it is not mandatory for a student to work on a real-life project. The student can formulate a project problem with the help of her/his Guide and submit the project proposal of the same. Approval of the project proposal is mandatory. If approved, the student can commence working on it, and complete it. Use the latest versions of the software packages for the development of the project.

Steps involved in the project work:

The complete project work should be done by the student only. The role of guide should be about guidance wherever any problem encounters during project. The following are the major steps involved in the project, which may help you to determine the milestones and regulate the scheduling of the project:

- Select a topic and a suitable guide.
- Prepare the project proposal in consultation with the project guide.
- Submit the project proposal along with the necessary documents to the Project guide and COD
- The COD/HOD concerned. Receipt of the project approval from the Project guide/CRD Person.
- Appear for the viva-voce as per the intimation by the Project Guide with the permission **of COD/HOD.**

Resubmission of MCA project in case of failed students

If the student is unsuccessful in the project, s/he should 're-do' the whole cycle, right from the submission of the project proposal. Students are advised to select a new topic for the project and should prepare and submit the project proposal to the Regional Centre concerned as per the project guidelines. There are no separate slots for the submission of the project synopsis/project reports for the failed students. Respective submissions of the project synopsis and the project reports should be done strictly as per the "Calendar for the MCA project" given in the project guidelines.

FORMAT OF THE STUDENT PROJECT REPORT ON COMPLETION OF THE PROJECT

1. Cover Page as per format

2. Acknowledgement

3. Certificate of the project guide as per Annexure A

4. Synopsis of the Project

5. Main Report

• Objective & Scope of the Project

• Theoretical Background

• Definition of Problem

• System Analysis & Design vis-a-vis User Requirements

• System Planning (PERT Chart)

• Process Logic of each Module Methodology adopted, System Implementation & Details of Hardware & Software used

• System Maintenance & Evaluation

• Cost and benefit Analysis

• Detailed Life Cycle of the Project o ERD, DFD o Input and Output Screen Design o Process involved o Methodology used for testing: o Test Report, Printout of the Reports, Printout of the Code Sheet

• User/Operational Manual - including security aspects, access rights, back up, controls, etc.

• Soft copy of the project on CD/Floppy to be submitted with Hard Bound Project Report

Second Semester

Course Code	**CSA652**
Course Title	**Advanced Java**
Type of Course	Major
L T P	3:0:0
Credits	3
Course Prerequisites	NA
Course Objective (CO)	This course introduces the fundamental programming concepts and techniques in Java Design and develops GUI applications using Abstract Windowing Toolkit (AWT), Swing and Event Handling.
Course Outcomes (CO)	The students will able to: 1. Learn the Internet Programming, using Java Applets. 2. Use the Java programming language for various programming technologies (understanding). 3. Develop software in the Java programming language, (application). 4. Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements (analysis). 5. Propose the use of certain technologies by implementing them in the Java programming language to solve the given problem (synthesis).

SYLLABUS

UNIT I

Java Basics: Review of Object oriented concepts, History of Java, Java buzzwords, JVM architecture, Data types, Variables, Scope and life time of variables, arrays, operators, control statements, type conversion and casting, simple java program, constructors, methods, Static block, Static Data, Static Method String and String Buffer Classes, Using Java API Document..

UNIT II

Inheritance: Classes, Super classes & Subclasses, Object-The Universal Super class, Object Wrappers, vectors, Enumeration Classes.

Packages and Interfaces: Defining, Creating and Accessing a Package, Understanding CLASS PATH, importing packages, differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces.

UNIT III

Exception handling: Concepts of exception handling, benefits of exception handling, Termination or resumptive models, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes.

Applets: Applets basics, Applets HTML tags and attributes, Inter-applet communication.

UNIT-IV

Java Servlets: Servlet Interaction & Advanced Servlets Life cycle of Servlet ,Java servlet development Kit, Javax.servlet package, Reading servlet Parameters, Reading Initialization Parameters, The Javax servlet, http package, handling HTTP.

Java Server Pages (JSP): JSP Technologies, Understanding the Client-Server Model, Understanding Web server software, Configuring the JSP Server, Handling JSP Errors, JSP Translation Time Errors, JSP Request Time Errors, Creating a JSP Error Page.

Struts: Introduction to the Apache Struts, MVC Architecture, Struts Architecture, How Struts Works? Introduction to the Struts Controller, Introduction to the Struts Action Class, Using Struts ActionFrom Class, Using Struts HTML Tags, Introduction to Struts Validator Framework, Client Side Address Validation in Struts, Custom Validators Example, Developing Application with Struts Tiles.

RECOMMENDED BOOKS			
SR.NO	**NAME**	**AUTHORS**	**PUBLISHER**
1	The Complete Reference – JAVA 2	Ptrick Naughton & Herbert Schildt	TMH Publications
2	Java 2 Black Book	Steven Holzner OT	Dreamtech Press

Course Code	**CSA654**
Course Title	**Research Methodology Tools**
Type of Course	Major
L T P	3:0:0
Credits	3
Course Prerequisites	Basic knowledge of Research
Course Objective (CO)	The objective of this course is to understand Research and Research Process
Course Outcomes (CO)	The students will able to: 1. Prepare a preliminary research design for projects in their subject matter areas. 2. Accurately collect, analyze and report data. 3. Present complex data or situations clearly. 4. Review and analyze research findings Get the knowledge of objectives and types of research.

SYLLABUS

UNIT I

Foundations of Research: Meaning, Objectives, Motivation, Utility. Concept of theory, empiricism, deductive and inductive theory. Characteristics of scientific method – Understanding the language ofresearch – Concept, Construct, Definition, Variable. Research Process

Problem Identification & Formulation – Research Question – Investigation Question – Measurement Issues – Hypothesis – Qualities of a good Hypothesis –Null Hypothesis & Alternative Hypothesis. Hypothesis Testing – Logic & Importance

UNIT II

Research Design: Concept and Importance in Research – Features of a good research design – Exploratory Research Design – concept, types and uses, Descriptive Research Designs – concept, types and uses. Experimental Design: Concept of Independent & Dependent variables.

Qualitative and Quantitative Research: Qualitative research – Quantitative research – Concept ofmeasurement, causality, generalization, replication. Merging the two approaches.

UNIT III

Measurement: Concept of measurement– what is measured? Problems in measurement in research – Validity and Reliability. Levels of measurement – Nominal, Ordinal, Interval, Ratio.

Sampling: Concepts of Statistical Population, Sample, Sampling Frame, Sampling Error, Sample Size, Non Response. Characteristics of a good sample. Probability Sample – Simple Random Sample,

Systematic Sample, Stratified Random Sample & Multi-stage sampling. Determining size of the sample– Practical considerations in sampling and sample size.

UNIT IV

Data Analysis: Data Preparation – Univariate analysis (frequency tables, bar charts, pie charts, percentages), Bivariate analysis – Cross tabulations and Chi-square test including testing hypothesis of association.Interpretation of Data and Paper Writing – Layout of a Research Paper, Journals in ComputerScience, Impact factor of Journals, When and where to publish ? Ethical issues related to publishing,Plagiarism and Self-Plagiarism.

RECOMMENDED BOOKS			
Sr. No.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Business Research Methods	Donald Cooper & Pamela Schindle	TMGH- 9th Edition
2	Research Methodology	C.R.Kothari	Kalyani Publications

Course Code	**CSA656**
Course Title	**MATLAB Tools**
Type of Course	Major
L T P	3 0 0
Credits	3
Course Prerequisites	Nil
Course Objective(s)	It explains the main concepts related to MATLAB.
Course Outcome (CO)	The students will be able to: 1. Understand the need for simulation/implementation for the verification of mathematical functions. 2. Understand the main features of the MATLAB/SCILAB program development environment to enable their usage in the higher learning. 3. Implement simple mathematical functions/equations in numerical computing environment such as MATLAB/SCILAB. 4. Interpret and visualize simple mathematical functions and operations thereon using plots/display.

SYLLABUS

UNIT I:
Introduction to Programming: Components of a computer, working with numbers, Machine code, Software hierarchy. Programming Environment MATLAB Windows, A First Program, Expressions, Constants, Variables and assignment statement, Arrays.

UNIT II:
Graph Plots: Basic plotting, Built in functions, Generating waveforms, Sound replay, load and save. Procedures and Functions Arguments and return values

UNIT III:
M-files: Formatted console input-output, String handling. (Control Statements) If, Else, Else-if, Repetition statements: While, for loop.

UNIT IV:
Manipulating: Text Writing to a text file, Reading from a text file, Randomizing and sorting a list, searching a list. GUI Interface Attaching buttons to actions, Getting Input, Setting Output

RECOMMENDED BOOKS

Sr. no.	Name	AUTHOR(S)	PUBLISHER
1.	MATLAB for engineering	Holly Moore	Pearson
2.	Essential MATLAB for engineers and scientists	Brain Hahn, Danel T. Valentine	Elesvier Science
3.	A Guide to MATLAB: For beginners and experienced users	Brain R. Hunt, Ronald L. Lipsman	Cambridge university press

Course Code	**EVS003**
Course Title	Natural Hazards & Disaster Management System
Type of Course	Minor (ID)
L T P	3:0:0
Credits	3
Course Prerequisites	Basic knowledge of Environmental Science.
Course Objectives (CO)	This course provides the basic conceptual understanding of natural hazards, disasters and its relationships with environment.
Course Outcomes (CO)	The students will able to: 1. Integrate knowledge and to analyze, evaluate and manage the different public health aspects of disaster events at a local and global levels, even when limited information is available. 2. Describe, analyze and evaluate the environmental, social, cultural, economic, legal and organizational aspects influencing vulnerabilities and capacities to face disasters. 3. Learn impact of climate disasters on agriculture.

SYLLABUS

UNIT I

Earthquake Risk Management: Earthquake Risk & Impart – Examples -Japan & Sikkim; Gap between perception of people & administration; Motivating preparedness Actions; Post Disaster Recovery Experience Gujarat; Mode Drill for public.

UNIT II

Flood Risk Management: Rising Flood Damage; Climate variability & change; Unprecedented Demographic changes; Increasing Environmental courses; Assessing Flood Risks; Typology of Flood Risk; Flood impact Assessment; Flood Risk Analysis; Managing Flood Risk including Adoption; Integrated Flood Management.

UNIT III

Climate Disasters & Agriculture: Impart of climate Disasters; Potential impacts of climate change on Agriculture; Vulnerability of agriculture – strategies for reduction : Disaster prevention & preparedness Drought; Mitigation; for climate disasters; Mitigation & preparedness strategy for agriculture, Examples; Farmers' Adaptation to climate change on agriculture.

UNIT IV

Risk Management of Forest Disasters: Elements detail; Productive functions of Forest resources (including socioeconomic functions); Forests, Deforestation & climate change; Desertification & Deforestation; Flooding & Deforestation; Lessons from Forest Management & Disaster Risk Reduction **Urban Disaster Risk Management:** Definitions; Understanding Risk of Urban Elements; Urban Risk Reduction. **Rural Livelihood & Management of Disaster Risk Reduction**: Definition of Vulnerability; Case Studies.

RECOMMENDED BOOKS			
Sr.No.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Natural hazards and disaster management: Vulnerability and Mitigation	R.B. Singh	Rawat Publications
2	Disaster Management	Harsh K. Gupta	University Press

CSA658 Advanced JAVA Lab

L	T	P
0	0	4

Learning Objectives: To understand Basic Programming Constructs and the concepts of Object Oriented Programming and its Applications Practically.

Lab Work

Students should be made to practice the various concepts learned in classroom by implementing them in the form of programs. Various programs should be practiced in the lab based on each of the following –

1. Write a Java Program that reads a line of integers, and then displays each integer, and the sum of all the integers.
2. Write a Java program to illustrate the concept of class with method overloading.
3. Write a Java program to illustrate the concept of Single level and Multi level Inheritance.
4. Write a Java program to paint like paint brush in applet.
5. Write a Java program to display analog clock using Applet.
6. Write a Java program to create different shapes and fill colors using Applet.
7. Write a Java program to illustrate collection classes like Array List, Iterator, Hash map etc.
8. Write a Java program for handling mouse & key events.
9. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -, *, % operations. Add a text field to display the result.
10. Write a Java program to build a Calculator in Swings.
11. Write a Java program to display the digital watch in swing.
12. Write a Java program that to create a single ball bouncing inside a JPanel.
13. Write a JAVA program JTree as displaying a real tree upside down.
14. Script showing use of variables in JavaScript.
15. Script showing user defined functions.
16. Script showing how JavaScript places code in the browser window
17. Script showing use of alert dialog box
18. Script showing use of Confirm dialog box
19. Program implementing the concept of cookies in JSP.
20. Program implementing the concept of session in JSP.
21. A servlet program to print hello world
22. A servlet program to create a cookie

CSA660 MATLAB ToolsLab

L T P
0 0 4

Learning Objectives: To become familiar with the operation of MATLAB.

- Basic Commands
- Working with Matrices

1. If x=[1 4; 8 3], find :
   a) the inverse matrix of x .
   b) the diagonal of x.
   c) the sum of each column and the sum of whole matrix x.
   d) the transpose of x.
2. If x= [2 8 5; 9 7 1], b=[2 4 5] find:
   a) find the maximum and minimum of x.
   b) find median value over each row of x.
   c) add the vector b as a third row to x.
3. If x=[2 6 12; 15 6 3; 10 11 1], then
   a) replace the first row elements of matrix x with its average value.
   b) reshape this matrix into row vector.
4. Generate a 4 x 4 Identity matrix.
5. Generate the following row vector b=[5, 10, 15, 20 . . . . . 95, 100], then find the number of elements in this vector.

- Expressions
- Relational and Logical Operations

CSA662 Research MethodologyTools Lab

L	T	P
0	0	4

Learning Objectives: The method section of a report details how the research was conducted, the research methods used and the reasons for choosing those methods. It should outline:

- the participants and research methods used, e.g. surveys/questionnaire, interviews
- refer to other relevant studies.

The methodology is a step-by-step explanation of the research process. It should be factual and is mainly written in the past tense.

CSA664 Six Weeks Industrial/Institutional Training

L	T	P
0	0	0

The 6 week industrial training must be undertaken in reputed industry. The student must submit a mid term report after one month. The student will submit Training Report along with training certification from industry. A presentation will be given by the student in front of Faculty of concerned department.

Course Code	**CSA666**
Course Title	**Cloud Computing Concepts**
Type of Course	OE
L T P	3:0:0
Credits	3
Course Prerequisites	Computer Networks, Database Management System
Course Objectives (CO)	To impart fundamental concepts in the area of cloud computing. To impart knowledge in applications of cloud computing
Course Outcomes (CO)	The students will able to: 1. Understand the concepts, characteristics, delivery models and benefits of cloud computing. 2. Understand the different characteristics of public, private and hybrid cloud deployment models. 3. Understand the key security and compliance challenges of cloud computing. 4. Understand the key technical and organizational challenges.

SYLLABUS

UNIT I

Overview of Cloud Computing: Introduction, Definition of cloud, Definition of cloud, characteristics Of cloud, Why use clouds, How clouds are changing, Driving factors towards cloud, Comparing grid with cloud and other computing systems, workload pattern for the cloud, "BigData", ITasaservice.

UNIT II

Cloud computing concepts: Concepts of cloud computing, Cloud computing leverages the Internet, Positioning cloud to a grid infrastructure, Elasticity and scalability, Virtualization, Characteristics of virtualization, Benefits of virtualization, Virtualization in cloud computing, Hypervisors, Multitenancy, Types of tenancy, Application programming interfaces(API).

Management: Desktops in the Cloud , Security, Cloud service delivery: Cloudservice, Cloud service model architectures, Infrastructure as a service(IaaS)architecture, Infrastructure as a service(IaaS) details, Platform as a service(PaaS)architecture, Platform As a service (PaaS) details, Platform as a service (PaaS) ,Examples of PaaS software,

UNIT III

Cloud deployment scenarios : Cloud deployment models, Public clouds, Hybridclouds, Community, Virtual private clouds, Vertical and special purpose, Migration paths for cloud, Selection criteria for Cloud deployment.

Security in Cloud computing: Cloud security reference model, security integration, security risks.

UNIT IV

Cloud Computing platforms : IBM Smart Cloud, Amazon Web Services, Google Cloud platform, Windows Azure platform, A comparison of Cloud Computing Platforms, Common building Blocks. Integration of cloud computing with mobile and adhoc network technologies.

RECOMMENDED BOOKS:			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	CloudComputing: Principles and paradigms	Raj Kumar Buyya, James Broberg,	Wiley
2	Cloud Computing: A practical Approach,	AnthonyT.Velte,TobyJ.VelteandRobert Elsenpeter	McGraw Hill
3	Cloud Computing Bible,	BarrieSosinsky	Wiley

Course Code	**CSA668**
Course Title	**Big Data Analysis**
Type of Course	OE
L T P	3:0:0
Credits	3
Course Prerequisites	Basic knowledge of computer system
Course Objective (CO)	This course will provide knowledge about contents of big data.
Course Outcomes (CO)	The students will able to: 1. Identify the characteristics of datasets and compare the trivial data and big data for various applications. 2. Select and implement machine learning techniques and computing environment that are suitable for the applications under consideration. 3. Solve problems associated with batch learning and online learning, and the big data characteristics such as high dimensionality, dynamically growing data and in particular scalability issues. 4. Understand and apply scaling up machine learning techniques and associated computing techniques and technologies.

SYLLABUS

UNIT I

Hours Grasping the Fundamentals of Big Data: The Evolution of Data Management - Understanding the Waves of Managing Data - Defining Big Data - Building a Successful Big Data Management Architecture - The Big Data Journey. **Examining Big Data Types:** Defining Structured Data - Defining Unstructured Data - Looking at Real-Time and Non-Real-Time Requirements - Putting Big Data Together.

UNIT II

Digging into Big Data Technology Components: Exploring the Big Data Stack- Layer 0: Redundant Physical Infrastructure- Layer 1: Security Infrastructure- Interfaces and Feeds to and from Applications and the Internet- Layer 2: Operational Databases- Layer 3: Organizing Data Services and Tools -Layer 4: Analytical Data Warehouses -Big Data Analytics -Big Data Applications.

UNIT III

Hours Virtualization and How It Supports Distributed Computing: Understanding the Basics of Virtualization- Managing Virtualization with the Hypervisor- Abstraction and Virtualization Implementing Virtualization to Work with Big Data.

UNIT IV

Map Reduce Fundamentals: Tracing the Origins of Map Reduce -Understanding the map Function-Adding the reduce Function -Putting map and reduce Together -Optimizing Map Reduce Tasks.**Exploring the World of Hadoop:** Explaining Hadoop -Understanding the Hadoop Distributed File System (HDFS)-Hadoop Map Reduce.

RECOMMENDED BOOKS

Sr. no.	Name	AUTHOR(S)	PUBLISHER
1.	Big Data for Dummies	Judith Hurwitz, Alan Nugent, Dr. Fern Halper	John Wiley & Sons
2.	Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics	Bill Franks	John Wiley & sons

Course Code	**CSA670**
Course Title	**Ruby Programming**
Type of Course	OE
L T P	3:0:0
Credits	3
Course Prerequisites	Basic Knowledge of Ruby
Course Objective (CO)	The objective of this course is to make students familiar with object Oriented Programming Language and Ruby for web Based Applications
Course Outcomes (CO)	The students will able to: 1. Explore the Model-view-Controller architecture for server-side applications. 2. Understand the Rails Framework. 3. Harness the speed and ease of developing a Rails application. 4. Create and use XML in Rails applications.

SYLLABUS

UNIT I

Introduction: What is Ruby, Why ruby, General purpose of ruby, Brief History of Ruby, Where does ruby get its ideas, Ruby Installation with RVM, Installations of Software (RVM, Rails , GIT, Mysql, Ruby,Sublime Text Editior), Rvm Commands, Rvm Usage, Creating a basic script in ruby, Sample demo of ruby program.

UNIT II

Working with Linux(Ubuntu Platform): Basic Linux Commands, file directory permissions , changing access rights, Text Editors used for ROR, Ruby Operators & Ruby Shell, Working with Ruby operators and expressions, Numeric Methods, Rand and Ranges, Strings, Escaping, Interpolation, String methods, Dates and Times, Ruby methods and modules, OOP in Ruby, Basic loops and iterators.

UNIT III

Rails Installation and Ruby Gems: What is Rails, Full tack Framework, Rails Strength, COC(convention over configuration),Rails Installation, Ruby on Rails installation on linux,Ruby Gems, Working with Ruby Gems, Gem commands Framework Technology MVC Rails Components.

UNIT IV

Models: What is model, Active record Basics, Destroy a model, Migrations, Modify, update a model, Dropping a database, Association, Validation and callbacks, Why Association, Without and with Association ,Types of Association, Active Record validations, Callbacks & types of callbacks Views, Embedded ruby, Working in HAML, Working with Ajax, Jquery in Rails framework, Testing, TDD & BDD.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Learn Ruby on Rails	Daniel Kehoe	RailsApps
2	Ruby on rails tutorials	MichealHartl	Covers Rail
3	Beginning Ruby	Peter Cooper	Apress

Course Code	**CSA672**
Course Title	**Data Warehousing and Data Mining**
Type of Course	**OE**
L T P	3:0:0
Credits	3
Course Prerequisites	Analysis of advanced aspect of data warehousing and data mining
Course Objective (CO)	The main objective of this course is to provide information about the concepts of data warehouse and also provide knowledge about data mining techniques.
Course Outcomes (CO)	The students will able to: 1. Understand about the need of data warehouse. 2. Understand the model and design of data warehouses. 3. Learn algorithms for data mining. 4. Apply the acquired knowledge for understanding data and select suitable methods for data analysis.

SYLLABUS

UNIT I

Review of Data Warehouse: Need for data warehouse, Big data, Data Pre-Processing, Three tier architecture; MDDM and its schemas, Introduction to Spatial Data warehouse, Architecture of Spatial Systems, Spatial: Objects, data types, reference systems; Topological Relationships, Conceptual Models for Spatial Data, Implementation Models for Spatial Data, Spatial Levels, Hierarchies and Measures Spatial Fact Relationships.

UNIT II

Introduction to temporal Data warehouse: General Concepts, Temporality Data Types, Synchronization and Relationships, Temporal Extension of the Multi Dimensional Model, Temporal Support for Levels, Temporal Hierarchies, Fact Relationships, Measures, Conceptual Models for Temporal Data Warehouses : Logical Representation and Temporal Granularity.

UNIT III

Introduction to Data Mining functionalities, Mining different kind of data, Pattern/Context based Data Mining, Bayesian Classification: Bayes theorem, Bayesian belief networks Naive Bayesian classification, Introduction to classification by Back propagation and its algorithm, Other classification methods: k-Nearest Neighbor, case based reasoning, Genetic algorithms, rough set approach, Fuzzy set approach.

UNIT IV

Introduction to prediction: linear and multiple regression, Clustering: types of data in cluster analysis: interval scaled variables, Binary variables, Nominal, ordinal, and Ratio-scaled variables; Major Clustering Methods: Partitioning Methods: K-Mean and K-Methods, Hierarchal methods: Agglomerative, Density based methods: DBSCAN.

RECOMMENDED BOOKS

S. No.	Name	AUTHOR(S)	PUBLISHER
1	Data Mining: Concepts and Techniques	J.Han and M. Kamber	Morgan Kaufmann Publishers
2	Advanced Data warehouse Design	Elzbieta Malinowski	Pearson
3	Modern DataWarehousing&Miningand Visualization	George M Marakas	Pearson

Course Code	**CSA674**
Course Title	**Mobile Computing and Wireless Network**
Type of Course	OE
L T P	3:0:0
Credits	3
Course Prerequisites	Basic knowledge of Data Communication and Computer Networks
Course Objective (CO)	To learn the basic concepts, aware of the GSM, SMS, GPRS Architecture, wireless protocols -WLN, Bluetooth, WAP, ZigBee issues and Network, Transport Functionalities of Mobile communication. To understand the concepts of Adhoc and wireless sensor networks.
Course Outcomes (CO)	The students will able to: 1. Explain the principles and theories of mobile computing technologies. 2. Describe infrastructures and technologies of mobile computing technologies. 3. List applications in different domains that mobile computing offers to the public, employees, and businesses. 4. Describe the possible future of mobile computing technologies and applications.

SYLLABUS

UNIT I

Wireless Communication Fundamentals, Architecture: Frequencies Spectrum-Multiplexing- Spread spectrum-GSM vs CDMA - 2G Mobile Wireless Services-Comparison of 2G and 3 G - GSM Architecture-Entities-Call Routing-PLMN-Address and identifiers-Network Aspects-Mobility Management-Frequency Allocation-Authentication and Security-SMSArchitecture-Value Added Service through SMS-GPRS-GPRS and Packet Data Network-Architecture-Network Operations-Data Service-Application.

UNIT II

Mobile Wireless Short Range Networks: GSM-Services and System Architecture, Radio Interfaces of GSM, Protocols of GSM Localization, Call Handling Handover, Security, New Data Services, General Packet Radio Service High-speed Circuit Switched Data, DECT, Modulation, Multiplexing, Controlling the Medium Access Spread Spectrum, Frequency Hopping Spread Spectrum (FHSS),Coding Methods, Code Division Multiple Access, IMT-2000 3G Wireless Communication Standards, WCDMA 3G Communications Standards ,CDMMA2000 3G Communication Standards, Imode, OFDM, High Speed Packet Access (HSPA) 3G Network Long-term Evolution, WiMaxRel 1.0 IEEE 802.16e, Broadband Wireless Access,4G Networks, Mobile Satellite Communication Network.

UNIT III

Mobile IP Network Layer, Transport Layer:IP and Mobile IP Network Layers, Packet

Delivery and Handover Management Location Management, Registration, Tunnelling and Encapsulation, Route Optimization Dynamic Host Configuration Protocol, VoIP, IPsec Conventional TCP/IP Transport Layer Protocols, Indirect TCP, Snooping TCP Mobile TCP, Other Methods of Mobile TCP-layer Transmission ,TCP over 2.5G/3G Mobile Networks .

Data Organization, Database Transactional Models – ACID Rules, Query Processing Data Recovery Process, Database Hoarding Techniques , Data Caching, Client-Server Computing for Mobile Computing and Adaptation Adaptation Software for Mobile Computing, Power-Aware Mobile Computing, Context-aware Mobile Computing.

UNIT IV

Mobile Ad hoc Network Routing Protocols: Communication Asymmetry, Classification of Data-delivery Mechanisms, Data Dissemination Broadcast Models, Selective Tuning and Indexing techniques, Digital Audio Broadcasting (DAB), Digital Video Broadcasting Synchronization, Synchronization Software for Mobile Devices, Synchronization Software for Mobile Devices SyncML-Synchronization Language for Mobile Computing,Sync4J (Funambol), Synchronized Multimedia Markup Language (SMIL).

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	"Mobile Computing"	Asoke K Talukder, Hasan Ahmed,Roopa R Yavagal	Tata McGraw Hill
2	"Mobile Computing" Second Edition	Raj Kamal	Oxford Higher Education,
3	Mobile Communications	Jochen Schiller	Addison-Wesley

Course Code	**CSA676**
Course Title	**Search Engine Optimization**
Type of Course	OE
L T P	3:0:0
Credits	3
Course Prerequisites	Familiarity with basics of Artificial Intelligence
Course Objective (CO)	To learn the basic concepts of paid advertising, social media, and other online platforms can generate traffic to websites, the majority of online traffic is driven by search engines.
Course Outcomes (CO)	The students will able to: 1. Define search engine marketing. 2. Describe the history of search engine marketing. 3. Identify the elements of search engine marketing plan. 4. Generate keywords that are highly relevant to Web site.

SYLLABUS

UNIT I

Internet & SEO Basics: Definition, Domain, Knowledge of World Wide Web, Difference between Portals and Search Engines, Types of SEO Techniques, Black Hat Technique & White Hat Technique, Working of Search Engine, Various SEO Tools, Website Design SEO guidelines.

UNIT II

SEO Research & Analysis: Market Research, Keyword Research & Analysis, Keyword Opportunity, Competitors Website Analysis, SWOT Analysis of Website, Tools available for keyword research, Ways to choose best keywords, Website analysis using various SEO Tools.

UNIT III

On Page SEO: On page optimization, SEO Page Title, Meta Description, Meta Keywords, Headings, Optimized Domain, Canonical Tag, Meta Tags, SEO Images, SEO internal link, Site Map, Hidden Text, Web Hosting, SEO 301 Redirect, SEO 404 error.

UNIT IV

Off Page SEO: Off Page Optimization, SEO Page Rank, Link Popularity, SEO Directory Submission, Social Bookmarks Submission, Blog Submission, Article Submission, Search Engine Submission, RSS Feed Submission.

RECOMMENDED BOOKS

Sr. no.	Name	AUTHOR(S)	PUBLISHER
1	SEO Fitness Workbook, 2016 Edition: The Seven Steps to Search Engine Optimization Success on Google	Jason McDonald	CreateSpace Independent Publishing Platform
2	Search Engine Optimization All-in-One For Dummies 3rd Edition	Bruce Clay	For Dummies
3	Ultimate Guide to Link Building	Eric Ward & Garrett French	Entrepreneur Press

Course Code	**CSA678**
Course Title	**Natural Language Processing**
Type of Course	OE
L T P	3:0:0
Credits	3
Course Prerequisites	Basic understanding about Probability and statistics , Automata and languages
Course Objective (CO)	The main purpose of this course is to provide the most fundamental knowledge to the students so that they can understand what the AI is. Due to limited time, we will try to eliminate theoretic proofs and formal notations as far as possible.
Course Outcomes (CO)	The students will able to: 1. Understand approaches to syntax and semantics in NLP. 2. Understand approaches to discourse, generation, dialogue and summarization within NLP. 3. Understand current methods for statistical approaches to machine translation. 4. Understand machine learning techniques used in NLP, including hidden Markov models and probabilistic

SYLLABUS

UNIT I

Introduction:Overview of NLP, Statistical machine translation, Language models and their role in speechprocessing, Course introduction and administration, *N*-gram Language Models and Information Theory*n*-gram models, Entropy, relative entropy, cross entropy, mutual information, perplexity.

Statisticalestimation and smoothing for language models: Statistical Machine Translation (MT), AlignmentModelsSmoothing,Smoothing absolute discounting, proving you have a proper probability distribution.

UNIT II

Good-Turing implementation: Information theory examples and intuitions, Java implementation issues,Statistical Alignment Models and Expectation Maximization (EM), EM and its use in statistical MT alignment models, Putting together a complete statistical MT system, Decoding and A* Search.

UNIT III

Introduction to supervised machine, learning methods: Naïve Bayes (NB), classifiers for entityclassification, Maximum Entropy Classifiers, Corpora and other resources.

Syntax and Parsing for Context-FreeGrammars (CFGs): Parsing, treebanks, attachment ambiguities. Context free grammars. Top-down andbottom-up parsing, empty constituents, left recursion, and repeated work, Probabilistic CFGs,

UNIT IV

Lexicalized Probabilistic Context-Free Grammars (LPCFGs): Lexicalization and lexicalized

parsing, TheCharniak, Collins/Bikel, and Petrov& Klein parsers.

Modern Statistical Parsers Search methods inparsing: Agenda-based chart, A*, and "best-first" parsing. Dependencyparsing, DiscriminativeparsingComputational Semantics Semantic representations, lambda calculus, compositionality, syntax/semantics interfaces, logical reasoning, Lexical Semantics.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Natural language Understanding	James A..	Pearson Education
2	Natural language processing	Bharati A., Sangal R., Chaitanya V..	Paninian perspective, PHI
3	Natural language processing and Information retrieval	Siddiqui T., Tiwary U. S..	OUP,2008

Course Code	**CSA680**
Course Title	**Computer and Information Security**
Type of Course	OE
L T P	3:0:0
Credits	3
Course Prerequisites	Basics of Computer Networks
Course Objective (CO)	Be aware of principles and protocols of internetwork, Understand the basic issues in information security, the concept of ciphers and cryptography, various ciphers, digital signatures and email security policies, malicious software and their remedies.
Course Outcomes (CO)	The students will able to: 1. Develop an understanding of information assurance as practiced in computer operating systems, distributed systems, networks and representative applications. 2. Gain familiarity with prevalent network and distributed system attacks, defences against them, and forensics to investigate the aftermath. 3. Develop a basic understanding of cryptography, how it has evolved, and some key encryption techniques used today. 4. Develop an understanding of security policies (such as authentication, integrity and confidentiality), as well as protocols to implement such policies in the form of message exchanges.

SYLLABUS

UNIT I

Introduction of IT: Network security, Goals of Network Security, cryptography and its types, ciphers and their types, steganography, Data Encryption Standard, RSA algorithm, key distribution protocols.

UNIT II

Software Security: Vulnerabilities, Attacks, and Countermeasures, Privileged programs (Set-UID programs) and vulnerabilities, Buffer Overflow vulnerability and attack, Return-to-libc attack, Race Condition vulnerability and attack, Format String vulnerability and attack, Input validation, Shellshock attack.

UNIT III

Web Security: Vulnerabilities, Attacks, and Countermeasures, Same Origin Policy, Cross-Site Scripting Attack, Cross-Site Request Forgery Attack, SQL-Injection Attack, Click-Jacking Attack, Web Tracking, Web Proxy and Firewall

UNIT IV

Smartphone Security, Access control in Android operating system, Rooting Android devices, Repackaging attacks, Attacks on apps, Whole-disk encryption, Hardware protection: TrustZone.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Computer Security :Hand on approach	Wenliang Du	Pearson
2	Computer and Information Security Handbook	John R. Vacca	Kindle Edition
3	The Art of Deception: Controlling the Human Element of Security	Kevin D. Mitnick	John Wiley & Sons

Third Semester

Course Code	**CSA751**
Course Title	**Programming with Python**
Type of Course	Major
L T P	3:0:0
Credits	3
Course Prerequisites	Basic knowledge of Programming
Course Objective (CO)	The objective of this course is to develop a basic understanding about the Python Concept.
Course Outcomes (CO)	The students will able to: 1. Understand why Python is a useful scripting language for developers. 2. Learn how to design and program Python applications. 3. Learn how to use lists, topples, and dictionaries in Python program. 4. Learn how to identify Python object types.

SYLLABUS

UNIT I

Introduction: Programming Language, History and Origin of Python Language, Features of Python, Limitations, Major Applications of Python, First Python Program, Python Interactive Help Feature, Python differences from other languages, Installing and setting Python environment in Windows and Linux, basics of Python interpreter, Execution of python program, Editor for Python code, syntax, variable, Data types. Flow control: if, if else, for, while, functions, continue, pass, break. Strings: Sequence operations, String Methods, Pattern Matching.

UNIT II

Lists: Basic Operations, Iteration, Indexing, Slicing and Matrixes; Dictionaries: Basic dictionary operations; Tuples and Files; Functions: Definition, Call, Arguments, Scope rules and Name resolution; Modules: Module Coding Basics, Importing Programs as Modules, Executing Modules as Scripts, Compiled Python files(.pyc), Standard Modules: OS and SYS, The dir() Function, Packages, Different ways to import Packages.

UNIT III

Classes and Objects: The concept of OOPS in Python, designing classes, creating objects, accessing attributes, editing class attributes, Built-in class attributes, Garbage collection, Destroying objects.

Exception Handling and Classes: Exception Handling-Introduction, Exceptions, and its types, how to handle exceptions.

File Management in Python: Operations on files (opening, modes, attributes, encoding, closing), read () & write () methods, tell () & seek () methods, renaming & deleting files in Python, directories in Python.

UNIT IV

Python and Databases: ODBC and Python, Working with Databases in MySQL, Working with Tables in MySQL, managing users in MySQL, Accessing MySQL data from Python, Working with SQLite Database.

Role of Python in Hacking and Cyber Forensics, Debugging in python: Introduction to PyDBG and immunity debugger; Hooking: Soft Hooking with PyDBG, Hard Hooking with Immunity Debugger, DLL, and code injection: Remote Thread Creation, DLL Injection, Code Injection.

RECOMMENDED BOOKS			
Sr. No.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Fundamentals of Python	Kenneth Lambert	Course Technology
2	Learning Python	O' Reilly	Mark Lutz
3	Python Programming: An Introduction to Computer Science 2nd Edition	John Zelly	Mark Lutz
4	"Gray Hat Python: Python Programming with Hackers and Reverse Engineers",	Justin Seitz	No Starch Press, Inc.

Course Code	**CSA753**
Course Title	**Advanced Data Structures**
Type of Course	Major
L T P	3:0:0
Credits	3
Course Prerequisites	Basic knowledge of Data Structures
Course Objective (CO)	The objective of this course is to understand significance of algorithms in the computer field and Various aspects of algorithm development as well.
Course Outcomes (CO)	The students will able to: 1. Analyze algorithms and its correctness and time efficiency. 2. Master a variety of Data structures 3. Master different algorithm design techniques 4. Apply and implement learned algorithm design techniques.

SYLLABUS

UNIT IIntroduction to Data Structure: Concept of data, problem analysis, data structures and data structure operations, algorithmic complexity, Big-O Notation and time space trade off, Asymptotic Notations.

Overview of Arrays, Recursion, Pointers, Pointer Arithmetic, Array of pointers, Arrays in terms of pointers, Static and Dynamic Memory Management, Garbage Collection, Understanding and Implementation of various Data Structures with applications.

UNIT IIStack: operations like push, pop and various applications like conversion from infix to postfix and prefix expressions, evaluation of postfix expression using stacks. **Queues**: operations like enqueue, dequeue on simple, circular and priority queues.**Linked Lists**: Operations like creation, insertion, deletion, retrieval and traversal on single, circular and doubly linked list.

UNIT IIITrees: definitions and concepts: Root, Node, Leaf Node, Level, Degree, Height and Tree representation using Linked List and Array Types of Trees: Binary trees, Binary search tree, Height balanced (AVL) tree, B- trees, B+ Tree, Tree operations: creation, insertion, deletion and traversals (Preorder, In-order, Post- ordered) and searching on various types of trees.

Heap : Definition , Structure , Algorithm & Application, Heap sort.**Graph:** definitions and concepts: Edge, Vertices, and Graph representation using Adjacency matrix, Adjacency lists, Types of graphs: Weighted, Unweighted, Directed, Undirected Graphs.**Graph operations**: creation, insertion, deletion, traversals and searching (depth-first, breadth-first) of various types of graphs and Dijkstra's algorithm for shortest distance calculation.

UNIT IVSearching: Concept and efficiency of linear and binary search algorithms.

Sorting: Concepts, Order, Stability, Efficiency of various algorithms (Selection Sort, Bubble Sort, Insertion Sort, Merge Sort, Quick Sort, Heap Sort, Radix Sort),Hashing: Definition,

Implementation and applications.**Flynn"s Classifications**: List Ranking, Prefix computation, Array Max, Sorting on EREW PRAM , Sorting on Mesh and Butterfly , Prefix sum on Mesh and Butterfly , Sum on mesh and butterfly ,Matrix Multiplication , Data Distribution on EREW, Mesh and Butterfly.

RECOMMENDED BOOKS			
SR.NO	**NAME**	**AUTHOR(S)**	**PUBLISHER**
1	Data Structures – A Pseudo code Approach with C++	Gilberg and Forouzan	Cengage
2	Schaum's Outline of Data Structures with C++	Hubbard John. R Hubbard John. R	Tata McGraw-Hill
3	Data Structures Using C and C++	Langsam,Augenstein, Tanenbaum	Pearson Education

Course Code	**CSA755**
Course Title	**Socket Programming**
Type of Course	Major
L T P	3:0:0
Credits	3
Course Prerequisites	Computer Networks
Course Objective (CO)	• The objective of this course is to understand the key protocols which support the Internet
Course Outcomes (CO)	The students will able to: 1. Understand major technologies and protocols used in network communications. 2. Have a detailed knowledge of the TCP/UDP Sockets. 3. Learn how to develop application with the help of socket programming. 4. Understand basic concepts of socket programming.

SYLLABUS

UNIT I - ELEMENTARY TCP SOCKETS

Introduction to socket programming – Overview of TCP / IP protocols – Introduction to sockets – Socket address structures – Byte ordering functions – Address conversion functions – Elementary TCP sockets – Socket – Connect – Bind – Listen – Accept –Read – Write – Close functions – Iterative server – Concurrent server.

UNIT II - APPLICATION DEVELOPMENT

TCP echo server – TCP echo client – POSIX signal handling – Server with multiple clients – Boundary conditions– Server process crashes– Server host crashes – Server crashes and reboots – Server shutdown – I/O multiplexing – I/O models – Select function – Shutdown function – TCP echo server (with multiplexing) – Poll function – TCP echo client (with multiplexing)

UNIT III - SOCKET OPTIONS, ELEMENTARY UDP SOC SOCKETS

Socket options – Getsocket and setsocket functions – Generic socket options – IP socket options – ICMP socket options – TCP socket options – Elementary UDP sockets – UDP echo server – UDP echo client – Multiplexing TCP and UDP sockets –Domain Name System – Gethostbyname function – IPV6 support in DNS – Gethostbyadr function – Getservbyname and getservbyport functions.

UNIT IV - ADVANCED SOCKETS

IPV4 and IPV6 interoperability – Threaded servers – Thread creation and termination– TCP echo server using threads – Mutexes – Condition variables – Raw sockets –Raw socket creation – Raw socket output – Raw socket input – Ping program – Trace route program

RECOMMENDED BOOKS

Sr. No.	Name	AUTHOR(S)	PUBLISHER
1	Introduction to Socket Programming	Reg Quinton, Scott Klement	SBIN

Course Code	**CSA757**
Course Title	**IPR**
Type of Course	Major
L T P	3:0:0
Credits	3
Course Prerequisites	Basic knowledge of Indian Laws
Course Objective (CO)	The objective of this course is to distinguish and explain various forms of IPRs and to identify criteria's to fit one's own intellectual work in particular form of IPRs.
Course Outcomes (CO)	The students will able to: 1. Explain the various digital crimes and comprehend the basic features of these crimes 2. Understand to identify what is a Protectable Subject matter under Copyright Laws and what is the manner of obtaining Copyright protection. 3. Gain expert knowledge in application of various provisions of Copyright law to determine the rights to which the IP holder will be entitled. 4. Understand IT Act 2000.

SYLLABUS

UNIT IUnderstanding of Intellectual Property(IP) and Intellectual Property Rights (IPRs): Introduction of IPR, An Overview of the IPR Regime, Philosophical Justification: Lockean Justification: Labour Theory, Hegelian Justification: Personality Theory, Utilitarian Theory.

UNIT II Subject Matter of Copyright: Literary works, Derivative Works, Computer Software/ Programs; Ownership of Copyright and Right of Copyright Owner: Author and Joint Author, Presumption of Authorship, Owner of different categories of Copyright, Right of Reproduction, Right of Derivative Works, Right of Broadcasting, Right of Communication of Works to the Public, Right of Paternity, Right to Publish

UNIT III Infringement of Copyright and Permitted Use of Copyright: Meaning of Infringement, Direct Infringement, Indirect (Contributory) Infringement Reasons for Taking Actions against Infringement, Fair use doctrine.

UNIT IV IT ACT 2000: Aims and Objectives; Overview of the Act; Jurisdiction; Role of Certifying Authority; Regulators under IT Act; Cyber Crimes-Offences and Contraventions; Grey Areas of IT Act.

RECOMMENDED BOOKS			
Sr. No.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Handbook of Cyber Laws	Vakul Sharma	Mc Millian
2	"Principles of Intellectual Property	N.S. Gopalakrishnan & T.G. Agitha	

CSA759Programmingwith Python Lab

L T P
0 0 4

Objectives: To becomefamiliarwith the operation of Python and Acquireknowledge about the basic concept of writing a program in Python.

1. To write a python program thattakes in command line arguments as input and print the number of arguments.
2. To write a python program to perform Matrix Multiplication.
3. To write a python program to compute the GCD of twonumbers.
4. To write a python program to find the mostfrequentwords in a text file.
5. To write a python program find the square root of a number (Newton'smethod).
6. To write a python program exponentiation (power of a number).
7. To write a python program find the maximum of a list of numbers.
8. To write a python program linearsearch.
9. To write a python program Binarysearch.
10. To write a python program selection sort.
11. To write a python program Insertion sort.
12. To write a python program merge sort.
13. To write a python program first n prime numbers.
14. To write a python program simulatebouncingball in Pygame.

CSA761 Advanced Data Structures Lab

L T P

0 0 4

Learning Objectives: This course will introduce the basic concepts of Data Structure algorithms and their implementation in Python.

1. WAP to implement a 3-stacks of size ‘m’ in an array of size ‘n’ with all the basic operations such as IsEmpty(i), Push(i), Pop(i), IsFull(i) where ‘i’ denotes the stack number (1,2,3), m n/3. Stacks are not overlapping each other. Leftmost stack facing the left direction and other two stacks are facing in the right direction.

2. WAP to implement 2 overlapping queues in an array of size ‘N’. There are facing in opposite direction to eachother. Give IsEmpty(i), Insert(i), Delete(i) and IsFull(i) routines for ith queue.

3. WAP to implement Stack ADT using Linked list with the basic operations as Create(), Is Empty(), Push(), Pop(), IsFull() with appropriate prototype to a functions.

4. WAP to implement Queue ADT using Linked list with the basic functions of Create(), IsEmpty(), Insert(), Delete() and IsFull() with suitable prototype to a functions.

5. WAP to generate the binary tree from the given inorder and postorder traversal.

6. WAP to implement Quick Sort on 1D array of Student structure (contains student_name, student_roll_no, total_marks), with key as student_roll_no. And count the number of swap performed.

7. WAP to implement Merge Sort on 1D array of Student structure (contains student_name, student_roll_no, total_marks), with key as student_roll_no. And count the number of swap performed.

8. WAP to implement Bubble Sort on 1D array of Employee structure (contains employee_name, emp_no, emp_salary), with key as emp_no. And count the number of swap performed.

9. WAP to implement Bucket Sort on 1D array of Faculty structure (contains faculty_name, faculty_ID, subject_codes, class_names), with key as faculty_ID. And count the number of swap performed.

10. WAP to implement Binary search on 1D array of Employee structure (contains employee_name, emp_no, emp_salary), with key as emp_no. And count the number of comparison happened.

11. Implement the above program I using hash function from Division methods.

12. Implement the above program I using hash function from Truncation methods.

13. WAP to implement Inorder Threaded Binary Tree with insertion and deletion operation.

14. WAP to implement Preorder Threaded Binary Tree with insertion and deletion operation

15. WAP to implement Postorder Threaded Binary Tree with insertion and deletion operation.

16. WAP to traverse given Inorder Threaded Binary Tree in inorder, preorder and postorder fashion.

17. WAP to traverse given Postorder Threaded Binary Tree in inorder, preorder and postorder fashion.

18. WAP to implement Red-Black trees with insertion and deletion operation for the given input data as Strings.

19. WAP to transform BST into AVL trees and also count the number rotations performed.

20. WAP to perform topological sort on dag using depth first search.

21. WAP to perform string matching using Rabin-Karp algorithm.

Course Code	**CSA763**
Course Title	**Computational Intelligence**
Type of Course	OE
L T P	4:0:0
Credits	4
Course Prerequisites	Basic knowledge of Soft computing
Course Objective (CO)	The main objective of this course is to provide conceptual as-well-as practical knowledgeabout Neural Networks, Fuzzy Logic and soft computing.
Course Outcomes (CO)	The students will able to: 1. Describe human intelligence and AI Explain how intelligent system works. 2. Apply basics of Fuzzy logic and neural networks. 3. Discuss the ideas of fuzzy sets, fuzzy logic and use of heuristics based on human experience 4. Develop some familiarity with current research problems and research methods in Soft Computing Techniques.

SYLLABUS

UNIT I

Introduction: Neural Networks, Application Scope of Neural Network, Fuzzy Logic, Genetic Algorithm, Hybrid Systems and Soft computing. Artificial Neural Network: Fundamental Concept, Evolution of Neural Networks, Basic Models of Artificial Neural Network, Important Terminologies of ANNs, McCulloch-Pitts Neuron, and Hebb Network.

UNIT II

Introduction to Fuzzy Logic, Classical Sets and Fuzzy Sets: Introduction to Fuzzy logic, Classical Sets(Crisp Sets), Operations of Classical Sets, Fuzzy Sets Operations.

Classical Relations and Fuzzy Relations: Cartesian Product of Relation, Classical Relation, Fuzzy Relations, Tolerance and Equivalence Relations, No interactive Fuzzy Sets.

Membership Functions: Features of Membership Functions, Fuzzification and Defuzzification.

UNIT III

Fuzzy Rule Base and Approximate Reasoning: Introduction, Truth Values and Table in Fuzzy Logic, FuzzyPropositions, Fuzzy Reasoning, Fuzzy Inference System.

Fuzzy Decision Making: Individual Decision Making, Multiperson Decision Making, Multiobjective Decision Making, Multiattribute Decision Making, Fuzzy Bayesian Decision Making.

Fuzzy Logic Control Systems: Control System Design, Architecture and Operation of FLC system, FLC System Models, Application of FLC Systems.

UNIT IV

Hybrid Soft Computing Techniques: euro-Fuzzy Hybrid Systems, Generic Neuro-Hybrid Systems, Genetic Fuzzy Hybrid and Fuzzy Genetic Hybrid Systems, Simplified Fuzzy ARTMAP.

Applications of SoftComputing: A Fusion Approach of Multispectral Images with SAR (Synthetic Aperture Rader), Optimization of Traveling Salesmen Problem using Genetic Algorithm Approach, Genetic Algorithm-Based Internet Search Technique, Soft computing Based Hybrid Fuzzy Controllers.

RECOMMENDED BOOKS			
Sr. No.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Principles of Soft Computing	S.N. Sivanandam, S.N. Deepa	Wiley
2	Fuzzy Logic and Soft Computing	Bernadette Bouchon-Meunier	World Scientific.
3	Soft Computing: Techniques and its Applications in Electrical Engineering	ByDevendra K. Chaturvedi	Springer Science & Business Media.

Course Code	**CSA765**
Course Title	**System Analysis and Design**
Type of Course	OE
L T P	4:0:0
Credits	4
Course Prerequisites	Knowledge of Software
Course Outcome (CO)	The main objective of this course is to provide students with an overall foundation of systems analysis and design to effectively and efficiently design and implement system.
Course Outcomes (CO)	The students will able to: 1. Explain what systems are and how they are developed. 2. Identify and describe the phases of the systems development life cycle. 3. Follow the analysis portion of the Systems Development Life Cycle in a disciplined manner. 4. Develop and evaluate system requirements.

SYLLABUS

UNIT I

Introduction to system, data, information, knowledge, types of system, requirements of information at different levels of management

System/Software Development Life Cycle: Requirements determination, requirements specifications, feasibility analysis, final specifications, hardware and software study, system design, system implementation, system testing, system maintenance.

UNIT II

Role of systems analyst, attributes of a systems analyst, tools used in system analysis

Information gathering, system requirements specification, Feasibility analysis, examining alternative solutions, cost – benefit analysis, quantifications of costs and benefits, tools for prototype creation

UNIT III

Tools for systems analysts: data flow diagrams, logical and physical DFDs, software tools to create DFDs

Structured systems analysis and design, procedure specifications in structured English, examples and cases, decision tables for complex logical specifications, Data oriented systems design, entity relationship model, E-R diagrams

UNIT IV

Control – audit and security of information systems, objectives of control, techniques used in control, auditing information systems, testing information systems, types of tests, security of information systems, disaster recovery,Complete system analysis and design case study of Library management system.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Introduction of System Analysis and Design	I.T.Haryszkiewycz	Pearson Education
2	Analysis and Design of Information System	V.Rajaraman	Pearson Education
3	System Analysis and Design Methods	J.K.Whiten., L.D.Bentley,	Galgotia Publications Pvt.Ltd.

CSA767 MOOC

L T P

0 0 4

Student shall submit certificates showing the credit points (no. of week course) earned through SWAYAM MOOCs to the Head of the department.

Course Code	**CSA769**
Course Title	**Design and Analysis of Algorithm**
Type of Course	OE
L T P	4:0:0
Credits	4
Course Prerequisites	Basic knowledge of algorithm design
Course Outcomes (CO)	The main objective of this course is to provide conceptual as well as practical knowledge ofvarious Algorithm Designing techniques and their impact on programming.
Course Outcomes (CO)	The students will able to: 1. Analyze the asymptotic performance of algorithms. 2. Write rigorous correctness proofs for algorithms. 3. Demonstrate a familiarity with major algorithms and data structures. 4. Apply important algorithmic design paradigms and methods of analysis.

SYLLABUS

UNIT I

Introduction: Fundamentals of Algorithmic Problem solving, important problem types, Fundamentals of the Analysis of algorithm efficiency, asymptotic notation, general sorting algorithms, Mathematical Analysis of recursive and non-recursive algorithms, Master's Theorem.

UNIT II

Divide and Conquer: General method, binary search, ternary search algorithm, merge sort, quick sort, selection, Strassen 's matrix multiplication, analysis of algorithms for these problems.

Greedy Method: General method, knapsack problem, job sequencing with deadlines, minimum spanning trees, single source paths, optimal storage on tapes, optimal merge patterns and analysis of these problems.

UNIT III

Dynamic Programming: General method, single source shortest path, all pair shortest path, optimal binary search trees, 0/1 knapsack, the traveling salesman problem, All pairs shortest path problem-Warshal's and Floyd's algorithms, Longest Common sequence (LCS).

Back Tracking: General method, 8 queens' problem, graph coloring, sum of subsets, Hamiltonian cycles, analysis of these problems.

UNIT IV

Branch and Bound: General Method, 0/1 knapsack and traveling salesman problem.

NP-Hard and NP-Completeness: P, NP, NP-Hard, NP-Complete.

String Matching Algorithms: KMP Algorithm, Rabin-Karp Algorithm.

Approximation Algorithms: Travelling-salesman Problem.

RECOMMENDED BOOKS			
SR.NO	**NAME**	**AUTHOR(S)**	**PUBLISHER**
1.	Fundamental of Computer algorithms,.	Ellis Horowitz and Sartaj Sahni,	Galgotia Publication

Course Code	**CSA771**
Course Title	**Mobile Architecture and Security**
Type of Course	OE
L T P	4:0:0
Credits	4
Course Prerequisites	To understanding the basic Mobile Computing
Course Objective (CO)	The main objective of this course is to provide conceptual as-well-as practical knowledgeabout basic Mobile architecture, Mobile Database and various security issues in Mobile computing.
Course Outcomes (CO)	The students will able to: 1. Be exposed to technology and business trends impacting mobile applications 2. Be competent with the characterization and architecture of mobile applications. 3. Be competent with understanding enterprise scale requirements of mobile applications. 4. Be competent with designing and developing mobile applications using one application development framework.

SYLLABUS

UNIT I

Hardware Architecture: Symmetric Multiprocessing, Distributed and Shared Memory. Multicomputer. Software Architecture, Client server architecture, 3-tier architecture, N-tier architecture, Peer-to-peer. Cluster computing concepts, Grid computing, Virtualization and Cloud Computing. Recent trends in processor technologies -Superscalar processors, Multi-core processors, Embedded processors.

UNIT II

Introduction to conventional databases: Distributed databases Mobile Data Access Systems: Mobility issues, On-demand services, Broadcast services, Transaction Processing, Security Moving Object Databases: Basic concepts and challenges, Accessing methods of moving object databases, Current Information Oriented Indexing, Historical Information Oriented Indexing, Mixed-type indexing, Indexing

UNIT III

IP Layer Security: Link Layer Security, Network Security options. Security Issues in a Mobile IPV6 Network, Mobile Code Issues: Security Measures for Mobile Agents, Security Issues for Downloaded code in Mobile phones Secure Mobile Commerce: MCommerce and its security challenges, Security of the radio interface.

UNIT IV

Security Issues in Single Hop Wireless Networks: Cellular Network Security, Access Control and Roaming Issues, Mobile IP Security Security Issues in Multihop Wireless Networks: Mobile Adhoc Network Security, Trust Management and Routing Issues, Wireless Sensor Network Security, Key Management, Sybil Attacks and Location Privacy, Vehicular Network Applications and Security, Wireless Metropolitan Area Networks (e.g. 802.11b).

Recommended Books			
S. No	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Wireless Security - Models,	Nichols and Lekkas	Threats and Solutions, McGraw-Hill.
2	Mobile Database Systems.	Kumar Vijay	John Willy & Sons.
3	Mobile Vas	R Krishna Kumar	McGraw-Hill

Course Code	**CSA773**
Course Title	**E-Commerce and Content Management System**
Type of Course	OE
L T P	4:0:0
Credits	4
Course Prerequisites	To understanding the basic HTML Tag
Course Objective (CO)	The objective of this course is to help students to understand E-commerce issues for providing a secure and effective method of conducting a business and the use of e-commerce in competing markets
Course Outcomes (CO)	The students will able to: 1. Identify and apply relevant problem solving methodologies 2. Design components, systems and/or processes to meet required specifications for a web presence 3. Be aware of the ethical, social, and security issues of information systems. 4. Communicate effectively in ways appropriate to the discipline, audience and purpose.

SYLLABUS

UNIT I

Introduction to Electronic Commerce: Potential benefits & limitations of E-Commerce, Traditional Commerce vs. E-Commerce vs M-Commerce, Different E-Commerce Models (B2B, B2C, C2C, P2P), E-Commerce applications, Social Networks, Auctions & Portals, Legal and Ethical issues in E-Commerce.

UNIT II

Introduction to Electronic Data Interchange: Types of EDI, Benefits of EDI Overview of Electronic Payment system, Types of Electronic payment schemes (Credit cards, Debit cards, Smart cards, Internet banking), Issues in Electronic payment systems Web Based Marketing and Communications: Online Advertising, E-Mail Marketing, Online Catalogs, Social Marketing and Targeted Marketing, Techniques and Strategies.

UNIT III

WWW concepts: Client/Server Computing, Web Servers and Clients, Web Browsers, Protocols and Ports, IP Address, Domains & DNS, URL, A Systematic approach to Website creation, Creating interactive and dynamic web pages, Factors in E-Commerce Website design, Web and Database integration, Website Optimization strategiesE-Commerce security, threats, managing security issues through internet security protocols and standards, and Firewall.

UNIT IV

Review of HTML: HTML tags; text formatting; text styles; lists: ordered, unordered and definition lists; layouts; adding graphics; tables; linking documents; images as hyperlinks; frames and layers; data collection using forms.
CSS: Introduction, consistent web designing using CSS.
Java Script: Introduction, DOM, documents, forms, statements, functions, objects, client side Interactive web page design, input validation, event handling
PHP: Introduction, server side dynamic programming, MYSQL database access.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	E-Commerce Essentials	Kenneth Laudon and Carol Traver	Pearson
2	Frontiers of Electronic Commerce	Ravi Kalakota, Andrew B.Whinston - Addison	Wesley Publication
3	E-Commerce, Fundamentals and Applications	Henry Chan, Raymond Lee, Tharam Dillon and Elizabeth Chang	Wiley India Publication

Course Code	**CSA775**
Course Title	**Computer Vision**
Type of Course	OE
L T P	4:0:0
Credits	4
Course Prerequisites	To understanding the basic Image And Speech Recognition
Course Objective (CO)	The main objective of this course is to provide conceptual as-well-as practical knowledgeabout Image and Speech Recognition.
Course Outcome (CO)	The students will able to: 1. Understand the fundamental concepts of a pattern recognition 2. Understand how to recognize patterns or objects. 3. Understand the basic of speech analysis. 4. Know how to convert text into speech synthesis.

SYLLABUS

UNIT I

Introduction to Pattern Recognition: Feature Detection, Classification, Review of Probability Theory, Conditional Probability and Bayes Rule, Random Vectors, Expectation, Correlation, Covariance, Review of Linear Algebra, Linear Transformations, Decision Theory, ROC Curves, Likelihood Ratio Test, Linear and Quadratic Discriminants, Fisher Discriminant.

UNIT II

Linear Discriminant/Perceptron Learning- Unsupervised Learning: Optimization by Gradient Descent, Support Vector Machines, K-Nearest-Neighbor Classification, Non-parametric Classification, Density Estimation,Parzen Estimation, Clustering, Vector Quantization, K-means, Mixture Modeling, Expectation Maximization, Hidden Markov Models.

UNIT III

Basic Concepts: Speech Fundamentals: Articulatory Phonetics, Production and Classification of SpeechSounds; Acoustic Phonetics acoustics of speech production; Review of Digital, Signal Processing concepts; Short, Time Fourier Transform, Filter, Bank and LPC Methods.

Speech Analysis: Features, Feature Extraction and Pattern Comparison Techniques: Speech distortion measures mathematical and perceptual Log Spectral Distance, Cepstral Distances, Weighted CepstralDistances and Filtering, Likelihood Distortions, Spectral Distortion using a Warped Frequency Scale, LPC, PLP and MFCC Coefficients.

UNIT IV

Speech Modeling: Hidden Markov Models: Markov Processes, HMMs, Evaluation, Optimal StateSequence Viterbi Search, BaumWelch Parameter Re-estimation, Implementation issues.

SpeechRecognition: Large Vocabulary Continuous Speech Recognition: Architecture of a large vocabularycontinuous speech recognition system acoustics and language models-n-grams, context dependent sub -word units; Applications and present status, Speech Synthesis.

TexttoSpeech Synthesis: Concatenative and waveform synthesis methods, TTS Architecture, subword units for TTS, intelligibility and naturalness role of prosod.

RECOMMENDED BOOKS			
Sr. no.	**Name**	**AUTHOR(S)**	**PUBLISHER**
1	Pattern Recognition and Image Preprocessing	Sing T. Bow,	CRC Press.
2	Pattern Recognition	SergiosTheodridis,	KonstantionsKautroumbas, Academic Press.
3	Fundamentals of Speech Recognition	Lawrence RabinerandBiing-Hwang Juang,	Pearson Education

Course Code	**CSA777**
Course Title	**Network and Web Security**
Type of Course	OE
L T P	4:0:0
Credits	4
Course Prerequisites	To understanding the basic Network and Web Security
Course Objective (CO)	The main objective of this course is to provide conceptual as-well-as practical knowledgeabout various issues in network and web security.
Course Outcomes (CO)	The students will able to: 1. Compare, contrast, and apply the key algorithmic design paradigms: brute force, divide and conquer, decrease and conquer, transform and conquer, greedy, dynamic. 2. Define, compare, analyze, and solve general algorithmic problem types: sorting, searching, string processing, graphs, and geometric. 3. Compare, contrast, and apply algorithmic tradeoffs: time vs. space, deterministic vs. randomized, and exact vs. approximate. 4. Compare, contrast, and apply key data structures: trees, lists, stacks, queues, hash tables and graph representations

SYLLABUS

UNIT-1

Foot Printing : Information gathering methodology, Hacking Tools, Scanning-Definition,Types of Scanning, Objectives of Scanning, Scanning Methodology, Counter measures; Enumeration- NetBios Null Sessions, hacking tools – Enumerating User Accounts, Active Directory Enumeration and Countermeasures; System Hacking-Administrator password guessing, Password Cracking Algorithm, Automated Password Cracking, Types of Password Attacks, Hacking tools.

UNIT-1I

Trojans and Backdoors: Overt and Covert Channels, Indications of a Trojan Attack, ReverseEngineering Trojans, Backdoor Countermeasures; Sniffers- Working of Sniffer, Passive Sniffing, Active Sniffing, Hacking tools, Sniffing Countermeasures; Denial of Service- Goal of DoS, Impact and Modes of Attack, DoS Attack Classification, Countermeasures for Reflected DoS, Tools for Detecting DDoS Attacks.

UNIT-1II

Session Hijacking: Spoofing vs. Hijacking, Steps in Session Hijacking, Types of SessionHijacking, Hacking Tools, Protection against Session Hijacking, IP Security; Hacking

Web Servers- Popular Web Servers and Common Security Threats, Apache Vulnerability, Attack against IIS Console, Hacking Tools, Countermeasures, Increasing Web Server Security; Web Application Vulnerabilities- Web Application Hacking, Anatomy of an Attack, Web Application Threats, Carnivore, Google Hacking, Counter measures.

Web Based Password Cracking Techniques: Authentication mechanisms, PasswordGuessing, Cookies, Password Crackers Available, Hacking Tools, Counter measures; SQL Injection- Attacking SQL Servers, SQL Server Resolution Service (SSRS), Osql-L Probing, SQL Server Talks, Preventive Measures; Hacking Wireless Networks – Rouge Access Points, Scanning Tools, Sniffing Tools, and Securing Wireless Networks.

UNIT-IV

Linux Hacking : Linux Vulnerabilities, Scanning Tools, Scanning Tools, Linux Security Tools,Advanced Intrusion Detection System, Linux Security Auditing Tool; Evading Firewalls.
Intrusion Detection Systems: Intrusion Detection Tools, Penetration Testing , Penetration Test vs. Vulnerability Test, Reliance on Checklists and Templates, Phases of Penetration Testing, Risk Analysis, Active Reconnaissance.

RECOMMENDED BOOKS			
SR.NO	**NAME**	**AUTHOR(S)**	**PUBLISHER**
1	Hackers Beware: The Ultimate Guide To Network Security	Eric Cole	Publisher Sams
2	The Secret of Hacking ;Third Edition	Manish Kumar	Publisher Leo Impact Security Services.

Course Code	**CSA055**
Course Title	**PC Assembly and Hardware**
Type of Course	VA
L T P	3 0 0
Credits	3
Course Prerequisites	To understanding the basic
Course Objective (CO)	The main objective of this course is to become skill enhanced in PC Assembly and Hardware devices.
Course Outcomes (CO)	The student will be able to: 1. Assemble and set up computer systems. 2. Configure and install computers 3. Install, connect and configure various peripheral devices 4. Diagnose and Troubleshoot issues in Computer Systems

UNIT I

Brief history of computer on the basis of Hardware. Computer system modules/ components and its operations, need of hardware and software for computer to work, different hardware components within a computer and connected to a computer as peripheral devices, different processors used for personal computers and notebook computers.

UNIT II

Perform installation, configuration, and upgrading of microcomputer/ computer: Hardware and software requirement, Assemble/setup microcomputer/ computer systems, accessory boards, types of motherboards, selection of right motherboard, Installation replacement of motherboard, troubleshooting problems with memory.

UNIT III

Install/connect associated peripherals: Working of printers and scanners, Installation of printers and scanners, sharing a printer over a local area network, troubleshooting printer and scanner problems, troubleshooting hard drive problems. Drivers: Meaning, role and types.

UNIT IV

Diagnose and troubleshooting of microcomputer/ computer systems hardware & software and other peripheral equipment: Approaches to solve a PC problem, troubleshooting a failed boot before the OS is loaded, different approaches to installing and supporting I/O device, managing faulty components. Booting and its types.

RECOMMENDED BOOKS

SR.NO	NAME	AUTHOR(S)	PUBLISHER
1	PC Hardware: The Complete Reference	Eric Cole	McGraw Hills

Course Code	**CSA057**
Course Title	**Digital Marketing With Google Certification**
Type of Course	VA
L T P	3 0 0
Credits	3
Course Prerequisites	Basic knowledge of Internet.
Course Objective (CO)	The main objective of this course is to become skilled in fundamentals of digital marketing powered by Google.
Course Outcomes (CO)	The student will be: 1. Learn basic concepts of digital marketing. 2. Efficient in practical understanding of modern marketing and advertising techniques, strategy, and scope in all industries. 3. Able to appear for certification exams like OMCA (OMCP), Facebook Marketing, YouTube Marketing, Google AdWords, Google Analytics, and Twitter Marketing. 4. Able to get more knowledge about the digital marketing.

S. No.	Topics
1	Introduction to Digital Marketing
2	Search Engine Optimisation(SEO)
3	Social Media Marketing
4	Web Analytics
5	E-Commerce Management
6	Planning and Creating a Website
7	Search Engine Marketing
8	Content Strategy
9	Email Marketing
10	Design Essential

REFERENCES:

Sr.No.	NAME	AUTHOR(S)	COURSE URL
1	Fundamentals of Digital Marketing	Google	https://learndigital.withgoogle.com/digitalunlocked/course/digital-marketing

Fourth Semester

CSA752 Research Work (Industrial Training)

L T P
0 0 24

The six month industrial training must be undertaken in reputed for whole semester. The student must submit a Mid-Term report after three months. The student will submit training report along with training certification from industry. A presentation at the end of semester will be given by the student in front of Faculty of concerned department.

Course Objectives:

This training also gives the knowledge about to acquire the latest techniques, skills, methodologies and to build a strong foundation for their career growth and help in boosting career of students, since by the end of this training; students are turned into professionals in their specialized area. In this training students will be able to:

1. Provide comprehensive learning platform to students where they can enhance their employ ability skills and become job ready along with real corporate exposure.
2. Enhance students' knowledge in one technology.
3. Increase self-confidence of students and helps in finding their own proficiency.
4. Provide learners hands on practice within a real job situation.

Course Outcomes:

Upon completion of this course, the student will:

CO1: Acquire and apply fundamental principles of computer Science.

CO2: Improve technical knowledge, management, leadership, and entrepreneurship skills.

CO3: Identify, formulate, and model problems and find engineering solution based on a systems approach.

CO4: Write technical documents and give oral presentations related to the work completed.

Further Guidelines and Format design and given by HOD/COD.