Swami Ramanand Teerth Marathwada University
Nanded
(NAAC Re-accredited with 'A' Grade)

School of Computational Sciences

Curriculum of

M.Sc. Computer Science / Computer Network / Computer
Application (2 years full time PG Programs)
And
MCA (AICTE approved, 3 years full time PG Program)

(Revised CBCS pattern)
Introduced from Academic Year 2017-2018

(with minor revisions as on 01-07-2018)

Director
School of Computational Sciences
S.R.T.M.University, Nanded (M.S.)

The School of Computational Sciences exists since inception of the University and offers Masters, M.Phil. and Ph.D. programs.

Master Degree Programs, M.Sc.(CS), M.Sc.(CN) and M.Sc.(CA), being officered are two years full time post graduate programs revised with industry expectations. These all programs have four semesters, which are normally completed in two years.

The MCA program is a three years full time AICTE approved program which is normally completed in six semesters.

Above all programs are offered as per CBCS (Choice Based Credit System) pattern, in which within discipline and cross discipline migration choices of courses are given to the students under open electives and subject electives. The students can choose open electives from the same program or from other programs of the same school or from other programs of other schools. The Evaluation of performance of a student for the course under Choice based Credit System (CBCS) is based on principle of continuous assessment through internal and external evaluation mechanisms. CBCS policy had emphasis given on imparting skills to students.

The eligibility criteria and fees structure shall be same as that of Campus Prospectus.

School of Computational Sciences
S. R. T. M. University, Nanded, MS, India

Draft Report on CBCS enabled syllabi of M.Sc.(CA/CN/CS) and MCA Programs

In compliance with the Hon'ble Vice Chancellor's directions, Pro Vice Chancellor's timely guidance, resolution passed by the Hon'ble Management Council and in the light of circular being communicated by the Deputy Registrar, Academics, a committee comprising of the Director of the School, Head Department and three faculties from the school have strived hard for reframing and revision the syllabi of existing 2 years full time M.Sc. Computer Application, M.Sc. Computer Network and M.Sc. Computer Science programs being taught by the school. The said revision exercise was also extended for 3 years full time MCA course which also exists in the school.

The committee members agreed unanimously to adhere the UGC guidelines as well as SRTMUN policy draft on Choice Based Credit System – CBCS, being circulated to the school for all M.Sc. programs. Similarly, the guidelines given by AICTE, New Delhi were observed for MCA program. The model CBCS syllabus framed by UGC, New Delhi was also reviewed. It was decided to have at least one open elective as a compulsory course in all the programs, in all the semesters. Accordingly, the interdisciplinary applications of Computers, IT, Scientific computing allied courses were found out across the various disciplines and relevant courses have been spread over all semesters of all the streams with two internal credits in each semester. The Communication Skills (given in UGC Scheme as a compulsory Ability Enhancement Course (AECC) to be taught) was also introduced as an Open Elective in early semesters.

While restructuring the courses to fit into the CBCS pattern, care has been taken to consider local needs placed in a national context so as to fulfil global demands. Due care is taken to introduce application oriented interdisciplinary learning. Therefore, students pursuing post graduation degrees over here, in specific courses are encouraged to imbibe knowledge and skills which enable all round personality development, skill enhancement and in-depth learning of technology platforms. Under the CBCS pattern, students would post graduate M.Sc. programs with a total number of 100credits which includes minimum 08compulsory credits from open electives across the all semesters wherein the students would be required to choose the courses from the choices available in the each semester.

The directions given by Hon'ble Pro Vice Chancellor sir reading *intra school* and *inter school* open electives was specifically accepted by the committee and due care is taken to embed them. Accordingly, horizontal and vertical migration among all M.Sc. and MCA programs with other programs offered by other schools in the campus is allowed.

The discussions with Hon'ble Pro Vice Chancellor sir lead to following specific agenda of the CBCS syllabi

1. To provide mobility and flexibility for students within and outside the Computational Science School as well as to migrate between institutions
2. To help students to learn at their own pace
3. To have provision for audit and credit courses
4. To impart more job oriented skills to students
5. To make any course multi-disciplinary in approach

In order to move ahead on the agenda, the committee members continuously sat together on all week days and finalised all semesters one by one. This activity started in mid June 2017 and finally ended on 13th July 2017. There were discussions on a uniform structure per semester, which is likewise to be extended across all semesters so as to make a M.Sc. program worth of 100 credits. All the semesters have 25 credits each.

Accordingly, 04 theory courses of 04 credit each, 01 theory course of 03 credits, 02 Lab courses of 02 credits each and 01 open elective course of 02 credits, were drafted as Semester 01 and Semester 02 of all M.Sc. programs. These courses are marked as compulsory foundation and core courses which at as brush up / revision courses for entry level students. This was intentionally done as the student population coming to school primarily comes from Permanent Non Grant colleges.

The third and fourth semesters have compulsory and elective courses to be completed, with open electives. The compulsory courses have been designed as per the perspective of CA/CN and CS courses. These are program specific courses which enable in depth learning in the allied courses. The electives are designed as per the relevant demand of a course in IT industry / Research area. In third semester, there are 03 theory courses of 04 credits each, 01 theory course of 03 credits, 01 specialized elective of 04 credits, 02 Lab courses of 02 credits and 01 open elective of 02 credits. This also sums up to 25 credits.

In the fourth semester there are 03 theory courses of 04 credits each, 01 project development activity of 03 credits, 01 specialized elective of 04 credits, 02 Lab courses of 02 credits each and 01 open elective of 02 credits. This also sums up to 25 credits. The project development activity was intentionally introduced so as give a real time feel of industry activities to the students. An unified course numbering system was used for proper numbering of all courses, viz,

F00x:	**Foundation Course**
C00x:	**Core Courses**
PSC-CA-x:	**Program Specific Courses for M.Sc.(CA)**
PSC-CN-x:	**Program Specific Courses for M.Sc.(CN)**
PSC-CS-x:	**Program Specific Courses for M.Sc.(CS)**
PSC-MCA-x:	**Program Specific Courses for MCA**
DEC-x:	**Department Specific Elective Subject for all programs**
OE-x:	**Open Elective**

A separate unified numbering system was used for MCA program so as to differentiate among MCA and M.Sc. programs.

The definition of credit in CBCS draft is finally taken as per the SRTMUN- CBCS policy, as a weightage to a course, to be given in relation to the hours assigned for the course. Generally one hour per week has one credit. For viability and conformity to the guidelines credits are awarded irrespective of the teaching hours.

First two semesters of all M.Sc. programs are kept common. They have compulsory foundation and core courses along with open electives. The third and fourth semesters of these programs consists of three major components. They are program specific core courses, elective courses and department specific elective courses. Also a compulsory component of open elective is mandatory per semester.

A core course is the course offered by the parent program, totally related to the major subject, components. Elective Course is also offered by the parent program whose objective is to provide choice and flexibility within the program. The student can choose his/her elective paper. Elective is related to the major subject. The difference between core course and elective course is that there is choice for the student. The program is at liberty to offer certain number of elective courses any semester.

The Departmental elective course is an inter program course offered by a program for the students belonging to other programs. The objective is to provide mobility and flexibility outside the parent program. This is introduced to make every course multi-disciplinary in nature. It is to be chosen from a list of courses offered by various programs in the school. The list is given in the syllabus copy.

The open electives are of application oriented and inter-disciplinary in nature. These courses can be offered by the concern program or concern school for the students in same program / school or for other schools. These have 02 internal credits.

All faculties were told to outline the specific topics of their interest and elaborate them further with objectives and outcome. The final version of syllabi is outcome oriented which smoothes the understanding of students regarding the skills he/she will be getting after the completion of the course. This has also made faculties to be specialized of the courses being drafted by them.

In order to see the employability of the skills being imparted through the revised syllabi, the syllabi draft was forwarded to Industry experts. Due care is taken to incorporate suggestions and modifications given by these experts. These experts are

1) Dr. Parvin Pawar, Philips Research Lab, Bangalore
2) Mr. Sanjay Kurundkar, Creve Info Tech Ltd, Pune
3) Mr. Ashish Tendulakr, Google Inc, Pune

UGC and AICTE guidelines regarding CBCS syllabi workout were duly considered while framing underlined syllabi. Efforts are made for incorporating skill enhancement components in the underlined syllabi. In order to offer more choices for learning, the certified MOOC courses, Spoken tutorial courses and Swayam courses are considered equivalent for open electives. However, in these cases, students must produce certificate towards successful completion of the said courses during the course year in order to claim credits for open electives.

It was decided to pass this draft for final approval from the Administrative Authorities including Dean of the faculty, Hon'ble Vice Chancellor and Pro Vice Chancellor sir,

Submitted with respects

1. **Dr. G.V. Chowdhary, Director**

2. **Dr. S. D. Khamitkar, HOD**

3. **Dr. H. S. Fadewar, Assistant Professor**

4. **Dr. P. U. Bhalcahndra, Assistant Professor**

5. **Mr. M. R. Mahamune, Assistant Professor**

Final draft of syllabi was approved by all the faculties in the school.

1. **Dr. N. K. Deshmukh, Assistant Professor**

1. **Dr.S. N. Lokhande, Assistant Professor**

2. **Mr. S. R. Mekewad, Assistant Professor**

3. **Ms. A. H. Sable, Assistant Professor**

4. **Mr. M. S. Darak. Assistant Professor**

5. **Mr. M. D. Wangikar, Assistant Professor**

Place: Nanded

Date:

This page is intentionally left blank

M.Sc.-CA/CS/CN and MCA Credit Scheme

Program	compulsory Theory course 03 credit	Program specialization courses 04 credit	Department Electives 04 credit	Lab course 02 credit	Project Development Activity	Open Electives for Other Schools	Total credits
	Compulsory	All Compulsory As per course	Any one	All compulsory As per course	All compulsory	Any one	
First Semester MSc. CA/ CN/ CS and MCA – Common Foundation courses	F005	F001 F002 F003 F004	N/A	F006 F007	N/A	OE-1 : A/B/C/D	25
Second Semester MSc. CA/ CN/ CS and MCA – Common Core courses	C005	C001 C002 C003 C004	N/A	C006 C007	N/A	OE-2 : A/B/C/D	25
Third Semester M.Sc. CA/ CN/ CS and MCA Students must opt for respective subjects for the course	PSC-CA/MCA-4 (For CA, MCA) PSC-CS-4 (For CS) PSC-CN-4 (For CN)	PSC-CA/ CS/ MCA-1 PSC-CN-1(For CN) PSC-CA/ CS/ MCA-2 PSC-CN-2 (For CN) PSC-CA-3 PSC-CS/ MCA-3 PSC-CN-003 (For CN)	DEC-1 DEC-2 DEC-3 DEC-4 DEC-5	PSC-CA/ CS/ MCA-5 PSC-CN-5(For CN) PSC-CA-6 PSC-CS/MCA-6 PSC-CN-6 (For CN)	N/A	OE-3 : A/B/C/D/ E	25
Fourth Semester M.Sc. CA/CN/CS and MCA Students must opt for respective subjects for the course	N/A	PSC-CA/ CS/ MCA-7 PSC-CN-7 (For CN) PSC-CA/ CN-8 (For CA & CN) PSC-CA/ CS-9 PSC-CS/ MCA-9 PSC-CN-9 (For CN)	DEC-6 DEC-7 DEC-8 DEC-9 DEC-10	PSC-CA/ CS/ MCA-10 PSC-CN-10 (For CN) PSC-CA/ CN-11 PSC-CS/ MCA-11	PSC-CA/ CS/ CN-12 PSC-MCA-12	OE-4 : A/B/C/D	25
Fifth Semester MCA	PSC-MCA-16	PSC-MCA-13 PSC-MCA-14 PSC-MCA-15	DEC-11 DEC-12 DEC-13 DEC-14 DEC-15	PSC-MCA-17 PSC-MCA-18	N/A	OE-5 : A/B/C/D	25
Sixth Semester MCA	N/A	N/A	N/A	N/A	PSC-MCA-19	N/A	25

Notes

1. For Theory, 04 credits means 02 internal credits and 02 external credits   2. For Theory, 03 credits mean 01 Internal and 02 external credits
2. For Lab, 02 credits means 01 internal and 01 external credits   3. For Open electives, 02 credits are purely internal credits
3. For Project Development Activity, 03 credits are purely internal
4. Student has to earn at least 02 credits in any semester from the interdisciplinary open elective course offered by other school.

First Year: M.Sc. (CA)/ (CN)/ (CS) and MCA

Subject Type	Subject Code	Subject Title	Number of Credits
First Semester Foundation courses	F001	Computer System Organisation	04
	F002	Programming Language Concepts	04
	F003	Digital Systems and Microprocessors	04
	F004	Introduction to Databases	04
	F005	Mathematical Foundations of Computer Science	03
LAB	F006	Lab 1: Digital Elect+ Micro Processor	02
	F007	Lab 2: SQL	02
Open Elective	OE-1	A. Programming in C B. Communication skills C. Seminar / Survey / Activity D. Other similar open electives offered by other schools / MOOC/ Swayam / Spoken tutorial platforms	02
Second Semester Core courses	C001	System Analysis and Design	04
	C002	Data Communications	04
	C003	Operating System Concepts	04
	C004	Elementary Data Structures and Algorithms	04
	C005	Object Oriented Programming Languages	03
LAB	C006	Lab 3: Data Structures and Algorithms	02
	C007	Lab 4: Object Oriented Programming	02
Open Elective	OE-2	A. Programming in Java B. Information Communication Technology (ICT) C. Seminar / Survey / Activity D. Other similar open electives offered by other schools / MOOC/ Swayam / Spoken tutorial platforms	02

Second Year: M.Sc. (CA)/(CN)/(CS) and MCA

Subject Type	Subject Code	Subject Title	Number of Credits
Semester – 3 Subject Electives Compulsory	PSC-CA/CS/MCA-1	Advanced Databases and Administration	04
	PSC-CN-1	Network Design and Analysis	For Each Subject
	PSC-CA/CS/MCA-2	Windows Programming	Total
	PSC-CN-2	Switching and Routing	12
	PSC-CA/CS/CN/ MCA-3	Computer Networks	
Subject Electives – compulsory 03 credits	PSC-CA/MCA-4	Software Engineering	03
	PSC-CS-4	Theory of Computations	
	PSC-CN-4	Linux and Network Administration	
Department Elective Courses - Odd Semester	DEC-1	Data Sciences	04
	DEC-2	Cloud Computing	
	DEC-3	Software Metrics and Project Management	
	DEC-4	Digital Image Processing	
	DEC-5	Cyber Forensics and Information Security	
LAB	PSC-CA/CS/MCA-5	Lab 5: Windows Programming	02
	PSC-CN-5	LSB 5: Linux Administration	
	PSC-CA/CS/MCA-6	Lab 6: Advanced Databases and Administration	02
	PSC-CN-6	Lab 6: Switching and Routing	
Open Elective	OE-3	A. Introduction to Open Sources B. Mobile Communications C. Introduction to Linux D. Seminar / Survey / Activity E. Other similar open electives offered by other schools / MOOC/ Swayam / Spoken tutorial platforms	02

Subject Type	Subject Code	Subject Title	Number of Credits
Semester -4 Core Electives Compulsory and Optional	PSC-CA/CS/MCA-7	Introduction to Web Technologies	04
	PSC-CN-7	Network Security and Cryptography	For Each Subject
	PSC-CA/CS/CN-8	Mobile Application Development	Total
	PSC-MCA-8	Management Information System	12
	PSC-CA/CS/CN/MCA-9	Compiler Designing	
Department Elective Courses – Even Semester	DEC-6	Internet of Things (IOT)	04
	DEC-7	Big Data Analytics	
	DEC-8	Natural Language Processing	
	DEC-9	Object Oriented Analysis and Designing	
	DEC-10	Advanced Operating Systems	
LAB	PSC-CA/CS/MCA-10	Lab 7: Web Technologies	02
	PSC-CN-10	Lab 7: Network Security and Cryptography	
	PSC-CA/CS/CN-11	Lab 8: Android Application Development	02
	PSC-MCA-11	Lab 8: Compiler Designing	
Project	PSC-CA/CS/CN-12	Project Development	03
	PSC-MCA-12	Mini Project Development	
Open Elective	OE-4	A. Artificial Intelligence B. Computer Graphics and Multimedia C. Professional Practices D. Other similar open electives offered by other schools / MOOC/ Swayam / Spoken tutorial platforms	02

Third Year: MCA

Subject type	Subject code	Subject title	Number of credits
Semester – 5 Subject Electives Compulsory and Optional	PSC-MCA-13	Mobile Application Development	04
	PSC-MCA-14	Biometrics Methods and Application	04
	PSC-MCA-15	E-Commerce	03
Subject Electives – compulsory 03 credits	PSC-MCA-016	JAVA Programming	04
Department Elective Courses - Odd Semester	DEC-11	Operations Research	04
	DEC-12	Decision Support System	
	DEC-13	Essentials of Management Skills	
	DEC-14	Decision Theory	
	DEC-15	Software Quality Assurance and Testing	
LAB	PSC-MCA-017	Lab 9: Mobile Application Development	02
	PSC-MCA-018	Lab 10: JAVA Programming	02
Open Elective	OE-5	A. Cyber Law and IT Protection B. Computer Application in Business C. Seminar / Survey / Activity D. Other similar open electives offered by other schools / MOOC/ Swayam / Spoken tutorial platforms	02
Semester -6	PSC-MCA-19	Major Project Development	25

Features of CBCS pattern for MCA program

1. Master of Computer Application Post graduate Degree Program are of 150 Credits

2. The subjects offered in these programs are classified as Odd Semester (1 and 3) and Even Semester (2 and 4) subjects

3. Every subject has a unique code associated with it. This code is used during examination process.

4. Each semester shall consist of theory courses, practical courses and one open elective.

5. Normal theory subject / course attract 04 credits (02 internal and 02 external). The further split up is as per CBCS guidelines.

6. The Labs / Practical courses are of 02 credits each (01 internal and 01 external).The further split up is as per CBCS guidelines.

7. Compulsory theory course and project development activity attracts 03 credits

8. Open elective of 02 credits is mandatory from other school in any choice of the semester.

9. Total credits per semester= 25

10. Total Credits of six Semesters= 150

F001: Computer System Organisation

Course Objectives

This course will introduce students to the fundamental concepts underlying modern computer organization and architecture. The emphasis is on studying and analysing fundamental issues in architecture design and their impact on performance.

Course Outcomes

By the end of this course, students should be able to understand the basics of computer hardware and how software interacts with computer hardware, understand how computers represent and manipulate data, and understand basics of Instruction Set Architecture.

Course Contents

Unit 1 Basic Structure of Computers

Functional units, basic operational concepts, Bus structures, Software performance, Memory locations and addresses, Memory operations, Instruction and instruction sequencing Addressing modes, Assembly language, Basic I/O operations, Stacks and queues.

Unit 2 Arithmetic Unit

Addition and subtraction of signed numbers, Design of fast adders, Multiplication of positive numbers, Signed operand multiplication and fast multiplication, Integer division, Floating point numbers and operations.

Unit 3 Basic Processing Unit

Fundamental concepts, Execution of a complete instruction, Multiple bus organization, Hardwired control, Micro programmed control,

Unit 4 Advance Control unit Design techniques

Pipelining, Basic concepts, Data hazards Instruction hazards, Influence on Instruction sets, Data path and control consideration Superscalar operation.

Unit 5 Memory System

Basic concepts, Semiconductor RAMs, ROMs , Speed, size and cost, Cache memories Performance consideration, Virtual memory, Memory Management requirements, Secondary storage.

Unit 6 I/O Organization

Accessing I/O devices, Interrupts, Direct Memory Access, Buses, Interface circuits, Standard I/O Interfaces (PCI, SCSI, USB).

Text Books
1. Computer Organization - Carl Hamacher, ZvonkoVranesic and SafwatZaky, 5th Edition McGraw- Hill, 2002.

Reference Books
1. Computer Organization and Architecture Designing for Performance- William Stallings, 6th Edition, Pearson Education.
2. Computer Organization and Design: The hardware / software interface- David A. Patterson and John L. Hennessy, 2nd Edition, Morgan Kaufmann Press.
3. Computer Architecture and Organization- John P. Hayes, 3rd Edition, McGraw-Hill.

F002: Programming Language Concepts

Course Objectives
This course will cover fundamental concepts of the majority programming languages: techniques for syntax and semantic analysis of programming languages and the major constructs and concepts of procedure, functional and logic languages.

Course Outcome
Students will be able to demonstrate programming language design concepts in a language they learn independently Improve your ability to develop effective algorithms, Improve the use of your existing programming language, Increase your vocabulary of useful programming constructs, Allow a better choice of programming language, Make it easier to learn a new language.

Unit1 The role of Programming Languages.
Introduction to Languages, Basic types of languages (Machine, Assembly, High level Languages),Toward Higher-Level Languages, Programming Paradigms, Language Implementation: Bridge the Gap.

Unit 2 Language Description: Syntactic Structure
Expression Notations, Abstract Syntax Trees, Lexical Syntax : Tokens and Spellings, Context-Free Grammars, Grammars for Expressions, Handling Associativity and Precedence.

Unit 3 Statements: Structured Programming
Need for Structured Programming, Syntax-directed Control Flow (conditional, Looping Construct, for, Selection Case) Design considerations: Syntax, Programming with Invariants.

Unit 4 Types: Data Representation
The role of types, Basic types, Arrays: Sequence of elements, Records: Name Fields, Union and Variant Records, Sets, Pointers

Unit 5 Procedure Activations
Introduction to Procedures, Parameter-Passing Methods, Scope Rules for Names, Nested Scopes in the Source Text, Activation Records, Lexical Scope.

Unit 6 Logic Programming
Computing with relations, Introduction to Prolog, Data Structure in Prolog, Programming Techniques, Control in Prolog, cuts.

Text Books
1. Programming Languages Concepts and constructs- Ravi Sethi, Pearson Education.
2. Concepts of Programming Languages- Robert .W. Sebesta, Pearson Education.
3. Programming Language Design Concepts- D. A. Watt, Wiley Dream Tech.

Reference Books
1. Programming Languages- A. B. Tucker, R. E. Noonan, 2nd Edition, TMH.
2. Programming Languages- K. C. Louden, 2nd Edition, Thomson Press.

F003: Digital Systems and Microprocessors

Course objectives

To understand fundamentals of number system, different number systems and their conversions and truth table, Logic families, binary arithmetic. Understand different types of flip-flops, Understand 8086 Microprocessor, Understand Interfacing of Microprocessor

Course Outcome

Understand and apply knowledge of different codes and number systems to understand different circuits. Understand and design adder substractor circuits and apply flip-flop and counter circuits

Course Content

Unit 1 Number System and Data Representation

Binary, Octal, Decimal and Hexadecimal Number System, their inter-conversions. Binary Codes: BCD, Excess3, Parity, Gray, ASCII and EBCDIC Codes, Their Advantages and Disadvantages.

Unit 2 Binary Arithmetic

Binary Addition, Binary Subtraction, 1's and 2'nd Compliment, Multiplication and Division. Logic Gate Truth Table, Properties And Symbolic Representation Of NOT, AND, OR, NOR, NAND, EX-OR, EX – NOR GATES, NOR and NAND GATES As A Universal Gates.

Unit 3 Boolean Algebra

Laws And Identities Of Boolean Algebra, Demorgan's Theorem, Use Of Boolean Algebra For Simplification Of Logic Expression, Karnaugh Map For 2,3,4 Variable, Simplification Of Sop And Pos Logic Expression Using K-Map.

Unit 4 Combinational / Sequential Circuits

Combinational Circuits Half Adder, Full Adder, Parallel Adder, Half Substractor, Full Substractor, Binary Adder and Substractor, Multiplexer, De-multiplexer, Decoder, Encoder. Sequential Circuits: Introduction: Sequential Circuits. Difference between combinational circuits and sequential circuits Flip- flop: SR, JK, D, T; Presetand Clear, Master and Slave Flip Flops their truth tables and excitation tables.

Unit 5 Introduction to Microprocessor

Architecture Of 8086, Block Diagram Of 8086, Pin Diagram 0f 8086, Minimum And Maximum Mode, Addressing Modes, Instruction Set: Data Transfer, Arithmetic, Logical, String Manipulation, Control Transfer, Unconditional Branch, Conditional Branch, Flag, Processor Control.

Unit 6 Interfacing of Microprocessor

Peripheral Devices, Input – Output interface, Asynchronous Data Transfer (Strobe and Handshaking Method), Modes of Transfer, Priority Interrupt.

Text Books
1. Modern Digital Electronics- R.P.Jain, Tata McGraw Hill
2. Digital Electronics-An introduction to theory and practice- Gothman, PHI Publication.

Reference Books
1. Advanced Microprocessors and peripherals- Ray BhurchandiMc-Graw Hill Pub
2. Digital systems Principles and application- Tocci, Prentice Hall Publication.

F004: Introduction to Databases

Course Objectives
This course is intended to provide an understanding of the current theory and practice of database management systems. The course provides a solid technical overview of database management systems, using a current database product as a case study. In addition to technical concerns, more general issues are emphasized.

Course Outcome
At the completion of this course, students should be able to understand the role of a database management system in organization. Understand basic database concepts, including the structure and operation of the relational data model. Understand Structured Query Language (SQL). And successfully apply logical database principles, including E-R Diagrams, database normalization.

Course Contents
Unit 1 Introduction
Problems in Traditional file oriented approach, Three level architecture of DBMS, basic database components like schema, views, instances, General Architecture of DBMS, Roles of DBA, Data Dictionary, Advantages and Disadvantages of DBMS

Unit 2 DATA Models
Concepts of Abstraction and Data Model, Discussions on data modeling using Entity Relationship model, Discussions on data modeling using Relational Model, E-R to Relational Conversion

Unit 3 Relational Algebra
Basics of Relational Algebra, selection, projection, division, cross product Operators Set Operators, Join and its types, writing Relational Algebra notations for user queries

Unit 4 Basic Normalization
Introduction to attributes, Keys, relationships and their types, Anomalies in databases, understanding Functional Dependencies(Determinant, partial, full, transitive, multi valued, etc), normalization process, First Normal form, Second Normal Form, Third Normal Form etc.

Unit 5 Advance Normalization
Boyce-Codd Normal Form, Fourth Normal Form, Fifth Normal Form.

UNIT 6 SQL
Introduction to data retrieval languages like QBE, QUEL, SQL Discussions on SQL, Table , View Definitions ,DDL Statements, DML Statements, DCL Statements , TCL statements , SQL Functions ,Introduction to PL/SQL , Cursors.

Text Books:
1. Database Management Systems- Raghu Ramakrishnan, Johannes, Gehrke, Tata McGraw Hill.
2. Database System Concepts- Silber Schatz Korth, Tata McGraw Hill.

Reference Books:
1. Fundamental of Database System- Sham Kanth B. Navathe, Pearson Education.
2. Introduction to Database management System- Bipin Desai, Galgotia Publications.
3. Oracle Development Language Oracle PL/SQL Programming, Steven Feuerstein , O'Reilly
4. ORACLE documentations on ORACLE PRESS / Internet.

F005: Mathematical Foundations of Computer Science

Course Objectives

Cultivate clear thinking and creative problem solving. Thoroughly train in the construction and understanding of mathematical proofs. Exercise common mathematical arguments and proof strategies.

Course Outcomes

At the end of the course student will be able to Understand the notion of mathematical thinking, mathematical proofs and to apply them in problem solving. Ability to understand use of functions, graphs and their use in programming applications. Apply discrete structures into computing problems, formal specification, artificial intelligence, cryptography, Data Analysis.

Unit 1

Sets, Venn diagrams, Operations on Sets, Laws of set theory, Power set and Products, Partitions of sets, The Principle of Inclusion and Exclusion

Unit 2

Propositions and logical operations, Truth tables , Equivalence, Implications ,Laws of logic, Normal Forms, Predicates and Quantifiers, Mathematical Induction

Unit 3

Relations, Paths and Digraphs, Properties and types of binary relations , Operations on relations, Closures, Warshall"s algorithm, Equivalence and partial ordered relations, Poset, Hasse diagram and Lattice ,Functions: Types of functions - Injective, Surjective and Bijective Composition of functions , Identity and Inverse function, Pigeon-hole principle

Unit 4

Permutations, Combinations, Elements of Probability, Discrete Probability and Conditional Probability, Generating Functions and Recurrence Relations, Recursive Functions, Introduction to Functional Programming

Unit 5

Graphs Definitions, Paths and circuits: Eulerian and Hamiltonian, Types of graphs, Sub Graphs Isomorphism of graphs

Unit 6

Algebraic structures with one binary operation: semigroup, monoid and group, Abelian group Isomorphism, Homomorphism and Automorphism, Cyclic groups, Normal subgroups, Codes and group codes

Text Books:
1. Discrete Mathematical Structures- Bernad Kolman, Robert Busby, Pearson Education.
2. Discrete Mathematical Structures- C. L. Liu, Second Edition, McGraw-Hill Book Company.
3. Discrete Mathematics and applications- K. H. Rosen, Tata McGraw Hill publishing Company

Reference Books:
1. Discrete Mathematical Structures- Y N Singh, Wiley-India Press.
2. Discrete Mathematics for Computer Scientists and Mathematicians- J. L. Mott, A.Kandel, Prentice Hall of India.
3. Discrete Mathematical Structures with Applications to Computer Science- Discrete Mathematics for Computer Scientists and Mathematicians, Tata Mcgraw-Hill.

F006: LAB Course- Digital Electronics and Microprocessor

Lab Course objectives:
The main lab objectives are to get familiar with the functioning of hardware components which are fundamental building blocks of computer. The first part of lab will introduces with fundamental digital logic design principles. The second part is focusing on the assembly language programming in 8086 microprocessor with assembler.

PART A

    A.   **Familiarization of digital ICs and digital IC Simulator**
        1. Verification of truth tables
    B.   **Study of combinational circuits**
        2. Verification of De Morgan's theorem, the postulates of Boolean algebra and
        3. Realization of Sum of Product and Product of Sum expression using universal gates
    C.   **Adders and Subtractor**
        4. Half adder and Half Subtractor
        5. Full adder and Full Subtractor
    D.   **Digital comparator, Parity generator and checker, and Code converters**
        6. Single bit digital comparator
        7. Odd parity generator and checker
        8. BCD to Excess-3 code converter
    E.   **Flip flops using gates and familiarization of ICs**
    F.   **Multiplexer, De-multiplexer, Shift registers and Counters**
        9. Multiplexer and De-multiplexer using gates
       10. Shift registers
       11. Ring counter and twisted ring (Johnson) counter
       12. Asynchronous UP and DOWN counter
       13. Variable modulo asynchronous counter (Decade counter)

PART B
Write and simulate following programs in assembly language of 8086
Program 1: 8- bit Subtraction
Program 2: 8- bit Division
Program 3: Palindrome
Program 4: Ascending order
Program 5: Descending order
Program 6: 16- bit Addition
Program 7: BCD to binary conversion
Program 8: Binary to BCD conversion
Program 9: Addition of a series of numbers
Program 10: 8- bit Multiplication
Program 11: Largest number in a list
Program 12: Stepper Motor
Program 13: Traffic Light
Program 14: LCD
Program 15: 7 Segment display
Program 16: Generation of Waveforms

F007: LAB Course- DBMS-SQL

Lab Course objectives:
After completing the lab course students will be familiar with basic database functionality

1. Creating database objects

2. Modifying database objects

3. Manipulating the data

4. Retrieving the data from the database server

5. Performing database operations using queries

6. Performing database operations (create, update, modify, retrieve, etc.,) using front-end tools

7. Design and Develop applications like banking, reservation system, etc.,

8. To create a DDL to perform creation of table, alter, modify and drop column.

9. To create a view for the purpose of display in order to hide the data.

10. Study of DCL extensive feature in order to safeguard information stored in its tables from unauthorized viewing and damage.

11. To create a single row functions.

12. Study of PL/SQL features

13. To Perform Banking Operations Using Procedures

14. To carryout payroll application using procedures

15. To write an algorithm to perform database connectivity using MS Access.

OE-1 A: Programming in C

Course Objectives
This course provides a complete introduction to programming in C, including both ANSI C and Kernighan and Ritchie C. In addition to covering basic syntax and semantics, the course emphasizes problem solving methodology and modular programming techniques.

Course Outcome
Upon successful completion of this course, students will understand the facility in using common programming constructs, including loops and conditionals; Facility in performing stream input/output; Facility in incorporating auxiliary libraries into a C program.

Course Contents
Unit 1
What is a Programming Language , What is a Compiler, C Syntax and Constructs Writing C Programs

Unit 2
Gearing up with logic and algorithms, flowcharts. Building logic for writing C Programs.

Unit 3
Basic input and Output in C , variables, declarations, operators, functions

Unit 4
Steps to Compiling a Program , Compilation Phases, Multi-File Compilation, Header Files The Standard Library

Unit 5
The Linking Process Control structures and Loops Pointers, Addresses and Memory

Unit 6
Passing Parameters by Address, Arrays, Address Structures, Pointers and Arrays

Text Books
1. The C Programming Language- Brian W. Kernighan, Dennis M. Ritchie, 2nd edition, Prentice Hall Software Series.

Reference Books
1. The Complete Reference by Herbert Schildt, McGraw Hill Publications.
2. Programming in ANSI C by E Balagurusamy, McGraw Hill Publications.
3. Let Us C by Yashavant Kanetkar, BPB Publications.

OE-1B: Communication Skills

Course Objectives
This course encourage the all round development of students by focusing on soft skills. This course makes the students aware of the importance, the role and the content of soft skills through instruction, knowledge acquisition, demonstration and practice.

Course Outcome
The coverage of soft skills that help develop a student as a team member, leader, all round professional in the long run have been identified and listed here for reference. As the time allotment for the soft kills laboratory is small and the fact that these skills are nurtured over years, students are encouraged to follow up on these skills as self-study.

Course Contents
Unit 1
Verbal and Nonverbal Spoken Communications, Public speaking, Group discussions, Oral Presentation skills, Perfect interview, listening and Observation skills, Body language, Use of presentation graphics, Use of presentation aids, study of Communication barriers.

Unit 2
Written Communications, Technical writing: technical reports, project proposals, brochures, newsletters, technical articles, and technical manuals. Official / business correspondence:

Unit 3
Business Letters, Memos, Progress Reports, Minutes of Meeting, Event Reporting. Use of: Style, Grammar and Vocabulary for effective Technical Writing. Use of: Tools, Guidelines for Technical Writing, Publishing.

Unit 4
Leadership Skills and Interpersonal Communications, Leaders: their skills, roles, and responsibilities. Vision, Empowering and delegation, motivating others, organizational skills, Problem solving and conflict management, team building, Interpersonal skills.

Unit 5
Organizing and conducting meetings, decision making, giving support, Exposure to work environment and culture in today's job places, improving personal memory,

Unit 6
Study skills that include Rapid Reading, Notes Taking, Self-learning, Complex problem solving and creativity. Business Ethics, Etiquettes in social as well as office settings, E-Mail Etiquettes, Telephone Etiquettes, Engineering Ethics and Ethics as an IT Professional, Civic Sense

Text Books
1. Technical Communications- Raman, Sharma, Oxford Press.
2. Technical Writing process and product- Sharon Gerson, Steven Gerson", Pearson Education Asia, LPE Third Edition.

Reference Books
1. Technical writing and Professional Communications for Non-native speakers of English- Thomas Huckin, Leslie Olsen, McGraw Hill.
2. Organizational Behavior - Newstrom, Keith Davis, Tata McGraw Hill.

OE-4C: Seminar/ Survey/ Activity

Guidelines for Seminar
1. Students need to confirm Seminar Topic with consent of guide
2. Student should submit the seminar report in hard copy (spiral binding) and Soft Copy (Report + Presentation) as per the guideline below
    2.1 Introduction of Seminar Topic
    2.2 Abstract of study
    2.3 Survey/Analysis
    2.4 Detail Study
    2.5 Results
    2.6 Conclusion
    2.7 References
2. Student should Give Presentation (With PPT)

Guidelines for Survey
1. Students need to finalize Survey topic with consent of guide
2. Student should submit Survey Report in Hard Copy (Spiral Binding) and Soft Copy (Survey Report + Presentation) as per the guidelines below
    2.1 Introduction of Survey Topic
    2.2 Abstract of Survey
    2.3 Analysis with Expected Population and Sample size
    2.4 Detail study/ Comparison
    2.5 Results
    2.6 Conclusion
    2.7 References
    2.8 Annex- collected samples (evidences)
3. Student should Give Presentation (With PPT)

    Any other Activity Suggested by Teacher/ Mentor/ Guide

OE-1D:
(Other Similar Open Electives offered by other Schools / MOOC/ Swayam / Spoken tutorial platforms)

Students can choose one of these open electives. But they need to take prior permission from School Director before joining one of these elective courses. \they must produce successful completion certificate / credits earned to the School after completing the underwent course.

C001: System Analysis and Design

Course Objectives

System analysis helps in discovering means to design systems where sub-system may have apparently conflicting objectives. It helps in achieving inter compatibility and unity of purpose of sub-systems. It offers a means to create understanding of the complex structures.

Course Outcome

After successfully completing this course, students will understand concepts of Analysis and Designing Information Systems. Students will understand writing system proposals, system development scheduling, and cost-benefits analysis etc. also dealing with quality assurance.

Course Contents

Unit 1

System Definition, Characteristics, Elements and Types of system, Need of System Analysis and design, Role and Qualities of System Analyst, System Development Life Cycle

Unit 2

Project Initiation, Feasibility study, Ascertaining HW/SW needs, Criteria for HW/SW selection, Make v/s Buy Decision, Cost Benefit Analysis

Unit 3

Structured Analysis tools- DFD, Data Dictionary, Decision Tree, Decision Table, Structured English, Activity planning control, Activity Diagrams, Case modeling, UML, Class Diagram

Unit 4

System Proposal, Project Scheduling, Information Gathering Tools- Interviews, Questionnaire, JAD, Prototyping

Unit 5

System Design, Input/output Design, From Design, Database Design, File organization

Unit 6

System Implementation Plan, Activity Network for Conversion, Combating Resistance to Change, System Testing, Test Plan AND test data, Types of System Test, Quality Assurance, Documentation

Text Books
1. System Analysis and Design- Kendall and Kendall, Pearson Education, Inc., Prentice Hall.

Reference Books
1. System Analysis and Design- E. M. Awad, Galgotia Publications Pvt. Ltd
2. Modern System Analysis and Design - Jeffrey A. Hoffer, Prentice-Hall, Inc.

C002: Data Communications

Course Objectives:
This course is organized into categories like data transmission and communication; communications networks; network protocols. The main aim of the course is to make student familiar with current communication technology available and how it works.

Course outcomes:
It explains the importance of data communications and the Internet in supporting business communications and daily activities. It also explains how communication works in data networks and the Internet. Recognize the different internetworking devices and their functions. Explain the role of protocols in networking. Analyse the services and features of the various layers of data networks. Students are expected to have basic knowledge of algorithms and reasonable programming experience. The familiarity with mathematics will be an advantage for various concepts.

Unit 1
Introduction to Communications Model, Data Communications, Networks, The Internet, An Example Configuration, The Need for a Protocol Architecture, The TCP/IP Protocol Architecture, The OSI Model, Standardization Within a Protocol Architecture, Traditional Internet-Based Applications, Multimedia.

Unit 2
Data transmission, Concepts and Terminology, Analog and Digital Data Transmission Transmission Impairments, Channel Capacity

Unit 3
Transmission media, Guided Transmission Media, Wireless Transmission, Wireless Propagation, Line-of-Sight Transmission

Unit 4
Digital Data communication techniques, Asynchronous and Synchronous Transmission, Types of Errors, Error Detection, Error Correction, Line Configurations

Unit 5
Data link Control protocols, Flow Control, Error Control, High-Level Data Link Control (HDLC)

Unit 6
Frequency Division Multiplexing, Synchronous Time Division Multiplexing, Statistical Time Division Multiplexing, Asymmetric Digital Subscriber Line,xDS

Text Book:
  1. Data and Computer Communications- William Stallings, 8th Edition Pearson Publication.
Reference books:
  1. Data Communications and Networking, Behrouz A. Forouzan, 2nd Edition, McGraw Hill Publication.

C003: Operating System Concepts

Course Objectives:
To understand the main components of an OS and their functions. To understand the working of an OS as a resource manager, file system manager, process manager, memory manager and I/O manager and methods used to implement the different parts of OS. To understand the concepts and implementation of virtual memory. To understand various issues in Inter Process Communication (IPC) and the role of OS in IPC.

Course Outcomes:
To understand and learn important computer system resources and their management policies, algorithms used by operating systems. To understand what makes a computer system function and the primary PC components. To understand the working of an OS as a manager of various resources. To understand and implement some of the functions of OS such as scheduling policies, page replacement algorithms, IPC.

Course Content

Unit 1 Overview of Operating system
Operating system objectives and functions, Evolution of OS, Characteristics of modern OS, Basic concepts: Processes, Files, System calls, Shell, Kernel architectures: Monolithic, Micro-kernel, Layered, Kernel mode of operations.

Unit 2 Process Management
Process description: Process, Process States, Process Control Block (PCB), Threads, Thread management. Process Scheduling: Types, Comparison of different scheduling policies.

Unit 3 Process Co-ordination
Principles of Concurrency, Race condition and critical section, Mutual Exclusion- Hardware and Software approaches, Semaphores, Monitors, Message Passing, Producer Consumer Problem. Deadlock: Principles of Deadlock, Deadlock Detection, Deadlock Avoidance, Deadlock Prevention.

Unit 4 Memory Management
Memory Management Requirements, Memory Partitioning, Virtual memory: Paging; Segmentation; Page replacement policies, page faults

Unit 5 Input Output Management
I/O Devices, Organization of the I/O Function, Operating System Design Issues, I/O Buffering, Disk Scheduling and disk scheduling algorithms, Disk cache.

Unit 6 File Management
Overview, File Organization, File Sharing; Record Blocking; Secondary Storage Management.

Text Books
1. Modern Operating Systems, Andrew S. Tanenbaum, III rd Edition, PHI Publication.
2. Operating System-Internal and Design Principles, William Stallings, Pearson Education.

Reference Books
1. Operating Systems Concepts- Silberschatz A., Galvin P., Gagne G, Wiley Publication.
2. Principles of Operating Systems-Naresh Chauhan, First Edition, Oxford University press.
3. Operating Systems in Depth- Thomas W. Doeppner, Wiley Publications..
4. Operating System Programming and Operating Systems- D M Dhamdhere, 2nd Revised Edition, Tata McGraw.

C004: Elementary Data Structures and Algorithms

Course Objectives:
Study basic concepts and methods of data structure. Study common applications of each of the data structures. Implement user defined data structures in a high level language. Develop the ability to compute time complexities of algorithms. Develop ability to design data structures for various applications

Course Outcome:
At the end of the course, students Are able to distinguish between the different elementary types of data structures (arrays and linked lists) and explain their unique properties and to implement stacks and queues programmatically using elementary data structures. Are able to construct binary tree structures and understand how their managing utilities (e.g., tree traversal, insertions, and deletions) work.

Unit 1 Introduction to Algorithm
Data, Variables (Local and Global), Data types, arrays Introduction to Algorithm, The efficiency of Algorithms, Analysis of Algorithms, overview of Space and Time Complexities, some fundamental algorithms for exchange , counting , summation .

Unit 2 Introduction to data structures
Introduction to data structures, Basic terminology, Primitive data structure operations
Overview of STACKS, QUEUES, LINKED LISTS, BINARY TREES and GRAPHS (Basic Definition , Representations, Characteristics , Types, Applications)

Unit 3 Tree and Graph
Minimum Spanning Trees, Growing a minimum spanning tree, The algorithms of Kruskal and Prim Graphs : DFS and BFS algorithms associated with Graphs, Single-source shortest Paths, The Bellman-ford algorithm,

Unit 4 Sorting and Searching
Introduction to searching and sorting problems, Linear search , Binary search, Selection sort , Bubble sort , Insertion sort , Merge sort, Complexities of searching and sorting algorithms.

Unit 5 Divide and Conquer Techniques
Divide and conquer, General method, Binary search, Merge sort, Strassen's matrix multiplication

Unit 6 Advanced Data Structure
Introduction to Greedy method, The general method, Container loading knapsack problem,
Introduction to Dynamic Programming, General method, Introduction to NP Theory.

Text Books
1. Fundamentals of Computer Algorithms- Ellis Horowitz, Satraj Sahani, University Press.

Reference Books
1. How to solve it by Computers- R.G. Dromey , 8th Edition , Pearson Education.
2. Data Structures, Lipschutz , Tata McGraw Hills.

C005: Object oriented Programming Languages

Course Objectives
At the end of the course, we expect student to have a good understanding about the concept of object-oriented programming using C++, and to be able to write and read basic C++ program.

Course Outcomes
Students will be able to study the basic concepts of Object oriented Programming. Students will be able to write programs in C++.

Course Contents
Unit 1 Introduction :
Concept, Benefits and Application of OOP, Structure of C++ Programming, Tokens, expressions and control structures keywords, identifiers, data types and operators in C++.

Unit 2 Functions in C++
Main Function, Function Prototyping, Call by reference, Return by reference, Inline Functions, Default arguments, Function overloading, Friend and Virtual functions.

Unit 3 Class and Objects
Classes, Specifying a class, Defining Member Functions, Making outside function inline, Nesting of Member Functions, private member functions, Arrays within a class, Friend classes, Static class members, Nested classes, Memory allocation for objects, Array to objects, Objects as function arguments.

Unit 4 Constructors and destructors
Constructors, Parameterized constructors, Multiple constructors in a class, constructors with default arguments, Dynamic initialization of objects, Copy constructors, dynamic constructors, Destructors.

Unit 5 Operator overloading and Type conversion
Defining operator overloading, overloading unary operators, overloading binary operators, overloading binary operators using friends, Manipulation of Strings using operators, Type conversions.

Unit 6 Inheritance, Pointers, Virtual functions and Polymorphism
Single, Multilevel multiple, hierarchical and hybrid inheritance, Virtual base classes, Abstract classes, Pointer to objects, pointer to derived class.

Text Books
1. Object Oriented Programming in C++ - Robert Lafore, Techmedia Publication.
2. C++ The Complete Reference– Herbert shield, Tata McGraw Hill Publication.
3. Object Oriented Programming in C++ - Saurav Sahay, Oxford University Press.
4. Object Oriented Programming in C++ - R Rajaram New Age International Publishers.

Reference Books
1. Object Oriented Programming with C++ - E. Balaguruswamy, Tata McGraw Hills.
2. A Treatise on Object Oriented Prog. Using C++ - B. Chandra, Narosa Publishing House.
3. Serial communication-A C++ developers guide – Nelson, M&T Press.

C006- LAB-3: Data Structures and Algorithms

Lab Course Objectives:
The main objectives of Lab course is to study implementation aspects of data structures and algorithms

1. Singly Linked Lists
   - Purpose
   - Brief Theory Reminder, Operations on a Singly-linked List.
2. Circular Singly Linked Lists
   - Purpose
   - Brief Theory Reminder, Operations on a Circular Singly-linked List
3. Doubly Linked Lists
   - Purpose
   - Brief Theory Reminder, Operations on a Doubly Linked List
4. Trees
   - Purpose
   - Brief Theory Reminder
   - Operations on Binary Trees
   - Completely Balanced Binary Trees
   - Arbitrary Trees
5. Binary Search Trees
   - Purpose
   - Brief Theory Reminder
   - Code Samples
6. Hash Tables
   - Purpose
   - Brief Theory Reminder
7. Graph Representations and Traversals
   - Purpose
   - Brief Theory Reminder
8. Graph Processing Algorithms
   - Purpose
   - Brief Theory Reminder
   - Minimum Spanning Tree
9. Algorithm Design. Greedy and Backtrack
   - Purpose
   - Brief Theory Reminder
10. Algorithm Design. Divide and Conquer and Branch and Bound
    - Purpose
    - Brief Theory Reminder
11. Algorithm Design. Dynamic Programming and Heuristics
    - Purpose
    - Brief Theory Reminder
12. Fundamental Sorting Algorithms
    - Purpose
    - Brief Theory Reminder
    - Sorting Algorithms Example Implementations

C007- Lab-4: Object Oriented Programming using C++

Lab Course Objective

At the end of the course students should be familiar with the main features of the C++ language. Be able to write a C++ program to solve a well specified problem. Understand a C++ program written by someone else. Be able to debug and test C++ programs. Understand how to read C++ doc library documentation and reuse library code. To make the students understand the features of object oriented principles and familiarize them with virtual functions, templates and exception handling. To make the students to develop applications using C++.

1. Write a program to enter mark of 6 different subjects and find out the total mark (Using cin and cout statement)
2. Write a function using reference variables as arguments to swap the values of pair of integers.
3. Write a inline function to find largest of three numbers.
4. Write a program to find the factorial of a number using recursion.
5. Define a class to represent a bank account which includes the following members as Data members: a) Name of the depositor b)Account Number c)Withdrawal amount d)Balance amount in the account Member Functions: a) To assign initial values b)To deposit an amount c) To withdraw an amount after checking the balance d) To display name and balance.
6. Write the above program for handling n number of account holders using array of objects.
7. Write a C++ program to compute area of right angle triangle, equilateral triangle, isosceles triangle using function overloading concept.
8. Write a C++ program to swap the values two integer members of different classes using friend function.
9. Write a C++ program for addition of two complex numbers using friend function (use constructor function to initialize data members of complex class)
10. Define a class string and overload to compare two strings and + operator for concatenation of two strings.
11. Write a program for overloading of Unary ++ operator.
12. Define two classes polar and rectangle to represent points in the polar and rectangle systems. Use conversion routines to convert from one system to the other.
13. Write a C++ program to perform matrix addition using operator overloading concept.
14. Consider a publishing company that markets both book and audio cassette version to its works. Create a class Publication that stores the title (a string) and price (type float) of a publication. Derive the following two classes from the above Publication class: Book which adds a page count (int) and Tape which adds a playing time in minutes (float). Each class should have get_data() function to get its data from the user at the keyboard. Write the main() function to test the Book and Tape classes by creating instances of them asking the user to fill in data with get_data() and then displaying it using put_data().
15. Consider an example of declaring the examination result. Design three classes student, exam and result. The student has data members such as rollno, name. Create the lass exam by inheriting the student class. The exam class adds data members representing the marks scored in 5 subjects. Derive the result from exam-class and it has own data members like total, avg. write the interactive program into model this relationship.
16. Create a base class called shape, Use this class to store two double type values that could be used to compute the area of figures. Derive two specific classes called triangle and rectangle from the base shape. Add tp the base class, a member function getdata() to initialize base class data members and another member function display_area() to

compute and display area of figures. Make display_area() as a virtual function and redefine the function in the derived class to suit their requirements.

17. Using these three classes, design a program that will acdept dimensions of a triangle or a rectangle interactively and display area.

18. Write an interactive program to compute square root of a number. The input value must be tested for validity. If it is negative, the user defined function my_sqrt() should raise an exception.

19. Write a c++ program to find maximum of two data items using function template.

20. Write a class template to represent a generic vector. Include member functions to perform the following task a) To create a vector b)Sort the elements in ascending order c) Display the vector

21. Write a program in C++ that illustrates the mechanism of validating array element references.

22. Write a c++ program for matrix multiplication with following specifications. a)Use constructor dynamic memory allocation for matrix b)Use getdata() function to input values for matrix c) Use show( ) to display the matrix d)Use mul() to multiply two matrices

23. Modify the above program as follow a) Use operator*() for matrix multiplication instead of mul( ) b)Make operator*() as friend function

24. Run the above program with following modification a)Make shape class as abstract class with display area() as pure virtual function b) Use constructor function to initialize the data members of base class not through the getdata().

25. To perform the write operation within a file.

26. Program for read the content of a file.

OE2-A: Programming in Java

Course Objectives

The objective of this course is to cover issues related to the definition, creation and usage of classes, objects and methods. Discuss the principles of inheritance and polymorphism and demonstrate though problem analysis assignments how they relate to the design of methods, abstract classes and interfaces.

Course Outcomes

Students completing the course should know: The model of object oriented programming abstract data types, encapsulation, inheritance and polymorphism. Fundamental features of an object oriented language like Java.

Course Contents

Unit-1 Introduction to java:

History, Features, How java differ from C and C++?, Java program structure, Java tokens, Java Statements, Java virtual machine, Command line arguments, Constants, Variable, Data types, Type casting.

Unit-2 Operators and Expression

Decision making and branching, Decision making and looping, Class, Methods, Objects, Constructors, Method overloading, Static members, nesting of methods

Unit-3 Inheritance

Overriding methods, Final variables, Final methods, Final Classes, Finalizer method, Abstract methods, Abstract Classes, Visibility Control, Interface, Arrays, Strings, Vectors, Wrapper Classes.

Unit-4 System packages:

Naming conventions, Creating and accessing packages, Introduction to multithreaded programming, Creating and extending threads, Life cycle of thread, Thread exception, Thread priority, Synchronization, Implementing Runnable interface, Types of errors, Exceptions, Exception handling code, Multiple catch statements, finally statement, Throwing our own exceptions, Exception for debugging.

Unit –5 Introduction to applet

How applet differ from application?, Applet code, Applet life cycle, Creating an executable applet, designing a web page, Applet tag, Passing parameter to applet,

Unit 6 the graphic class

Lines, Rectangles, Circles, Ellipses, Arcs, Polygons, Line graphs, Bar charts, Control loops in applet

Text Books
1. Programming with Java A Primer – E.Balaguruswamy, McGraw Hill.
2. Java 7 Programming Black Book -Kogent Learning Solutions Inc,DreamTech press

Reference Books
1. Java Fundamentals A comprehensive introduction- Herbert Schildt, Dale Skrien, McGraw Hill Education.
2. The Complete Reference, Java 2 -, Herbert Schild, (Fourth Edition) - TMH.
3. Core Java Volume-I Fundamentals- Horstmannand Cornell, - Pearson Education.

OE-2B: Information Communication Technology (ICT)

Course Objectives:
The Information and Communication Technology is Open elective course. This syllabus is developed according to the concepts of skills required in all most all domains. This course offers deep understanding of ICT usage and its applications, which enable students to meet their individual needs.

Course Outcomes:
This course will developed technical, practical, personal and organizational skills in students. This course benefits students to meet their personal as well as global needs according to ever growing challenges in ICT.

Course Contents

Unit 1 Computer Fundaments
Information processing Cycle, Brief History of Computers, Environmental, social and ethical issues, laws of ICT, Organizations of Computer System, Introduction to Operating Systems, measures to protect data and systems

Unit 2 Application Software
Advance Word Processing, working with styles, templates, forms, Advance Spreadsheets, working with multiple worksheets and workbooks, advance functions, Making presentations, working with multimedia presentations

Unit 3 Database
Working with data, tables, and relationships, creating and customising queries, customising forms, creating reports

Unit 4 Information and Communication systems
Information systems, networking concepts, functions of network devices, cabling standards, firewall, networking protocols, network security

Unit 5 Internet Terminology
Web Fundamentals, Web Security, Communication protocols, creating web pages, working with images and multimedia, working with special effects

Unit 6 Applications of ICT
Career options in ICT, Job search on Internet and other media, Formatting Resume or CVs, Formatting Application Letters, working with publications

Text Books
1. Computer Fundamentals, Ms Office and Internet and Web Technology- Dinesh Maidasani, Firewall Media.
2. Computer Fundamentals- Anita Goel, Person Education.
3. Computer Fundamentals- P. K. Sinha, EduTech Learners.

Reference Books:
1. MS Office for Dummies- Wallace Wang, Wiley Publishing, Inc.
2. Ms Office Step by Step- John Lambert, Microsoft Press.
3. Access Bible - Michael Alexander, Wiley Press.
4. Fundamentals of Computer Networking - Sanjay Sharma, Katson Press.

OE-2C: Seminar/ Survey/ Activity

Guidelines for Seminar
1. Students need to confirm Seminar Topic with consent of guide
2. Student should submit the seminar report in hard copy (spiral binding) and Soft Copy (Report + Presentation) as per the guideline below
   2.1 Introduction of Seminar Topic
   2.2 Abstract of study
   2.3 Survey/Analysis
   2.4 Detail Study
   2.5 Results
   2.6 Conclusion
   2.7 References
3. Student should Give Presentation (With PPT)

Guidelines for Survey
1. Students need to finalize Survey topic with consent of guide
2. Student should submit Survey Report in Hard Copy (Spiral Binding) and Soft Copy (Survey Report + Presentation) as per the guidelines below
   2.1 Introduction of Survey Topic
   2.2 Abstract of Survey
   2.3 Analysis with Expected Population and Sample size
   2.4 Detail study/ Comparison
   2.5 Results
   2.6 Conclusion
   2.7 References
   2.8 Annex- collected samples (evidences)
3. Student should Give Presentation (With PPT)

   Any other Activity Suggested by Teacher/ Mentor/ Guide

OE-2D:
(Other Similar Open Electives offered by other Schools / MOOC/ Swayam / Spoken tutorial platforms)

Students can choose one of these open electives. But they need to take prior permission from School Director before joining one of these elective courses. \they must produce successful completion certificate / credits earned to the School after completing the underwent course.

PSC-CA/CS/MCA-1: Advanced Databases and Administration

Course Objectives
This course is intended to provide comprehensive understanding of the advances and administrations practices in database management systems. The course provides a solid technical overview of roles and responsibilities of DBA in an organisation. These include concurrency, recovery, performance, warehouses.

Course Outcome
At the completion of this course, students should be able to understand the role of a database management system in an organization. Design and implement a small database project using latest platform. Understand the concept of a database transaction and related database facilities, including concurrency control, journaling, backup and recovery, and data object locking and protocols.

Course Contents
Unit 1
Review of the fundamental principles of database management systems, relational databases and SQL, Query processing and query optimisation.

Unit 2
Transaction management: ACID properties, Concurrency control, Recovery.

Unit 3
Beyond records and objects: stored procedures and functions, triggers, semantic technologies.

Unit 4
Distributed databases data fragmentation and replication, distributed query processing, distributed transaction management, Parallel databases, components, performance issues, standard architectures, Data Warehouse technology

Unit 5
Introduction, Installation, contemporary database Server and its Management Studio , Database Administration, Managing Server Security , Manipulating Schemas, Tables, Indexes, and Views

Unit 6
Dealing with Indices, constraints and partitions, Replication, Implementing Replication, Back Up and Recovery, Database Automation and Maintenance

Text Books
1. Database Management Systems- R. Ramakrishnan and J.Gehrke, 3rd Edition, McGraw Hill
2. Database System Concepts- A.Silberschatz, H.F.Korth and S.Sudarshan, 6th Edition, McGraw-Hill

Reference Books
1. Principles of Distributed Database Systems - M.T.Oszu and P.Valduriez, Springer,
2. Management of Heterogeneous and Autonomous Database Systems- A.Elmagarmid, M.Rusinkiewicz and A.Sheth (eds), Morgan Kaufmann, Oracle Press Books.

PSC-CN-1: Network Design and Analysis

Course Objectives

The primary objective of this course is to give students an understanding of how to design, manage and secure a computer network. It further examines how network managers and system admin can strategically use different techniques to capture and analyze network and system data to create a competitive advantage.

Course Outcomes

Completing this course student will understand Network design and implementation of Network operations and management, Network Monitoring and reporting, Traffic analysis and maintaining Security

Course Contents

Unit 1 – Introduction

This Unit introduces the course, Networking Basics, networking terminology, common physical and logical topologies, networking architectures and protocols, network connections, and the Open Systems Interconnection (OSI) model.

Unit 2 – Cables and Connectors

Twisted pair, coaxial and fibre optic cabling, standards, specifications, and components used for wiring implementation. Networking Devices, adapters, routers, firewalls, and layer3 switches.

Unit 3 – Ethernet

Ethernet architecture, specifications, network devices connection. Network Implementation, IP addressing, assigning IP addresses, mapping logical host names to IP addresses, routing, and accessing the Internet,.

Unit 4 – Wireless Networking

radio frequency wireless network, Networking architecture, infrastructure, and wireless standards (802.11, Infrared, and Bluetooth). Implement security on a wireless network; configure a wireless network, Wide Area Networks (WANs), (WAN) technologies, structure, and services.

Unit 5 – Network Security

Various network threats. firewall, a Virtual Private Network (VPN), and switch features to enhance security. Authentication and encryption for the network. An Intrusion Detection System (IDS) and network monitoring tools. Network Management, components of network management. SNMP, remote management, network monitoring tools, and elements to optimize the performance of the network.

Unit 6 – Troubleshooting

systematic methodology for troubleshooting, tools to troubleshoot network connectivity problems, and commands to gather network information and troubleshoot IP configuration problems. troubleshoot name resolution, switching and routing problems.

Text Books
1. Data Networks- D. Bertsekas and R. Gallager, Prentice-Hall,
2. Computer Networks: A Systems Approach- L. Peterson and B. Davies, McGraw Hill.

Reference Books
1. Computer Networks- A. S. Tanenbaum, 4th edition, Prentice Hall.
2. Introduction to Probability Models - S. Ross, 9th edition, Elsevier Press.
3. Queueing Systems Volume 1: Theory - L. Kleinrock, Wiley Publications.

PSC-CA/CS/MCA-2: Windows Programming

Course Objectives:
Windows Programming explores the fundamentals of structured design, development, testing, implementation, and documentation of application development in windows environment. It includes language syntax, data and file structures, input output tools, etc. the course will also emphasize Object Oriented Programming concepts like encapsulation (creating classes and instances), inheritance (defining classes the inherit data and/or methods from existing classes) and polymorphism (overriding base-class methods in derived classes).

Course Outcomes:
The student will use Visual Basic.Net to build Windows applications using structured and object-based programming techniques. Students will be exposed to analyze program requirements, Design/develop programs with GUI interfaces, Code programs and develop interface using Visual Basic.Net, Perform tests, resolve defects, and revise existing code.

Course Contents:
Unit-1 Introduction to Windows Programming
Need for Windows Programming, Advantages and Disadvantages of Windows Programming, Event Oriented Programming, Introduction to .NET concepts, .Net Framework, CTS, CLS, CLR, MSIL

Unit-2 Exploring IDE
Working with Development Environment, IDE Navigation, Interface Design, Understanding Tools, Controls, and Events, Understanding Programming concepts

Unit-3 Control Structures
Conditional Expressions, Decision Structures, Looping Constructs, working with Procedures

Unit-4 Functions
Introduction to Functions, Inbuilt Functions, String Functions, Math Functions, Formatting Function, Date and Time Function, User Defined Function

Unit-5 Advance Controls
Working with Menus, Advance interaction controls, Error Handling, Working with Files, Graphics, Working with Arrays, Dimensions of Arrays

Unit-6 Database Access
ADO.NET, Dataset, Database Connections, Database tools, Data Grid view Control

Text Books
1. The Complete Reference Visual basic .NET- Jeffrey R. Shaprio, McGraw Hill.
2. Mastering Visual Basic 2010- EvangelosPetroutsos, Sybex Publications.

Reference Books:
1. Programming Windows - Charles Petzold, Microsoft Press
2. Visual Basic Programming Black Book- Steven Holzner, Dream-Tech Press

---

PSC-CN-2: Switching and Routing

Course Objectives
As Enterprises migrate toward controller based architectures, the role and skills required of a core network engineer are evolving and more vital than ever. To prepare for this network transition, but ensure that they stay relevant with skill sets needed for the adoption.

Course Outcomes
This course let students understand the concepts of Switching and Routing. It will make student to be familiar with the related concepts of finding network paths, routing loops, Tree addressing.

Course Contents
Unit 1: Routing and Switching Strategies
Switching, Forwarding and Filtering Traffic, Forwarding Based on MAC Addresses, Routing: Finding Paths: Routing Devices, Static Routes, Default Routes, Dynamic Routes, Routing Protocols, Choosing or Installing a Route, Routing Loops, Discard or Null Routing, IPv6

Unit 2: Host Routing
The Decision Process (Case 1: Destination Is on the Same Network as the Source, Case 2: Destination Is on a Different Network than the Source), What If the Default Gateway Is Not Known?, Host Routing Tables, Addressing, Tracking the Packets: Case 1: Destination Is on the Same Network as the Source, Case 2: Destination Is on a Different Network than the Source

Unit 3: Spanning Tree and Rapid Spanning Tree
Why Are Loops Bad?, The Structure of Spanning Tree BPDUs : (The Comparison Algorithm, Some Definitions, Spanning Tree Addressing, Port States, Spanning Tree Timers), The Operation of Spanning Tree, Spanning Tree Messages, VLANs and Spanning Tree, The Rapid Spanning Tree Protocol, The Operation of RSTP, Security

Unit 4: VLANs and Trunking Problem
Big Broadcast Domains, What Is a VLAN? (The Effect of VLANs, VLAN Ports Do Not Need to be Continuous, Types of VLANs, VLANs Between Switches ,What is a Trunk? (Trunking Protocol Standards, Pruning, VLAN Design Considerations)

Unit 5: Routing Information Protocol
Version 1 V/S Version 2, Protocol Description, Structure, Basic Operation (Timers, Addressing), Advanced Operation (Split Horizon, Poisoning, Poison Reverse, Triggered Updates, Count to Infinity, How Do I Get Off of My Network?, RIP and Loops, Security ,RIP and IPv6

Unit 6: Open Shortest Path First
Protocol Description, Being Link State, Structure and Basic Operation, Hello, DB Description, Link State Request, Link State Update, Link State ACK, Timers, Advanced Operation, OSPF and IPv6

Text Books
1. CCNA Routing and Switching, Todd Lammle, Sybex
2. Switching Basics and Intermediate Routing CCNA 3 Companion Guide- Cisco.

Reference Books
1. Packet Guide to Routing and Switching by *Bruce Hartpence*, O'Reilly books
2. Network Basics of Bridging, Routing, and Switching- J. Walter, Junos OS for Dummies.

PSC-CA/CS/CN/MCA-3: Computer Networks

Course Overview

Students should be able to have an understanding of the fundamental concepts of computer networking and have a basic knowledge of the various networks models and their uses. They should be able to understand the organization of computer networks, factors influencing computer network development and the reasons for having variety of different types of networks.

Course Outcome

At the end of the course, students will be able to understand basic computer network technology. Understand and explain various components of computer networks. Identify the different types of network topologies and protocols. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer. Identify the different types of network devices and their functions within a network. Understand and build the skills of routing mechanisms.

Course Contents

Unit -1

What is the Internet; network edge, network core; Delay, Loss and throughput in Packet Switched Networks, Protocol Layers and their Service Models

Unit -2

Principles of Network Applications, The Web and HTTP, File Transfer: FTP, Electronic Mail in the Internet, DNS-The Internet's Directory Service, Peer-to-Peer applications, Socket Programming, Creating network applications

Unit -3

Introduction and Transport-Layer Services; Multiplexing and De-multiplexing, Connectionless Transport UDP, Principles of Reliable of Data Transfer, Connection Oriented Transport: TCP, Principles of Congestion Control, TCP Congestion Control

Unit-4

Introduction, Virtual circuit and datagram networks, What is inside a router, Internet Protocol (IP), Forwarding and Addressing in the Internet, Routing Algorithms, Routing in the Internet, Broadcast and Multicast Routing

Unit-5

Introduction to the link layer, Error Detection and Correction Techniques, Multiple Access links and Protocols, Switched local area networks

Unit-6

Introduction, Wireless Links and Network Characteristics, CDMA, WiFi: 802.11 Wireless LANs, The 802.11 Architecture, Channels and Association, 802.11 Frame format, The 802.11 MAC Protocol

Text Book
1. Computer Networking A Top-Down Approach- James F Kurose, 6th edition Pearson Publication

Reference Book
1. Computer Networks: A Top-Down Approach- Behrouz A. Forouzan, Firouz Mosharraf McGraw Hill publications.

PSC-CA/MCA-4: Software Engineering

Course Objectives
This course introduces the concepts and methods required for the construction of large software intensive systems. It aims to develop a broad understanding of the discipline of software engineering. It seeks to complement this with a detailed knowledge of techniques for the analysis and design of complex software intensive systems. It aims to set these techniques in an appropriate engineering and management context. It provides a brief account of associated professional and legal issues.

Course Outcomes
After completing the course students will be able to understand the issues affecting the organization, planning and control of software based systems development, complete the analysis and design of a small software intensive system, read and understand the professional and technical literature on software engineering.

Course Contents
Unit 1: Product and Process
Evolving role of Software(SDLC), Software Characteristics, Software Applications, Crisis on the Horizon, Software Myths, A layered Technology, software process model, Evolutionary software process models, Component based development, fourth generation techniques, process and product.

Unit 2: Managing Software Project:
Introduction, Project Management Concepts, Software Process and Project Metrics.

Unit 3: Conventional Methods for Software Engineering
Introduction, System Engineering, Analysis Concepts and Principles, Analysis Modeling.

Unit 4: Design Concepts and Principles
Architectural Design, User Interface Design, Component-level Design.

Unit 5: Software Testing Techniques
Software testing Strategies, Testing tactics.

Unit 6: Object- Oriented Software Engineering
Introduction, Object-Oriented Concepts and principles, Objected-Oriented Analysis, Object-Oriented Design, Object-Oriented Testing, Technical Metrics for Object-Oriented Systems.

Text Books:
    1. Software Engineering a Practitioners Approach- Pressman, 5th Edition, TMH.
    2. An integrated approach to software Engineering- Pankaj Jalota, Narosa Publication.

Reference Books:
    1. Software Engineering- Jawadekar, TMH Pub.
    2. Software Engineering - Sommerville, Pearson Education.

PSC-CS-4: Theory of Computations

Course Objectives

To better understand the mathematical foundations of computer science, to understand the topics of regular languages, deterministic finite automata, nondeterministic finite automata, regular expressions, context-free grammars, pushdown automata, Turing Machines, computational complexity, to gain an appreciation for applications of formal languages and automata.

Course Outcomes

At the conclusion of the course, students should be able to study the computational complexity in computer science and convert transition diagrams for NFA to DFA

Course Contents

Unit- 1 Fundamentals

Strings, Alphabet, Language, Operations, Finite state machine, definitions, finite automaton model, acceptance of strings, and languages, deterministic finite automaton and non deterministic finite automaton, transition diagrams and Language recognizers.

Unit-2 Finite Automata:

NFA- Significance, acceptance of languages. Conversions and Equivalence : NFA to DFA conversion, minimisation of FSM, equivalence between two FSM's, Finite Automata with output- Moore and Melay machines.

Unit-3 Regular Languages:

Regular sets, regular expressions, identity rules, Constructing finite Automata for a given regular expressions, Conversion of Finite Automata to Regular expressions. Closure properties of regular sets. (Proofs not required).

Unit- 4 Context Free Grammars:

Ambiguity in context free grammars.Minimisation of Context Free Grammars.Chomsky normal form, Greiback normal form. Enumeration of properties of CFL .

Unit-5 Push Down Automata:

Push down automata, definition, model, acceptance of CFL, Acceptance by final state and acceptance by empty state and its equivalence. Equivalence of CFL and PDA, interconversion. (Proofs not required). Introduction to DCFL and DPDA.

Unit- 6 Turing Machine:

Turing Machine, definition, model, representation of TM, Language acceptability TM, design of TM, Description of TM. Types of Turing machines (proofs not required).

Text Books

1. Introduction to Automata Theory Languages and Computation- Hopcroft H.E. and Ullman J. D., Pearson Education.
2. Introduction to Theory of Computation – Sipser, 2nd edition, Thomson Press.

Reference Books:

1. Introduction to Computer Theory- Daniel I.A. Cohen, John Wiley, Word Press.
2. Introduction to languages and the Theory of Computation -John C Martin, TMH
3. Elements of Theory of Computation- Lewis H.P. and Papadimition C.H., Pearson /PHI.

PSC-CN-4: Linux and Network Administration

Course Objectives

This course introduces the UNIX/Linux family of operating systems. Basic commands, utilities, System structures, scripting and tools are explored. Elements of system administration are presented. This course is primarily oriented for would-be users of UNIX -- in the words of the course text, p. iv, for those "primarily interested in it as a tool". It is not a course in UNIX system programming (it is not a course in UNIX internals), nor is it a course in UNIX system administration, although I hope we will brush up against a few aspects of UNIX system administration during the course of the semester.

Course Outcome

Students who complete the course will have demonstrated the ability to do the use of basic UNIX/Linux commands from the command line (from a terminal window); organize and manage their files within the UNIX/Linux file system; organize and manage their processes within UNIX/Linux; usefully combine UNIX/Linux tools using features such as filters, pipes, redirection, and regular expressions; customize their UNIX/Linux working environment; be knowledgeable enough about basic UNIX/Linux shell scripting to be able to successfully read and write bash shell scripts; know how to use UNIX/Linux resources to find additional information about UNIX/Linux commands.

Course Contents

Unit- 1:

Definition of Operating System, Types of Operating System, features of Linux, Basic Architecture of Unix/Linux system, features of Kernel and Shell.

Unit-2:

Linux/Unix File system - Boot block, super block, Inode table, data blocks, How Unix/Linux kernel access files, Unix/Linux standard file system.

Unit 3:

Structure of file system, Essential Linux commands - Commands for files and directories creating and viewing files using cat, cd, ls, cp, md, rm, mkdir, rmdir, pwd, file, more, less, file comparisons –cmpandcomm, View files, disk related commands, checking disk free spaces, chmod with its options, cal,date,who,tty, lp,stty.

Unit 4:

Filters and pipes: head, tail ,wc, pr, cut, paste, sort, uniqe, grep, egrep, fgrep ,tee,
The process: shell process, parent and children, process status, system process, multiple jobs in background and foreground, changing process priority with nice, premature termination of process, Mathematical commands- bc, expr, factor, units.

Unit 5:

Creating and editing files with VI editor with their command options, Operators, text deletion, text movement, changing text, yanking text, filtering text, the ex mode, moving text from one file to another. Communication: The bulletin board –news, write, mesg, talk, mail, elm, pine, finger, vacation and connecting to remote machine.

Unit 6:

System administration Common administrative tasks, identifying administrative files configuration and log files, Role of system administrator, Managing user accounts-adding and

deleting users, changing permissions and ownerships, Installation of Unix/Linux system– Unix/Linux Installation requirement, complete Procedure steps, Partitioning the Hard drive, System startup and shut-down process, init and run levels. File system mounting, lpstat, backup strategy, installing software on Unix/Linux.

Text Books
1. Unix – Syed Mansoor Sarwar, Robert kortskey - Pearson Education.

Reference Books:
1. Unix concepts and Application- Sumitabha Das, Tata McHill
2. Using Linux – David Bandel and Napier, Pearson Education.

DEC-1: Data Sciences

Course Objectives
Data Science is the study of the general extraction of knowledge from data. Being a data scientist requires an integrated skill set spanning mathematics, statistics, machine learning, databases and other branches of computer science. This course will introduce students to this rapidly growing field and equip them with some of its basic principles and tools as well as its general mindset.

Course Outcome
At the conclusion of the course, students should be able to describe what Data Science is and the skill sets needed to be a data scientist. Identify probability distributions commonly used as foundations for statistical modelling. Fit a model to data. Use R to carry out basic statistical modelling and analysis. Explain the significance of exploratory data analysis (EDA) in data science. Apply basic tools (plots, graphs, summary statistics) to carry out EDA.

Course Contents
Unit-1 Introduction:
What is Data Science?, Big Data and Data Science hype, getting past the hype, Why now? Datafication - Current landscape of perspectives, Skill sets needed

Unit-2 Statistical Inference
Populations and samples, Statistical modelling, probability distributions, fitting a model, Intro to R Exploratory Data Analysis and the Data Science Process, Basic tools (plots, graphs and summary statistics) of EDA, Philosophy of EDA, The Data Science Process, Case Study: Real Direct (online real estate firm)

Unit-3 Three Basic Machine Learning Algorithms
Linear Regression, k-Nearest Neighbours (k-NN), k-means One More Machine Learning Algorithm and Usage in Applications, Motivating application: Filtering Spam, Why Linear Regression and k-NN are poor choices for Filtering Spam, Naive Bayes and why it works for Filtering Spam, Data Wrangling: APIs and other tools for scrapping the Web

Unit-4 Feature Generation and Feature Selection
Extracting Meaning From Data, Motivating application: user (customer) retention, Feature Generation (brainstorming, role of domain expertise, and place for imagination), Feature Selection algorithms, Filters; Wrappers; Decision Trees; Random Forests Recommendation Systems: Building a User-Facing Data Product, Algorithmic ingredients of a Recommendation Engine, Dimensionality Reduction, Singular Value Decomposition, Principal Component Analysis, Exercise: build your own recommendation system

Unit-5 Mining Social-Network Graphs
Social networks as graphs, Clustering of graphs, Direct discovery of communities in graphs, Partitioning of graphs, Neighbourhood properties in graphs

Unit-6 Data Visualization
Basic principles, ideas and tools for data visualization 3, Examples of inspiring (industry) projects, Exercise: create your own visualization of a complex dataset 10. Data Science and Ethical Issues, Discussions on privacy, security, ethics, A look back at Data Science, Next-generation data scientists

Text Books

1. Doing Data Science- Cathy O'Neil and Rachel Schutt, Straight Talk from the Frontline. O'Reilly.

Reference Books

1. Machine Learning: A Probabilistic Perspective- Kevin P. Murphy, MIT Press.
2. Data Mining and Analysis: Fundamental Concepts and Algorithms- Mohammed J. Zaki and Wagner Miera Jr., Cambridge University Press.

DEC-2: Cloud Computing

Course Objectives

This course is to know the emerging trends in Cloud Computing. To have thorough knowledge of Virtualization Technologies and Cloud architecture. To integrate security in cloud applications. To have systematic knowledge of Ubiquitous Computing.

Course Outcomes

Student will Understand and Familiar with the basic concepts of cloud computing. Student will understand how to build large scale distributed systems and cloud applications. Comprehend the importance of cloud security. Understand Ubiquitous Computing and applications.

Course Contents

Unit –1

Defining Cloud computing, essential characteristics of Cloud computing, Cloud deployment model, Cloud service models, Multi-tenancy, Cloud cube model, Cloud economics and benefits, Cloud types and service scalability over the cloud, challenges in cloud NIST guidelines.

Unit - 2

Virtualization concepts, types, Server virtualization, Storage virtualization, Storage services, Network virtualization, Service virtualization, Virtualization management, Virtualization technologies and architectures, Internals of virtual machine, Measurement and profiling of virtualized applications. Hypervisors: KVM, Xen, HyperV Different hypervisors and features.

Unit - 3

Architecture for federated cloud computing, SLA management in cloud computing: Service provider's perspective, performance prediction for HPC on Clouds, Monitoring Tools.

Unit - 4

Cloud Security risks, Security, Privacy, Trust, Operating system security, Security of virtualization, Security risks posed by shared images, Security risk posed by a management OS, Trusted virtual machine monitor.

Unit - 5

Cloud Platforms: Amazon EC2 and S3, Cloudstack, Intercloud, Google App Engine, Open Source cloud Eucalyptus, Open stack, Open Nebulla, etc., Applications.

Unit - 6

Basics and Vision, Applications and Requirements, Smart Devices and Services, Human Computer Interaction, Tagging, Sensing and controlling, Context-Aware Systems, Ubiquitous Communication, Management of Smart Devices, Ubiquitous System Challenge and outlook.

Text Books
1. Cloud Computing Principles and Paradigms- RajkumarBuyya, J.Broberg, A. Goscinski, Wiley Publishing.
2. Cloud Security: Comprehensive guide to Secure Cloud Computing- Ronald Krutz, Wiley Publishing.

Reference Books
1. Cloud Computing: Practical Approach- Anthony T. Velte, McGraw Hill.
2. Cloud Security and Privacy- Tim Mather, O'REILLY Publication.

DEC-3: Software Metrics and Project Management

Course Objectives
Software Project Management covers details about handling the project activities, principals and modern software project management practices. The five process groups and nine knowledge areas of the Project Management Institute Body of Knowledge (PMI BOK) are examined in the context of the systems development lifecycle. Portfolio management and the use and application of software project management tools are also discussed

Course Outcome
Students will Understand the five process groups and nine knowledge areas of the PMI Book, Understand approaches for managing and optimizing the software development process, Understand efficient techniques for managing each phase of the systems development lifecycle, Use and application of tools to facilitate the software project management process.

Course Contents
Unit-1 Fundamentals of Project Management
Definition, Characteristics of Project, Types of Project, Project Phases, Project management Process, Project life cycle, Project Life Cycle Models

Unit-2 Project formulation
Significance of project formulation, Step-Wise Approach to Project formulation, Feasibility analysis, Cost Benefit Analysis, Cash flow forecasting, Return on Investment.

Unit-3 Software project Approach Selection
Project Vs Activity, Activity Planning, Planning Approaches, Process models, Waterfall model, V Model, Spiral model, Software prototyping, appropriate model selection

Unit-4 Software Effort Estimation
Software estimation techniques, Estimation Approaches, Definition of Project scheduling, Project controls and importance, Network techniques of Project Management: Gantt chart, CPM, PERT, COCOMO

Unit-5 Risk and Uncertainty Decisions
Project Risk, Types of Project Risk, Identification of Risk, Risk Prioritization, Project risk Analysis, Qualitative analysis and Quantitative analysis, Sensitivity Analysis, Break Even analysis, Risk Planning

Unit-6 Resource Allocation
Resources, Burman's Priority list, Cost Schedules, Software quality assurance, relation between software quality and software productivity, Role of project manager in software development

Text Books
1. Project Management, S. Chaudhary, Tata McGraw Hill.
2. Project-Preparation, Appraisal, Budgeting and Implementation, Prassna Chandra, Tata McGraw Hill.

Reference Books:
1. Software Project Management, Bob Hughes and Mike Cotterell, Tata McGraw Hill.
2. Software Project Management: A real-world Guide to Success, Joel Henry, Pearson education.

DEC-4: Digital Image Processing

Course Objectives
This course is to study the image fundamentals and mathematical transforms necessary for image processing. This course elaborates the concepts of the image enhancement techniques and image restoration procedures. It is to study the image compression procedures with the study of image segmentation and representation techniques.

Course Outcomes
This course made students to learn digital image fundamentals, exposed to simple image processing techniques, be familiar with image compression and segmentation techniques, to learn to represent image in form of features

Course Contents
Unit-1 Digital Image Processing Systems:
Fundamental steps in DIP. Components of an Image Processing System, Elements of Visual Perception, Image sensing and acquisition, Image sampling and quantization Digital Image Representation, Data Classes and Image types and Converting between Data Classes and Image types

Unit-2 Intensity transformation and spatial filtering:
Intensity Transformation function, Histogram processing and Function plotting, Spatial filtering

Unit-3 Frequency Domain Processing:
2D –discrete Fourier transform, Filtering in frequency domain, Obtaining Frequency Domain Filters from spatial filters

Unit-4 Image Restoration:
A Model of the Image Degradation /Restoration Process, Noise Models, Restoration in presence of Noise only –spatial filtering, Periodic Noise Reduction by Frequency domain filtering

Unit-5 Color Image Processing and Wavelets:
Color Image Representation, Converting to other Color Space

Unit-6 Introduction to Wavelets:
Fast wavelet transform, working with Wavelet Decomposition structures Inverse Fast Wavelet transform

Text Books:
  1. Digital Image Processing- R.C. Gonsales R. E. Woods, Second Edition, Pearson Education
  2. Fundamentals of Image Processing- Anil K. Jain, PHI Publishing.

Reference Books:
  1. Digital Image Processing using MATLAB- R.C. Gonsales R. E. Woods, Second Edition, Pearson Education.

DEC-5: Cyber Forensics and Information Security

Course Objectives

The student should be made to Learn the security issues network layer and transport layer, Be exposed to security issues of the application layer, Learn computer forensics Be familiar with forensics tools, Learn to analyze and validate forensics data

Course Outcomes

Upon completion of the course, the student should be able to discuss the security issues network layer and transport layer. Apply security principles in the application layer. Explain computer forensics. Use forensics tools. Analyze and validate forensics data.

Course Contents

Unit 1

IPSec Protocol - IP Authentication Header - IP ESP - Key Management Protocol for IPSec Transport layer, Security: SSL protocol, Cryptographic Computations – TLS Protocol.

Unit 2

PGP - S/MIME - Internet Firewalls for Trusted System: Roles of Firewalls – Firewall related terminology- Types of Firewalls - Firewall designs - SET for E-Commerce Transactions.

Unit 3

Introduction to Traditional Computer Crime, Traditional problems associated with Computer Crime. Introduction to Identity Theft and Identity Fraud. Types of CF techniques - Incident and incident response methodology – Forensic duplication and investigation.

Unit 4

Preparation for IR: Creating response tool kit and IR team. - Forensics Technology and Systems - Understanding Computer Investigation – Data Acquisition.

Unit 5

Processing Crime and Incident Scenes–Working with Windows and DOS Systems. Current Computer Forensics Tools: Software/ Hardware Tools.

Unit 6

Validating Forensics Data – Data Hiding Techniques – Performing Remote Acquisition – Network Forensics – Email Investigations – Cell Phone and Mobile Devices Forensics

Text Books
1. Internet Security: Cryptographic Principles, Algorithms and Protocols- Man Young Rhee, Wiley Publications.
2. Computer Forensics and Investigations- Nelson, Phillips, Enfinger, Steuart, Cengage Learning, India Edition.

Reference Books
1. Computer Forensics- John R.Vacca, Cengage Learning.
2. Internet Cryptography- Richard E.Smith, 3 rd Edition Pearson Education.
3. Computer Forensics and Cyber Crime: An Introduction- MarjieT.Britz, 3 rd Edition, Prentice Hall.

PSC-CA/CS/MCA-5 Lab-5: Windows Programming

Lab Course Objectives

The student will use Visual Basic.Net to build Windows applications using structured and object-based programming techniques. Students will be exposed to analyze program requirements, Design/develop programs with GUI interfaces, Code programs and develop interface using Visual Basic.Net, Perform tests, resolve defects, and revise existing code.

1. Study Window's API and Their Relationship with MFC classes
2. Study essential classes in Document View Architecture and Their Relationship with each other
3. Create Window and Interact with it
4. Draw a free hand drawing as Mouse is Drag
5. Create Window of My Own Class (MFC)
6. Line Drawing Using MFC Classes
7. Creating a Notepad in VC++
8. Creating a Blinking Cursor
9. Creating a Menu, Dialog Box and Adding Shortcut andAccelerator Keys, Status Bar, Tools to the Menu items
10. Serializing your own Objects and Class
11. Create, Open , Read, Write, Modify and Close a file
12. Creating a Multiple Document Interface
13. Creating a Dynamic Link Library
14. Creating a Web Browser
15. Creating Internet Applications using HTTP
16. Creating Internet Applications using FTP
17. Creating an ActiveX Control
18. Creating a Dialog based Application
19. Database Connectivity in VC++
20. Keyboard Handling

PSC-CN-5 Lab-5: Linux Administration

Lab Course Objectives

This course explores different ways that Linux can be deployed with a strong emphasis on command line administration; students will learn how to manage user accounts, file systems, and processes while gaining hands-on experience installing, configuring, and administering a Linux system.

1. Installation of Red HAT/any other available 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. Shutting down

2. Software selection and installation

3. Basic Commands

4. Do the following changes in Grub file a. Write the path where the grub file is located. b. Change the timeout and title of the system.

5. Setting up Samba Server

6. Configuring dhcp server and client

7. Configure a DNS Server with a domain name of your choice.

8. Configure a Linux server and transfer files to a windows client . (Setting up NFS File Server)

9. Connecting to the internet a. Setting up linux as a proxy server b. Configuring mozilla or firefox to use as a proxy.

10. Configuring Mail Server.

11. Configure FTP on Linux Server. Transfer files to demonstrate the working of the same.

12. Using gcc compiler (Programming using C).

13. Using gcc ++ compiler (Programming using C++).

14. Configuring Apache Web Server.

15. 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 Using javac compiler

PSC-CA/CS/MCA-6 Lab 6: Advance Database Administration

Lab Course Objectives

This course is intended to provide comprehensive understanding of the advances and administrations practices in database management systems. The course provides a solid technical overview of roles and responsibilities of DBA in an organisation. These include concurrency, recovery, performance, warehouses.

List of Practical's
1. Distributed Database for Bookstore
2. Deadlock Detection Algorithm for distributed database using wait- for graph
3. Object Oriented Database – Extended Entity Relationship (EER)
4. Parallel Database – University Counselling for colleges
5. Parallel Database – Implementation of Parallel Join and Parallel Sort
6. Active Database – Implementation of Triggers and Assertions for Bank Database
7. Deductive Database – Constructing Knowledge Database for Family Relations
8. Query Processing – Implementation of an Efficient Query Optimizer
9. Designing XML Schema for Company Database

PSC-CN-6 Lab 6: Switching and Routing

Lab Course Objectives

The Linux network programming course covers network programming using the Switching and Routing systems. The content of the course is based on the network programming.

1. Implement the Switching, Forwarding and Filtering Traffic.

2 Routing: Finding Static Routes, Default Routes, Dynamic Routes, Routing Protocols.

3 Choosing or Installing a Route, Routing Loops, Discard or Null Routing, IPv6.

4 Host Routing Tables, Addressing, Tracking the Packets.

5 The Operation of Spanning Tree, Spanning Tree Messages, VLANs and Spanning Tree.

6 Tree Protocol, The Operation of RSTP, Security.

7 Trunking Protocol Standards, Pruning, VLAN Design

8 Advanced Operation, OSPF and IPv6 .

OE-3A: Introduction to Open Sources

Course Objective
This course is to introduce the concept of open Source Software. This enables students to learn Linux Environment. And to make students well versed with Android and Shell Programming

Course outcomes
This helps to develop android applications. It gives students knowledge to install and work on Linux. And to perform Shell Programming.

Unit 1 Over View of Open Source
Need of Open Sources, Advantages, Applications- FOSS, FOSS usage, Free Software Movement, Commercial Aspect of Open Source Movement, Licensing, Certification, Open Source Software Development Model, comparison with Proprietary software, Open source vs source, Widely used open source software license, Apache License, BSD license, GNU General Public License, GNU Lesser General Public License, MIT License, Eclipse Public License and Mozilla Public License.

Unit 2 Open Source Operating System
Installation of Linux, Multi boot Theory, Hard disk partitioning, Swap space, LVM, and Boot loader Command Line, Basic File System, Manamgnet Task, Working with files, Piping and Redirection, Working with VI editor, use of sed and understanding FHS of Linux

Unit 3 Open Source Operating System: Administrator task
Job management, Process Management, Mounting Devices and file system working with Linux, Backup, working with user, group and permission, Managing Software. Understanding Boot process and related system files, Common kernel Management Task

Unit 4 Open source Operating System: Network and Security Administration
Basic networking commands, Configuration of Apache Web servers, DNS servers, DHCP servers, NFS, FTP servers. Securing servers with IP tables. Setting up Cryptographic services, SSL, Managing Certificate with Open SSL, working with the GNU Privacy guard.

Unit 5 Open Source Operating System: Shell Programming
Bash Shell Scripting, Executing Script, Working with Variables and Input, Script control, handling with signals, creating functions, working sed and gawk Working with web using shell script: Downloading web page as formatted text file and parsing for data, working URL etc.

Unit 6 Open Source mobile programming
Android programming: Setting up Android Environment, Activites and Intents, User Interface, Designing UI using views, Data Persistence, Content Providers, messaging and networking, Location-based Services, Publishing Android Applications

Text Books
1. Redhat Linux 6.0 Administration, Sander Van Vugt, Wiley Press.
2. Linux Shell scripting Cookbook: Sarath Lakshman Packt Publishing.
3. Linux Lab - Open source Technology: Dayanand Ambavade –Dream Tech

Reference books
1. Beginning Adnorid Development Wrox Press
2. Drupal guide to Planning and Building Web Site: Wrox Press

OE-3B: Mobile Communications

Course Objectives

This course to make students familiar with fundamentals of mobile communication systems. To choose system (TDMA/FDMA/CDMA) according to the complexity, installation cost, speed of transmission, channel properties etc. To identify the requirements of mobile communication as compared to static communication. To identify the limitations of 2G and 2.5G wireless mobile communication and use design of 3G and beyond mobile communication systems. As a prerequisite for the course in Wireless LANs.

Course Outcomes

This course make students familiar with various generations of mobile communications. To understand the concept of cellular communication. To understand the basics of wireless communication. Knowledge of GSM mobile communication standard, its architecture, logical channels, advantages and limitations.

Course Contents

Unit 1 Wireless Communication Fundamentals:

Introduction , Wireless transmission , Frequencies for radio transmission , Signals , Antennas , Signal Propagation , Multiplexing , Modulations , Spread spectrum , MAC , SDMA , FDMA , TDMA , CDMA , Cellular Wireless Networks.

Unit 2 Telecommunication Networks:

Telecommunication systems , GSM , GPRS , DECT , UMTS , IMT-2000 , Satellite Networks - Basics , Parameters and Configurations , Capacity Allocation , FAMA and DAMA , Broadcast Systems , DAB - DVB.

Unit 3 Wireless LAN:

WIRLESS LAN : Wireless LAN , IEEE 802.11 - Architecture , services , MAC , Physical layer, IEEE 802.11a - 802.11b standards , HIPERLAN , Blue Tooth.

Unit 4 Mobile Network Layer:

Mobile IP, Dynamic Host Configuration Protocol - Routing , DSDV , DSR , Alternative Metrics.

Unit 5 Transport and Application Layer:

Traditional TCP, Classical TCP improvements, WAP, WAP 2.0.

Unit 6 Mobile Operating System:

Symbian OS, Android, Mac OS X (iPhone),Others (Windows Mobile, BlackBerry, Palm, Linux), Cross - platform: Java ME.

Text Books
1. Wireless Communications: Principles and Practice- Theodore S Rappaport, Pearson.
2. Digital Communication with Emphasis on Data Modems: Theory, Analysis, Design, Simulation, Testing, and Applications- Richard W. Middlestead, Wiley Press.

Reference Books
1. Satellite Communications Systems Engineering: Atmospheric Effects, Satellite Link Design and System Performance- Louis J. Ippolito Jr., Wiley Press.

OE-3C: Introduction to Linux

Course Objectives

This course to make students familiar with fundamentals of Linux systems. To identify the requirements Linux system installation. Work with Linux system it's commands, file system.

Course Outcomes

This course make students familiar with various contents of Linux. To understand the concept of handling Linux and performing operations using Linux commands and tools. To understand the basics of Linux. Knowledge of architecture, logical channels, advantages and limitations.

Course Contents

Unit 1: Synaptic package manager

Synaptic Package Manager, How to install packages, Basic Commands, Commands with example, Command interpreter, Shell, Using man, Apropos,

Unit 2: General Purpose Utilities in Linux

Echo, uname, who, passwd, date, cal, Brief overview on Files and directories, pwd, ls, cat, File System, File, Directory, File Inode, Types of Files,Home directory and Current directory, Change Directory(cd), mkdir,rmdir, cat, rm, cp, mv, cmp, wc, File Attributes.

Unit 3: Redirection Pipes

Input, output and error stream, Redirection : > and >>, Working with Linux Process, Process, Shell process, Process spawning - parent and child process, Process attributes - pid, ppid, Init Process, User process and System process, ps with options

Unit 4: The Linux Environment

Environment variable vs Local variables, set command, env command, SHELL, HOME, PATH, LOGNAME, PS1, PS2, history, ! and ~, alias, Basics of System Administration, Root login-su, User management - UID, GID, useradd, usermod, userdel, Discs – Du, df, Simple filters, Head, tail, sort, cut, paste

Unit 5: The grep command

To see the content of a file, To list the entries of a particular stream, To ignore cases, Lines that do not match the pattern, To list the line numbers, To store the result in another file, To know the count, To match more than one pattern, Character class, To match a pattern at the end of the file, The sed command, Line Addressing, Context Addressing, Basics of awk, Awk Preliminaries, Selection criteria, action, Fields, Regular expressions, NR - number of records, Variables

Unit 6: Networking tools

Ping, Telnet, ftp, ssh, scp and sftp, Linux Process, Fork, Exec, Wait, Nice, Kill with options, More about Linux Process, Cron, crontab

Text Books:
1. Fedora 10 and Red Hat Enterprise Linux Bible- Christopher Negus, Wiley Publishing.
2. Linux For Dummies- Dee-Ann LeBlanc, R. K. Blum, Wiley Publishing.

Reference Books:
1. Ubuntu for Non-Geeks, 2nd Edition: A Pain-Free, Project-Based, Guide book- Rickford Grant, Phil Bull, William Pollock Press.

OE-3D: Seminar/ Survey/ Activity

Guidelines for Seminar
1. Students need to confirm Seminar Topic with consent of guide
2. Student should submit the seminar report in hard copy (spiral binding) and Soft Copy (Report + Presentation) as per the guideline below
   2.1 Introduction of Seminar Topic
   2.2 Abstract of study
   2.3 Survey/Analysis
   2.4 Detail Study
   2.5 Results
   2.6 Conclusion
   2.7 References
3. Student should Give Presentation (With PPT)

Guidelines for Survey
4. Students need to finalize Survey topic with consent of guide
5. Student should submit Survey Report in Hard Copy (Spiral Binding) and Soft Copy (Survey Report + Presentation) as per the guidelines below
   5.1 Introduction of Survey Topic
   5.2 Abstract of Survey
   5.3 Analysis with Expected Population and Sample size
   5.4 Detail study/ Comparison
   5.5 Results
   5.6 Conclusion
   5.7 References
   5.8 Annex- collected samples (evidences)
6. Student should Give Presentation (With PPT)

   Any other Activity Suggested by Teacher/ Mentor/ Guide

OE-3E:
(Other Similar Open Electives offered by other Schools / MOOC/ Swayam / Spoken tutorial platforms)

Students can choose one of these open electives. But they need to take prior permission from School Director before joining one of these elective courses. \they must produce successful completion certificate / credits earned to the School after completing the underwent course.

PSC-CA/CS/MCA-7: Introduction to Web Technologies

Course Objectives
This course will cover the practical aspects of multi-tier application development using the .NET framework. This course is to introduce the basics of distributed application development. Technologies covered include the Common Language Runtime (CLR), .NET framework classes, VB, ASP.NET, and ADO.NET. It also cover service oriented architecture, design, performance, security, content managements and deployment issues building multi-tier applications.

Course Outcomes
Upon completion of this course, the student will be able apply technical knowledge and perform specific technical skills, including design web applications using ASP.NET.

Course Contents
Unit 1 Web Components
Introduction to Internet, Web Client/Server Model, Protocols for Web Client/Server Communication, Understanding Web Server IIS.

Unit 2 Introduction to ASP.NET
DOT NET Framework, CLR, Framework Class Library, Garbage Collection, MSIL, Web Services, COM+ Component Services, Intro to ASP.NET, ASP.NET and HTML Controls, ASP.NET Events and Events Handler.

Unit 3 Web Programming with VB.
Data Types, Variables, Expressions, Flow Control, Operators, Conditional Statements, Looping Structures, Arrays, OOP Concepts, Objects, Properties, Methods, Classes, Scope, Events

Unit 4 Essentials ASP.NET
Working with Web forms, Directory Structure in ASP.NET, ASP.NET Compilation Model, Code behind Model, Working with Web form Controls, Navigation Controls, Validation Controls, Validation Groups, Client/Server Side Validation.

Unit 5 ASP.NET Master Page
ASP.NET Master Page Overview, Master Page Layout with CSS, Master Page Directive and Content Place Holder, Creating and Applying Themes, Cookies, ASP.NET Session State, Application State

Unit 6 Data Access with ADO.NET
Working with ADO.NET, Overview of ADO.NET Objects, Working with Connection Object, Command Object, Data Adapter Object, Data Set Object, Data Reader Object, Data Table Object.

Text Books
1. ASP.NET and VB.NET Web Programming - Coruch Matt J, Addison Wesley.
2. ASP.net – The Complete Reference- Matthew MacDonald, Tata McGraw Hill
3. Beginning ASP.NET 2.0- John Wiley and Sons, Wrox Publication.

Reference Books:
1. ASP.NET3.5 in C# and VB- Bill Evjen, S. Hanselman, Devin Rader, Wrox Publication
2. Pro ADO.NET 2.0- Sahil Malik, A-Press.
3. Ado.Net: The Complete Reference- Michael Otey, Tata McGraw-Hill Education

PSC-CN-7: Network Security and Cryptography

Course Objectives
This course will introduce private and public key encryption, key distribution (Kerberos, public key infrastructure), cryptographic hash functions, digital signatures, IP Security (IPSec), Secure Socket Layer (SSL/TLS), DNS Security (DNSSEC), WEP/WPA intrusion detection, Firewalls, denial of service, phishing, and an overview of many attacks that the Internet has experienced, especially in the last decade.

Course Outcomes
Completion of this course, the students should be able to compare various cryptographic techniques. To understand the designs secure applications. To inject secure coding in the developed applications.

Course Contents
Unit 1:
Introduction: Basic objectives of cryptography, secret-key and public-key cryptography, one-way and trapdoor one-way functions, cryptanalysis, attack models, classical cryptography.

Unit 2:
Block ciphers: Modes of operation, DES and its variants, RCS, IDEA, SAFER, FEAL, Blow Fish, AES, linear and differential cryptanalysis. Stream ciphers: Stream ciphers based on linear feedback shift registers, SEAL, unconditional security.

Unit 3:
Message digest: Properties of hash functions, MD2, MD5 and SHA-1, keyed hash functions, attacks on hash functions. Public-key parameters: Modular arithmetic, gcd, primality testing,

Unit 4:
Chinese remainder theorem, modular square roots, finite fields. Intractable problems: Integer factorization problem, RSA problem, modular square root problem, discrete logarithm problem, Diffie-Hellman problem, known algorithms for solving the intractable problems.

Unit 5:
Public-key encryption: RSA, Rabin and EIGamal schemes, side channel attacks. Key exchange: Diffie-Hellman and MQV algorithms. Digital signatures: RSA, DAS and NR signature schemes, blind and undeniable signatures.

Unit 6:
Entity authentication: Passwords, challenge-response algorithms, zero-knowledge protocols. Standards: IEEE, RSA and ISO standards. Network issues: Certification, public-key infrastructure (PKI), secured socket layer (SSL), Kerberos.

Text Books
1. Cryptography and Network Security- William Stallings, Prentice Hall of India.
2. Cryptography and Network Security- Forouzan, Tata McGraw-Hill.

Reference Books
1. Network Security: Private Communication in a Public World- Charlie Kaufman, Prentice Hall Series.

PSC-CA/CS/CN-8: Mobile Application Development

Course Objectives

Today's applications are increasingly mobile. This course teaches students how to build mobile apps for Android that is today's mobile operating platforms. Students learn to write both web apps and native apps for Android using Eclipse and the Android SDK platforms.

Course Outcomes

At the conclusion of the course, students should be able to understand the basic concepts of mobile computing, Learn the basics of mobile telecommunication system, Be exposed to Ad-Hoc networks and Gain knowledge about different mobile platforms and application development

Course Contents

Unit 1 Introduction

Introduction to Mobile Computing, Introduction to Android Development Environment, Factors in Developing Mobile Applications, Mobile Software Engineering, Frameworks and Tools, Generic UI Development, Android User Understanding B4A for Android: Installing Basic4Android and Android SDK, Install and configure Basic4Android, Installing Android Emulator, My first program (MyFirstProgram.b4a), Second program (SecondProgram.b4a)

Unit 2 Understanding Android Mobiles and the IDE of B4A

Screen sizes and resolutions (Special functions like 50%x, 50dip, PerXToCurrent, PerYToCurrent - 50%x, DipToCurrent - 50dip), Understanding various Android Emulators for B4A, Understanding B4A bridge (The Designer, Tools, General Setting)
Menu and Toolbar, Toolbar, File menu, Edit menu, Project menu, Tools menu, Code area, tabs

Unit 3 Process and Activity life cycle

Variables and objects, Variable Types, Names of variables, declaring variables, Simple variables, Array variables, Array of views (objects), Type variables, Casting, Scope(Process variables, Activity variables, Local variables), Tips and Modules(Activity modules, Code modules, Service modules)

Unit 4 Understanding Basic Language

Program flow, Process Globals routine, Globals routine, Activity Create (First Time As Boolean) routine, Activity Resume routine, Activity Pause (User Closed As Boolean) routine, Expressions (Mathematical expressions, Relational expressions, Boolean expressions), Conditional statements (If – Then – End If, Select – Case) Loop structures (For – Next, Do – Loop), Subs (Declaring, Calling a Sub, Naming, Parameters, Returned value),Events, Libraries (Standard libraries, Additional libraries folder)

Unit 5 Creating User Interface,

Menu example, TabHost example, Button toolbox example, Scroll View examples, SQLite Database (SQLite Database basics, SQLite Database example program), GPS (GPS Library, GPS Objects)

Unit 6:

String manipulations, Files (File object, Text Writer, Text Reader, Text encoding), Graphics and Drawing

Text Books

1. Fundamentals of Mobile Computing- Prasant Kumar Pattnaik, Rajib Mall, PHI Learning Pvt.Ltd, New Delhi.

Reference Books

1. Java: A Beginner's Guide- Herbert Schildt, Oracle Press.
2. Learning Java by Building Android Games- John Horton, Packt Publishing.
3. Android Programming for Beginners- John Horton, Packt Publishing.

PSC-MCA-008: Management Information System

Course Objectives:
This course introduces students to the use of computer-based systems in support of managerial decision making in organizations.

Course Outcomes
This course will give deep knowledge about MIS concepts with various kinds of tools and techniques. This course also guides students to learn MIS and quality improvement strategies.

Unit-1: Management Information system
Need, Purpose and objectives- contemporary approaches to MIS – Information as a strategic resources, use of information for competitive advantage, capital MIS as an instrument for the organizational change.

Unit-2: Information Management and Decision Making:
Model of Decision Making– Classical, administrative and Herbert Simon's Models, Attributes of Information and its relevant to decision making – Types of Information.

Unit-3: Information Technology:
Definition, IT Capabilities and their organizational impact – Telecommunication and Networks – Types and Topologies of Networks – IT in enabled Services such as call Centres, Geographical Information System etc.

Unit-4: DBMS and Systems Analysis and Design:
Data warehousing and Data mining, System Development Life Cycle – Alternative Systems Building Approaches– Proto Typing Development Strategies-Structured Analysis-Prototyping-Rapid Developing Tools, CASE Tools– Object oriented systems (only introduction to these tools and techniques).

Unit-5: Decision Support System:
Group Support System–Executive Information Systems- Executive Support Systems, Experts Systems and Knowledge based Experts Systems – Artificial Intelligence.

Unit-6: Management Issues in MIS:
Information Security and controls- Quality assurance, Ethical and Social Dimension, Intellectual Property Rights as related to IT services/ IT products, Managing Global Information Systems.

Text Books:
1. Management Information Systems-Laudon, 7th Edition, Pearson Education Asia.
2. Management Information Systems- Jawadekar, Tata McGraw Hill.

Reference Books
1. Management Information Systems- Davis and Olson, Tata McGraw Hill.
2. Management Information Systems- Jayant Oke, Nirali Prakashan.

PSC-CA/CS/CN/MCA-9: Compiler Designing

Course Objectives
This course explores the phases of Compiler, to aware the Finite Automata and Lexical Analysis, to understand Parsing Techniques.

Course Outcomes
Completion of these course students will be able to perform Syntax as well as Semantic analysis. Students will be able to plot transition diagrams for DFA and NF

Course Contents
Unit 1: Introduction to Compilation
Compiler Basics, Issues in Compilation, Phases of Compilation: the Analysis – Synthesis Model, Compiler Construction Tools

Unit 2: Designing a Lexical Analyser
Role of Lexical Analysis, Input Buffering, Specification of Tokens, Recognition of Tokens,

Unit 3: Review to FA concepts
Finite automata, Conversion from regular expression to NFA, Deterministic finite automata, Conversion from NFA to DFA, Minimization of DFA, Creating Lexical Analyzer with LEX

Unit 4: Designing Syntax Analyzer
Role of Syntax Analyser, Classification of parsers, Top-Down Parsing: Introduction, Problems in top-down parsing, Recursive Parsing, Problems in Recursive Procedures, Predictive Parsing, Error Handling in Predictive Parsers, Bottom Up Parsing: Shift Reduce Parser, Actions of shift reduce parser, Construction of parse tree, Operator Precedence Parsing, Components of operator precedence parsers, Parsing action, Construction of operator precedence parsers, Advantages and disadvantages of operator precedence Parsing. LR Parsing: Simple LR parser, LALR parser.

Unit 5: Intermediate Code Generation
Need For Intermediate Code Generation, Intermediate Forms: Polish Notation, Quadruples, Triples, and Indirect Triples and Blocks

Unit 6: Code Optimization
Introduction, need for code optimization, Classification of code optimization techniques: Optimization techniques that work on machine code, Optimization techniques that work on intermediate forms of source code i.e. Optimization with in Basic Blocks: Folding, Redundant operation elimination, Optimization with in Loop: Strength Reduction, Dead code elimination, Moving operation within block out of block.

Text Books:
1. Compiler Principle, Techniques and Tools- Aho A.V., R. Sethi and J.D. Ullman, Addison Wesley.
2. Compiler Construction Theory and Practice, Barret, Couch, Asian Student Edition.

Reference Books
1. Compiler Construction Principle and Practice- Dhamdhere D.M, McMillan India.
2. Modern Compiler Design- David Galles, Pearson Education, 2009.
3. Compiler Construction for Digital Computer- Gres D., Wiley Press.

DEC-6: Internet of Things (IoT)

Course Objectives

The objective of the course is to Vision and Introduction to IoT Data and Knowledge Management and use of Devices in IoT Technology. Understand State of the Art IoT Architecture. Industrial Automation and Commercial Building Automation in IoT.

Course Outcomes

At the end of the course the student will be able to understand the vision of IoT from a global context. Use of Devices, Gateways and Data Management in IoT. Building state of the art architecture in IoT. Application of IoT in Industrial and Commercial Building Automation.

Course Contents

Unit -1 M2M to IoT

The Vision-Introduction, From M2M to IoT, M2M towards IoT-the global context, A use case example, Differing Characteristics.

Unit-2 M2M to IoT

A Market Perspective, Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies. M2M to IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.

Unit -3 M2M and IoT Technology Fundamentals

Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service (XaaS), M2M and IoT Analytics, Knowledge Management

Unit -4 IoT Architecture-State of the Art

Introduction, State of the art, Architecture Reference Model- Introduction, Reference Model and architecture, IoT reference Model

Unit-5 IoT Reference Architecture

Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views. Real-World Design Constraints- Introduction, Technical Design constraints-hardware is popular again, Data representation and visualization, Interaction and remote control

Unit -6 Industrial Automation

Service-oriented architecture-based device integration, SOCRADES: realizing the enterprise integrated Web of Things, IMC-AESOP: from the Web of Things to the Cloud of Things, Commercial Building Automation- Introduction, Case study: phase one-commercial building automation today, Case study: phase two- commercial building automation in the future.

Text Books
1. From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence- Jan Holler, Vlasios Tsiatsis, 1st Edition, Academic Press.

Reference Books
1. Internet of Things A Hands-on-Approach- Vijay Madisetti and Arshdeep Bahga, VPT.

DEC-7: Big Data Analytics

Course Objectives

The course will focus on data mining and machine learning algorithms for analyzing very large amounts of data or Big data. Map Reduce and No SQL system will be used as tools/standards for creating parallel algorithms that can process very large amounts of data.

Course Outcomes

By providing a balanced view of "theory" and "practice," the course should allow the student to understand, use, and build practical big data analytics an management systems. The course is intended to provide a basic understanding of the issues and problems involved in massive online repository systems, knowledge of currently practical techniques for satisfying the needs of such a system, and an indication of the current research approaches that are likely to provide a basis for tomorrow's solutions

Course Contents

Unit 1 Introduction:

Big Data introduction: Big data - definition and taxonomy, Big data value for the enterprise, Setting up the demo environment, First steps with the Hadoop "ecosystem"

Unit 2 Technologies and tools for big data analytics:

Introduction to Map Reduce/Hadoop, Data analytics using Map Reduce / Hadoop, Data visualization techniques, Spark

Unit 3 The Hadoop ecosystem:

Introduction to Hadoopand components:MapReduce/Pig/Hive/HBase, Loading data into Hadoop, Handling files in Hadoop, Getting data from Hadoop

Unit 4 Introduction to Hadoop

Big Data Apache Hadoop and Hadoop Eco System, Moving, Data in and out of Hadoop, Understanding inputs and outputs of Map Reduce, Data Serialization.

Unit 5 SPARK:

Introduction to Data Analysis with Spark, Downloading Spark, and Getting Started, Programming with RDDs, Machin Learning with MLlib

Unit 6

Querying big data with Hive (Introduction to the SQL Language, From SQL to HiveQL) Querying big data with Hive (Introduction to HIVE e HIVEQL, Using Hive to query Hadoop files)

Text Books
1. Big Data and Hadoop - VK Jain, Kindle Edition.
2. Hadoop – The Definitive Guide - Tom White, O'Reilly Press.

Reference Books
1. The Human Face of Big Data- Rick Smolan and Jennifer Erwitt, Odds Productions.
2. Learning Spark: Lightning-Fast Big Data Analysis- Holden Karau, O'Reilly Media.

DEC-8: Natural Language Processing

Course Objectives
To learn the techniques in natural language processing. Be familiar with the natural language generation. Be exposed to machine translation. Understand the information retrieval techniques.

Course Outcome
At the end of this course, the student should be able to do design the processing steps required for a NLP task. To study fundamentals of Natural language processing. To make the student familiar with basic language processing operations like: Morphological analysis, Parts-of-Speech tagging, Lexical processing, Semantic processing, and Knowledge representation.

Course Contents
Unit 1 Introduction
Basic text processing: Review of Regular Expressions and Automata, word tokenization, word normalization, word level morphology, stemming -Porters algorithm, sentence segmentation, edit distances.

Unit 2 POS Tagging
Introduction to parts of speech and POS tagging, rule based and stochastic taggers, POS tagsets, Hidden Markov Model and Viterbi algorithm.

Unit 3 Language Modeling
Introduction to N-gram, probability estimation for n-gram, evaluation and perplexity, smoothing techniques, Named-Entity recognition.

Unit 4 Parsing
Syntactic structure, co-reference resolution, parsing, parsing algorithms, parsing in case of ambiguity; probabilistic parsing, the CKY algorithm, Issues in parsing.

Unit 5 Semantics
Word Senses, word relations, word similarity and thesaurus methods, Word sense Disambiguation, Knowledge base and supervised WSD , WordNet , Unsupervised based WSD.

Unit 6 Applications
Information extraction, Question answering system, Summarization, Sentiment analysis.

Text Books
1. Speech and Language Processing- Daniel Jurafsky and James Martin, Prentice Hall.
2. Natural Language Understanding- Allen, James, 2nd Edition, Benjamin-Cumming Publ.
3. Foundations of Statistical Natural Language Processing- C. Manning, H. Schuetze, MIT.

Reference Books:
1. Natural Language Processing and Information Retrieval- Tanveer Siddiqui, Oxford University Press.
2. Natural Language Processing with Python- Edward Loper, Ewan Klein, O'Reilly Media.
3. Speech and Language Processing, Daniel Jurafsky and James H. Martin, Pearson Education.
4. Neural Network Methods in Natural Language Processing- Yoav Goldberg, Morgan and Claypool Publishers.

DEC-9: Object Oriented Analysis and Design

Course Objectives
Object Oriented Analysis and Design deals with planning and developing of Information systems using techniques that view a system as set of objects which works together to perform system's functionality. This perspective stands in contrast to more traditional "procedural" or "structured" way of system design. Object-oriented techniques point to the flexibility and extensibility of object-oriented systems along with other benefits such as increased modularity, abstraction, and encapsulation. This course deals with the concepts, skills, methodologies, techniques, tools, and perspectives essential for Object Oriented Analysis and Design.

Course Outcomes
After successfully completing this course, students will understand concepts of Object Oriented Analysis and Designing. Students will understand the real time system development and acquire skills to prepare Object Oriented Analysis and Design documents for given problem using Unified Modeling Language

Course Contents
Unit 1
Views of software Developments: SSAD and OOAD, Objects and Classes, Abstraction and Encapsulation, UML modeling, Object Oriented Methodologies

Unit 2
Object Oriented SDLC, Relational Unified Process, Requirement engineering, problem analysis, road map for OOA andOOAD

Unit 3
Structured Modeling, Modeling techniques, Modeling elements, Classes, Relationships, Interfaces, Packages, Class Diagrams

Unit 4
Behavioral Modeling, Interactions, Use Case Diagrams, Sequence Diagrams, Activity Diagrams, State Chart Diagrams forward and Reverse Engineering

Unit 5
Architectural Modeling of System, Component and Component Diagram, Deployment and Deployment Diagram,

Unit 6
Object Precedence, Object Oriented Database Management System, Mapping Object to Relational data Structure, Testing Object Oriented Applications, Testing Strategies Benefits of Patterns

Text Books
1. Object – Oriented Modeling and Design- J Rumbaugh , M Blaha, PHI Publication.

Reference Books
1. Principles of Object- Oriented Software Development - Anton Eliens , Addison Wesley.
2. Object Oriented System Development - Ali Bahrami McGraw-Hill international Edition.

DEC-10: Advanced Operating Systems

Course Objectives
This course covers general issues of design and implementation of advanced modern operating systems. The focus is on issues that are critical to the applications of distributed systems and computer networks, which include interposes communication, distributed processing, sharing and replication of data and files.

Course Outcomes
Completion of this course will help students to learn fundamentals of operating systems. To gain the knowledge on distributed operating system concepts that includes architecture, mutual exclusion algorithms, deadlock detection algorithm and agreement protocols.

Course Contents
Unit 1:
Introduction Functions of operating systems, Design approaches: layered, kernel based and virtual machine approach, why advanced operating systems, types of advanced operating systems

Unit 2:
Distributed Operating Systems Architecture of distributed operating systems, system architecture types, issues in distributed operating systems, inherent limitation of distribute systems, distributed mutual exclusion: classification of mutual exclusion algorithms, Lamport's ,token based algorithm, Suzuki-Kasami's Broadcast algorithm, Raymond's Tree based algorithm, Distributed deadlock detection, Distributed file systems, Distributed shared memory, Distributed scheduling

Unit 3:
Multiprocessor Operating Systems Introduction, structure of multiprocessor operating system, operating system design issues, threads, the test and set instruction, the swap instruction, implementation of the process wait , processor scheduling, reliability and fault tolerance.

Unit 4:
Real Time Operating System Introduction to Real time systems and Real Time Operating Systems, Characteristics of Real Time operating Systems, Classification of Real Time Operating Systems, Services, structure, goal and feature of RTOS, architecture of RTOS, micro kernels and monolithic kernels, tasks in RTOS, Performance measures, estimating program runtimes, task assignment, scheduling in RTOS, rate monotonic scheduling, priority inversion, task management, inter task communication, applications of various RTOS.

Unit 5:
Data base operating Systems Introduction to database operating systems, concurrency control: theoretical aspect, distributed database system, concurrency control algorithms

Unit 6:
Mobile Operating System Symbian O.S.: introduction, kernel design in Symbian OS, scheduling in Symbian OS, File systems on mobile phones, I/O in Symbian OS, Application development using Android. Introduction to cloud OS.

Text Books:
1. Advanced Concepts in Operating Systems- M Singhal and NG Sivaratri, Tata McGraw Hill
2. Distributed Operating system- A.S. Tanenbaum, Pearson Education Asia.
3. Modern Operating system- A.S. Tanenbaum, 3rd edition, Prentice Hall.

Reference Books:
1. Real Time Operating System- Sebastian Fischmeister, Barr Group Publishing.
2. Real-Time Systems- Jane Liu, Pearson Ed. Asia.
3. Real -Time Systems- Krishna and Shin, McGraw Hill International.
4. Smart phone operating system concepts with Symbian O.S. A tutorial Guide- Michael J. Jipping. Symbian Press, Wiley.
5. Application development using Android, Hello, Android, mobile development platform- Ed Burnett, 3rd Edition, The Pragmatic Bookshelf.

PSC-CA/CS/MCA-10 Lab-7: Web Technologies

Lab Course Objectives

This course will cover the practical aspects of multi-tier application development using the .NET framework. This course is to introduce the basics of distributed application development. Technologies covered include the Common Language Runtime (CLR), .NET framework classes, VB, ASP.NET, and ADO.NET. It also cover service oriented architecture, design, performance, security, content managements and deployment issues building multi-tier applications.

List of Experiments

1. Simple application using web controls a) Finding factorial Value b) Money Conversion c) Quadratic Equation d) Temperature Conversion e) Login control
2. States of ASP.NET Pages
3. Ad-rotator Control
4. Calendar control a) Display messages in a calendar control b) Display vacation in a calendar control c) Selected day in a calendar control using style d) Difference between two calendar dates
5. Tree-view control a) Tree-view control and data-list b) Tree-view operations
6. Validation controls
7. Query textbox and Displaying records
8. Display records by using database
9. Data-list link control
10. Data-binding using drop-down-list control
11. Inserting record into a database
12. Deleting record into a database
13. Data-binding using data-list control
14. Data-list control templates
15. Data-binding using data-grid
16. Data-grid control template
17. Data-grid hyperlink
18. Data-grid button column
19. Data-list event
20. Data-grid paging
21. Creating own table format using data-grid

PSC-CN-10 Lab-7: Network Security and Cryptography

Course Objectives
This course explains fundamental ideas associated with Network security and cryptography, explains modern concepts associated with switches. It clears the understanding about Cryptography.

List of Practical's
1. Basic programs related with objectives of cryptography, secret-key and public-key cryptography
2. One- way and trapdoor one-way functions.
3. Practical based on DES and its variants.
4. Practical's based on Hash function. Key hash functions, attacks on hash function.
5. Practical based on Public-key parameters.

PSC-CA/CS/CN-11 Lab-8: Android Application Development

1. Develop an application that uses GUI components, Font and Colours
2. Develop an application that uses Layout Managers and event listeners.
3. Develop a native calculator application.
4. Write an application that draws basic graphical primitives on the screen.
5. Develop an application that makes use of database.
6. Develop an application that makes use of RSS Feed.
7. Implement an application that implements Multi threading
8. Develop a native application that uses GPS location information.
9. Implement an application that writes data to the SD card.
10. Implement an application that creates an alert upon receiving a message.
11. Write a mobile application that creates alarm clock

PSC-MCA-11 Lab- 8: Compiler Designing

Lab Course Objectives
This course explores the phases of Compiler, to aware the Finite Automata and Lexical Analysis, to understand Parsing Techniques. Students will be able to perform Syntax as well as Semantic analysis. Students will be able to plot transition diagrams for DFA and NF

1. Practical's based on Synthesis Model, Compiler Construction Tools.
2. Practical's based on Conversion from regular expression to NFA.
3. Practical's based on Conversion from NFA to DFA, Minimization of DFA, Creating Lexical Analyzer with LEX.
4. Practical's based on Classification of parsers, Top-Down Parsing, Recursive Parsing, Problems in Recursive Procedures, Predictive Parsing, Bottom Up Parsing.
5. Practical's based on Intermediate Code Generation, Intermediate Forms.

PSC-CA/CS/CN- 12: Project Development
And
PSC-MCA-12: Mini Project Development

Guidelines for Project Development and Report Submission

3. Students needs to Finalize the project topic with consent of project guide allotted within 1 week of starting semester
4. In 3nd week students needs to submit project analysis report
5. Till the end of semester students needs to submit 3 progress reports to the project guide for Designing, Coding and Testing respectively
6. At the end of semester Students needs to submit the Complete Project Report (Black Binding with Golden Word Embossing as per the guidelines given for project report) with CD (Soft Copy of Project).
7. Students should present the project (live Demonstration) at the time of Practical Examination.

OE-4A: Artificial Intelligence

Course Objectives
In this course, students will gain an appreciation of what "artificial intelligence" means, and how it can be usefully applied to real-world problems. The course is a rich field spanning formal systems for representing and processing symbolic information, computational models of human cognition, and a range of techniques for learning, planning and reasoning under uncertainty.

Course Outcome
Students will learn the intricacies of state-space search and constraint programming. Students will understand how expert knowledge can be fed into and be processed by modern computers. Students will acquire skills of planning algorithms to find solutions to optimization problems.

Course Contents
Unit 1 Introduction:
Overview and Historical Perspective, Turing test, Physical Symbol Systems and the scope of Symbolic AI, Agents.

Unit 2 State Space Search:
Depth First Search, Breadth First Search, DFID. Heuristic Search: Best First Search, Hill Climbing, Beam Search, Tabu Search.

Unit 3 Randomized Searches:
Simulated Annealing, Genetic Algorithms, Ant Colony Optimization. Finding Optimal Paths: Branch and Bound, A*, IDA*, Divide and Conquer approaches, Beam Stack Search. Problem Decomposition: Goal Trees, AO*, Rule Based Systems, Rete Net.

Unit 4: Game Playing:
Minimax Algorithm, Alpha Beta Algorithm, SSS*.

Unit 5 Planning and Constraint Satisfaction:
Domains, Forward and Backward Search, Goal Stack Planning, Plan Space Planning, Graph plan, Constraint Propagation.

Unit 6 Logic and Inferences:
Propositional Logic, First Order Logic, Soundness and Completeness, Forward and backward chaining.

Text Books
1. A First Course in Artificial Intelligence- Deepak Khemani, McGraw Hill Education.
2. Heuristic Search:Theory and Applications- S. Edelkamp, Morgan Kaufmann, Elsevier.
3. Artificial Intelligence: The Very Idea- John Haugeland, A Bradford Book, The MIT Press

Reference Books
1. Machines Who Think: A Personal Inquiry into the History and Prospects of Artificial Intelligence- Pamela McCorduck, A K Peters/CRC Press.
2. Artificial Intelligence- Elaine Rich and Kevin Knight, Tata McGraw Hill.
3. Artificial Intelligence: A Modern Approach- Stuart Russell, Peter Norvig, Prentice Hall.
4. Introduction to Artificial Intelligence- Eugene Charniak, Drew McDermott, Addison Wesley.
5. Artificial Intelligence- Patrick Henry Winston, Addison-Wesley.

OE-4B: Computer Graphics and Multimedia

Course Objectives

This subject helps students develop problem-solving, communication and research skills in the context of computer graphics, including computer representation, and manipulation and display of pictorial information. Multimedia and web design technology play an important role in the field of education, agriculture, product launch, science and technology, corporate development and enhanced business opportunities.

Course Outcomes

Students will be able to have a basic understanding of the core concepts of computer graphics. Be capable to create interactive computer graphics. They will also understand a typical graphics pipeline.

Course Contents

Unit-1

Introduction to raster scan displays, Pixels, frame buffer, Vector and Character generation, random scan systems, Graphics Primitives, Display devices, Display file structure, Scan Conversion techniques, line drawing: simple DDA, Bresenham's Algorithm, Circle Drawing Algorithms. Scan line polygon fill algorithm, boundary-fill and flood-fill algorithms

Unit-2

2D transformation: Translation, Rotation, Scaling, Shearing, Reflection. Inverse Transformation, Homogenous coordinate system, Matrices Transformation, Composite Transformation. Windowing and Clipping: World Coordinate System, Screen Coordinate System, Viewing Transformation, Line Clipping, Cohen Sutherland, Midpoint Line clipping algorithms, Polygon Clipping: Sutherland –Hodgeman, Weiler-Atherton algorithms.

Unit-3

3D transformations: translation, rotation, scaling. Parallel and Perspective Projection, Types of Parallel and Perspective Projection. Hidden Surface elimination: Depth comparison, Back face detection algorithm, Painters algorithm, Z-buffer algorithm. Curve generation, Bezier and B-spline methods.

Unit-4

Basic Illumination Model, Diffuse reflection, Specular reflection, Phong Shading Gourand shading, ray tracing, color models like RGB, YIQ, CMY, HSV.

Unit –5

Multimedia System: An Introduction, Multimedia hardware, Multimedia System Architecture. Data and File Format standards. i.e RTF, TIFF, MIDI, JPEG, DIB, MPEG

Unit 6

Audio: digital audio, MIDI, processing sound, sampling, compression. Video: Avi, 3GP,MOV, MPEG, compression standards, compression through spatial and temporal redundancy. Multimedia Authoring

Text Books

1. Computer Graphics- Donald Hearn and M.P. Becker, Pearson Pub.
2. Procedural Elements of Computer Graphics- Rogers, Tata McGraw Hill.

Reference Books
1. Computer Graphics Principle and Practice- FolayVandam, Feiner, Hughes, Pearson Pub.
2. Computer Graphics- Sinha and Udai , Tata McGraw Hill.
3. Principles of Multimedia- Parekh, Tata McGraw Hill.
4. Multimedia System Design- Prabhat k Andleigh, KiranThakral , PHI Pub.

OE-4 C: Professional Practices.

Course Objectives:
The purpose of introducing professional practices is to provide opportunity to students to undergo activities which will enable them to develop confidence. Industrial visits, expert lectures, seminars on technical topics and group discussion are planned in a semester so that there will be increased participation of students in learning process.

Course Outcome:
Student will be able to: Acquire information from different sources, Prepare notes for given topic., Present given topic in a seminar., Interact with peers to share thoughts., Prepare a report on industrial visit, expert lecture.

Unit 1 Guest Lectures: (Any Two)
Guest lectures by industry experts, other professional are to be arranged from the following topics or any other suitable technical area. The brief report is to be submitted by individual student as part of term work.
1. 3-D animation techniques. 2. Stress management. 3. IT Act 2008. 4. Linux installation and administration. 5. Resume writing and preparation of C.V. 6. Introduction of "Python" programming language. 7. Career opportunities in IT industry. 8. Plastic Memory 9. Psychological Personality Development. 10. Managing emotional quotient 11. Internet Marketing. 12. Any Other Relevant Topic.

Unit 2 Information Search: (Any Two)
Form a group of 2 students. Information should be collected from various resources like Internet, books, journals etc. on the following allocated topics or any other suitable topic suggested by guide.
Prepare Individual technical report on selected topics of 8-10 pages and deliver seminar on at least one topic.
1.Android O.S. of mobile systems. 2.Autonomic computing to manage complexity of network components. 3.Cloud computing application (any one). 4.Biometrics – in secure E-transactions. 5.Pervasive Computing 6.E–MINE: A novel web mining approach 7. 5G wireless systems 7.Jini – advanced set of network protocols 8.Parasitic Computing 9.E – wallet 10.Any other relevant topic.

Unit 3 Group Discussion: (Any One)
Form a group of 5 students and write a brief report on selected topic as a part of term work.
Some of the suggested topics: 1.Role of UN in peace keeping 2.Effect of cinema on youth 3.Government contribution to IT 4.Balance between professionalism and family 5.Position of women India compare to other nations. 6. Present state of Indian Cricket Team 7.Is globalization really necessary? 8.Is India growing spiritually? 9. Any other suitable topic.

Unit 4 Mini Projects:
A group of 6to8 students be formed for group discussion; 1. Prepare a report on Computerization of Lab or Office 2. E-learning Open source Application installation and demonstration to educational institution.3. Any other relevant topics.

Unit 5 Prepare Yourself : (Any Two)
Preparation towards Interview. Write a brief report on selected topic as a part of term work.
1.Mock Interview 2.Mock aptitude test and puzzle solving.(Attach answer paper) 3.CV Preparation.(Attach CV). 4. Any other relevant activity.

Unit 6 Social Contribution:

Socially Relevant activities Conduct any one activity through active participation of students and write the report Group of students – maximum 4 Report – not more than 6 pages List of suggested activities – (Activity may be thought in terms of campus improvement) i) Go green movement ii) Literacy camps iii) Building ethical and moral values iv) Conservation of electrical energy v) Water conservation vi) Clean campus / city vii) Awareness to avoid use of plastic carry bags viii) Educating students / people about fire fighting equipment ix) Rain water harvesting x) Traffic management within campus / city.

References Books:

1. Books on personality development and soft skills.
2. Engineering Subjects Reference books.
3. Journals and Magazines –IEEE journals, IT Technologies, PC Quest, Linux for You, CSI, Computer Today etc.
4. Local News Paper. 5.Books on General Knowledge, Aptitude Test, Puzzle Solving by – R .S. Agarwal, Shakuntala Devi
5. Websites - www.groupdiscussion.com - www. Seminarprojects.com

OE-4D:
(Other Similar Open Electives offered by other Schools / MOOC/ Swayam / Spoken tutorial platforms)

Students can choose one of these open electives. But they need to take prior permission from School Director before joining one of these elective courses. \they must produce successful completion certificate / credits earned to the School after completing the underwent course.

PSC-MCA-13: Mobile Application Development

Course Objectives

Today's applications are increasingly mobile. This course teaches students how to build mobile apps for Android that is today's mobile operating platforms. Students learn to write both web apps and native apps for Android using Eclipse and the Android SDK.

Course Outcomes

At the conclusion of the course, students should be able to understand the basic concepts of mobile computing, learn the basics of mobile telecommunication system.

Course Contents

Unit 1: Introduction

Introduction to Mobile Computing, Introduction to Android Development Environment, Factors in Developing Mobile Applications, Mobile Software Engineering, Frameworks and Tools, Generic UI Development, Android User Understanding B4A for Android: Installing Basic4Android and Android SDK, Install and configure Basic4Android, Installing Android Emulator, My first program (MyFirstProgram.b4a), Second program (SecondProgram.b4a)

Unit 2: Understanding Android Mobiles and the IDE of B4A

Screen sizes and resolutions (Special functions like 50%x, 50dip, PerXToCurrent, PerYToCurrent - 50%x, DipToCurrent - 50dip), Understanding various Android Emulators for B4A, Understanding B4A bridge (The Designer, Tools, General Setting) Menu and Toolbar, Toolbar, File menu, Edit menu, Project menu, Tools menu, Code area, tabs

Unit 3: Process and Activity life cycle

Variables and objects, Variable Types, Names of variables, declaring variables, Simple variables, Array variables, Array of views (objects), Type variables, Casting, Scope(Process variables, Activity variables, Local variables), Tips and Modules(Activity modules, Code modules, Service modules)

Unit 4: Understanding Basic Language

Program flow, Process_Globals routine, Globals routine, Activity_Create (FirstTime As Boolean) routine, Activity_Resume routine, Activity_Pause (UserClosed As Boolean) routine, Expressions (Mathematical expressions, Relational expressions, Boolean expressions), Conditional statements (If – Then – End If, Select – Case) Loop structures (For – Next, Do – Loop), Subs (Declaring, Calling a Sub, Naming, Parameters, Returned value),Events, Libraries (Standard libraries, Additional libraries folder)

Unit 5: Creating User Interface,

Menu example, TabHost example, Button toolbox example, ScrollView examples, SQLite Database (SQLite Database basics, SQLite Database ex. program), GPS Library, GPS Objects

Unit 6:

String manipulations, Files (File object, TextWriter, TextReader, Text encoding), Graphics and Drawing

Text Books
   1. Fundamentals of Mobile Computing- Prasant Kumar, Rajib Mall, PHI Publishing.

Reference Books
   1. Android Programming for Bingers- John Horton, Packt Publisher.

PSC-MCA-14: Biometrics Methods and Application

Course Objectives:
In this course, students will learn to methods of biometrics, devices of biometrics, use for computer security, design and build a secure system.

Course Outcomes:
Successful completion of this course will prepare the student to do any of the following: Perform RandD on biometrics methods and systems, Evaluate and design security systems incorporating biometrics, Understand the technology of biometrics for public policy matters involving security.

Unit-1 Introduction
Input-output channels: Vision, Hearing, Touch, Movement, Human memory: Sensory memory, Short-term memory, Long-term memory, thinking: reasoning and problem solving, Skill acquisition, Errors and mental models. Motivations for Using Biometric Systems, Human Identity and Biometrics, Levels of Identification, Biometrics for Identity Management

Unit-2 Fundamentals of Biometrics
Biometric Technologies Work In General, Overview of Applications, Errors and Error Rates, Failure to Acquire, Personal Biometric Criteria, Biometric System-Level Criteria, Key Elements of Biometric Systems, Biometric Performance Metrics, Template Storage Considerations, Terms and Definitions Related to Biometrics.

Unit-3 Types of Biometric Technologies
Dynamic Signature Analysis, Facial Imaging or Recognition, Fingerprint, Hand Geometry, Iris Recognition, Keystroke Analysis/Keystroke Dynamics, Palm print, Retinal Scan, Skin Spectroscopy/Skin Texture/Skin Contact, Speaker Verification, Vascular Biometrics, Other Biometric Technologies

Unit-4 The Biometric System Design Process
System Concept Development, Operational Considerations and Constraints, The Requirements Definition, The System Specification, Biometric Access Control, The Architectural Aspects of an Automated Access

Unit-5 Structure of Biometric Standards
Introduction, Current Work in Biometric Standards, Development, International Standards Organizations, BioAPI Consortium, Common Biometric Exchange Framework Format (CBEFF), Best Practices in Standards Development.

Unit-6 Testing and Evaluation
Introduction, Understanding Biometric System Performance, Comparison of Types of Testing, Technology Testing, Scenario Testing, Operational Testing

Text Books:
1. Biometric Technology Application Manual, Volume One: Biometric Basics Compiled and Published by: National Biometric Security Project Updated Summer 2008.

References Books:
1. Human Computer Interaction- Alan Dix, Janet Finlay, Gregory D. Abowd, Russell Beale.
2. Biometric Recognition: Challenges and Opportunities, Joseph N. Pato and Lynette, National Research Council

PSC-MCA-15: E-Commerce

Course Objectives:
To prepare students competent enough to take up to employment and self employment opportunities in E-Commerce and M-Commerce fields.

Course Outcomes:
Student will understand and familiar with environment and operations in the field of E-Commerce. Students training and practical approach by exposing them to modern technology.

Unit -1 Introduction to E-Commerce
Electronic Commerce Framework, Electronic Commerce and Media Convergence, Anatomy of E-Commerce, Electronic Commerce Applications. Network Infrastructure for Electronic Commerce: Components of I-way, Network Access Equipment, Global information Distribution Networks.

Unit -2 The Internet as a Network Infrastructure
Internet Terminology, NSFNET Architecture, National Research and Education Network, Internet Governance. The Business of Internet Commercialization: Telco/Cable/On-Line Companies, National Independent ISPs, Regional ISPs, Local ISPs, Internet Connectivity options.

Unit -3 Electronic Commerce and the World Wide Web
Architectural Framework for Electronic Commerce, Technology behind the Web, Security and the Web, Consumer-Oriented Electronic Commerce: Consumer-Oriented Applications, Mercantile Process Model.

Unit- 4 Electronic Payment Systems
Types of Electronic Payment Systems, Digital Token based Electronic Payment Systems, Credit Card Based Electronic Payment Systems, Risk and Electronic Payment Systems, Designing Electronic Payment Systems. Inter Organizational Commerce and EDI: Electronic Data Interchange, EDI Applications in Business, EDI: Legal, Security and Privacy issues.

Unit- 5 Advertising and the Marketing on the Internet
The New Age of Information, Advertising on Internet, Information search and retrieval, Electronic Commerce Catalogs, Information filtering.

Unit- 6 On-Demand Education and Digital Copyrights
Computer Based Education and Training, Technological Components of Education on demand, Digital Copyrights. Software Agents: Characteristics and Properties of Agents, the Technology behind Software Agents, Browsers and Software Agents.

Text Books:
   1. Frontiers of Electronic Commerce, Ravi Kalakota, Pearson Education.

Reference Books:
   1. E-Commerce: Business, Technology, Society, Ken Laudon, Jeffrey Travis, Prentice Hall.

PSC-MCA-16: Java Programming

Course Objectives

Objective of this course is to introduce the students to some concepts of advanced programming and practice on reusing components. It focuses on Graphical User Interface (GUI), networking, and database manipulation. Discuss the principles of inheritance and polymorphism and demonstrate though problem analysis assignments how they relate to the design of methods, abstract classes and interfaces.

Course Outcomes

With this course Students should be able to Learn the Internet Programming, using JApplets. Create a full set of UI widgets and other components, including windows, menus, buttons, checkboxes, text fields, scrollbars and scrolling lists, using Abstract Windowing Toolkit (AWT) and Swings. Learn to access database through Java programs, using Java Data Base Connectivity (JDBC). Create dynamic web pages, using Servlets and JSP. Understand the multi-tier architecture of web-based enterprise applications using Enterprise JavaBeans (EJB).

Course Contents

Unit-1 Introduction to java:

History, Features, Java program structure, Java tokens, Java Statements, Java virtual machine, Command line arguments, Constants, Variable, Data types, Decision making and branching, looping, Class, Methods, Objects, Method overloading, Nesting of methods

Unit-2 Inheritance and System packages

Overriding methods, Final variables, Final methods, Final Classes, Abstract methods, Abstract Classes, Visibility Control, Arrays, Strings, Vectors, Naming conventions, Creating and accessing packages, Introduction to multithreaded programming, Creating and extending threads, Life cycle of thread, Thread exception, Thread priority, Synchronization, Exception handling, Multiple catch statements, finally statement, Throwing our own exceptions, Exception for debugging

Unit-3: Applets and Graphics

Applet code, Applet life cycle, creating an executable applet, designing a web page, Applet tag, passing parameter to applet, Lines, Rectangles, Circles, Ellipses, Arcs, Polygons, Line graphs, Bar charts, Control loops in applet

Unit-4: Java Database Connectivity:

The design of JDBC, JDBC driver types, Basic JDBC programming, concept.

Unit –5 Java Beans and Swing:

Introduction to Java Bean, Advantages of Java beans, Application Builder tools, Using BDK, JAR Files, JApplet, JIconsand Labels, Textfields, Buttons, Combo Boxes, Scrollpanes, Trees, Tables, Menu, Bars and Menus, Tool Bars, Dialog Boxes, File dialog, Progress Bar.

Unit 6

Servlets and Java Server Pages : The life cycle of a servlets, Using Tomcat for server development, A simple servlet, Using cookies, Session Tracking, Introduction to java server pages, A simple JSP, example, Scripting.

Text Books
1. Programming with Java A Primer – E.Balaguruswamy, McGrawhill
2. Java 7 Programming Black Book - Kogent Learning Solutions Inc, Dream Tech press

Reference Books
1. Java Fundamentals A comprehensive introduction- Herbert Schildt, Dale Skrien, McGraw Hill.
2. The Complete Reference, Java 2 – Herbert Schild, Fourth Edition, - TMH.
3. Core Java Volume-I Fundamentals- Horstmann and Cornell, - Pearson Education.

DEC-11: Operations Research

Course Objectives:
The objectives of this course are to: introduce students to the techniques of operations research in mining operations, provide students with basic skills and knowledge of operations research and its application in mineral industry, introduce students to practical application of operations research in big mining projects

Course Outcome:
Upon successful completion of this course, the student will be able to: explain the meaning of operations research know the various techniques of operations research, apply the techniques used in operations research to solve real life problem in mining industry select an optimum solution with profit maximization.

Course Contents:
Unit 1:
Operations research and its scope, Necessity of operations research in industry, Introductions to Linear programming problems, General linear programming problems, Mathematical Formulation of L.P.P., Basic solution,

Unit 2:
Important theorems, solution of linear programming problem, Graphical method for solution, convex set, some important theorems, revised simplex method, dual simplex method.

Unit 3:
Theory of Simplex methods: Introduction, slack and surplus variables, some definitions and notations

Unit 4:
Fundamental theorems of linear programming, BSF from F.S., Improved B.S.F. Unbounded solution, optimality of solutions.

Unit 5:
Computational procedure of simplex method for the solution of a maximization L.P.P., artificial variable technique, duality and sensitivity analysis.

Unit 6:
Introduction, competitive game, finite and infinite game, two person zero sum game, rectangular game , solution of game, saddle point, solution of a rectangular game with saddle point. PERT-CPM, product planning control with PERT-CPM.

Text Books:
1. Linear Programming- R. K. Gupta, Krishna PrakashanMandir.
2. Introduction to Operations Research- F.S.Hillier and G.J.Liebermann, McGraw Hill.
3. Operations Research- Kantiswaroop, P.K.Gupta, Sultan Chand and Sons, New Delhi.
4. Linear Programming- G.Hadley, Narosa publishing House.

Reference Books:
1. Nonlinear and Dynamic Programming- G.Hadley, Addison-Wesley.
2. Operations Research-An Introduction- H.A.Taha, Macmillan Publishing Company, Inc,.
   Optimization Theory and Applications- S.S.Rao, Wiley Eastern Ltd., New Delhi.

DEC-12: Decision Support System

Course objectives:
This Course leads students to learn Decision Support System, DSS Tools, DSS implementation and impacts and Enterprise DSS.

Course Outcomes:
Student should get familiarity to new methods for DSS.

Course Contents:
Unit 1:
Decision Support Systems-An Overview, Decision Support Systems (DSS) Concept DSS : Deterministic Systems , Artificial Intelligence, Knowledge Based Expert Systems, MIS and Role of DSS

Unit 2:
Data warehouse, Access, Analysis, Mining and Visualization for DSS, Data warehousing, access, analysis and visualization, Data collection problems and quality, Internet and commercial database service, Database Mgt System for DSS , Database organization structure for DSS, Data warehousing, LAP, Data mining, Data Visualization, GIS and virtual reality, Business Intelligence

Unit 3:
DSS Development .Introduction to DSS development, Traditional system development life cycle, Alternate development methodologies, Prototyping: DSS Methodology

Unit 4:
Tools for DSS development DSS Technology levels and tools DSS development platform DSS development tools selection Team – developed DSS End user Developed DSS Development of DSS: Putting system together DSS future

Unit 5:
Enterprise Decision Support System Enterprise system: Concept and definition Evolution of executive and enterprise information system Characteristics and capabilities of ESS Comparing and integrating EIS and DSS EIS , data access, data warehousing, OLAP , multidimensional analysis, presentation Including soft information in enterprise systems Organizational DSS Supply and value chain and decision support Computerized systems– MRP , ERP , SCM Frontline DSS Future of DSS and EIS

Unit 6:
Implementation, integration and impacts Implementation: an overview The major issues of implementation, Implementation strategies System Integration: What and Why? Generic models of MSS integration Models of ES and DSS integration. Integration of EIS, DSS and ES Intelligent DSS Intelligent modelling Examples of integrated systems

Text Books:
 1. Decision Support Systems and Intelligent systems- Efrain Turbon, McGraw Hill.
References Books:
 1. Management Information Systems by W S Jawadekar, McGraw Hill.

DEC-13 Essentials of Management Skill

Course Objectives

This Course Demonstrate an acceptable level of mastery in personal, interpersonal, group, and organizational management skills linked with organizational effectiveness; Gain insights by working in student teams to develop skills in team development, project management, and deepen understanding of course material. To equip executives with general management and functional area knowledge. To enhance analytical skills for effective decision making

Course Outcomes:

After studying this course, you should be able to: Understand what is meant by management and managerial effectiveness, Identify the roles which are fulfilled while working as a manager., Identify managerial activities that contribute to managerial effectiveness.

Course Contents:

Unit-1 Introduction to Management

Definition, Characteristics of management, Importance of Management, Administration, Management thoughts: Contribution of F.W. Taylor, Henry Fayol, Peter Drucker, etc Management process school, Systems Management School

Unit -2 Planning and Controlling

Planning: Definition, Characteristics, Nature, Importance, Types of Plans: (Standing and Single Use Plans), Planning Process Controlling: Concept, Definition, Principles of Controlling, Objectives of controlling, Importance of Controlling

Unit-3 Organizing

Concept, Definition, Process of organization, Principles of organization, Authority, Responsibility and Delegation, Forms of organization. Centralization and Decentralization

Unit- 4 Leadership and Motivation

Concept of Leadership, Definition, Qualities of Leadership, Leadership Styles Motivation: Meaning and Definition, Theories of Motivation1. Maslow's Need Hierarchy McGregor's Theory "X' and Theory 'Y"

Unit- 5 Staffing

Human Resource Planning, Recruitment, Selection, Training, Training and development, Performance appraisal methods

Unit- 6 Quality Concepts and Social responsibility of Business

Total Quality Management, ISO, Quality Circle Social Responsibility of Business: Definition, Responsibilities towards owners, workers, consumers, suppliers, state, society etc.

Text Books:
1. Essentials Of Management- Harold Koontz ,Heinz Weihrich, Tata Mcgraw Hill.
2. Principles and Practice Of Management- Dr. S. C. Saxena, Sahitya Bhavan Publications.

Reference Books:
1. Principles Of Management- R. N. Gupta, S. Chand and Company.

DEC-14: Decision Theory

Course Objectives:
Decision theory is an important branch of economics that, implicitly or explicitly, forms the basis of most economic theory, both micro and macro. How does one model human decision makers? How should a utility function be interpreted? How does the presence of risk, affect decisions? These are questions you will find yourselves well equipped to answer by the end of the course

Course outcomes:
The students will familiarize with fundamental concepts of the statistical decision theory and Bayesian inference. At the end of the course, they will be able to formulate a decision theoretic approach to problem, evaluate Bayes and posterior risks and find the optimal solution. The students will be able to apply empirical and hierarchical Bayes approaches, will solve statistical games and find maximin and minimax strategies when playing against an intelligent opponent.

Course Contents:
Unit 1:
Decision problem, loss function, risk function, randomized and nonrandomized decision rule. Decision principles (Conditional Bayes, Frequentist).Testing and estimation problem as decision problems. Optimal decision rule.

Unit 2:
Concept of admissibility and completeness, Bayes rules, minimax decision rule. Admissibility of Bayes rules. Existence of Bayes decision rule.

Unit 3:
Definition of non-parametric test, advantages and disadvantages of nonparametric tests. Single sample problems. (i) Test of randomness (ii) Tests of goodness of fit: Empirical distribution function.

Unit 4:
Kolmogorov-Smirnov test, comparison of Chi-squareand KS test. (iii) Problem of location: Sign test, Wilcoxon's signed rank test, Wilcoxon paired sample signed rank test.

Unit 5:
Two Sample Problems: Different types of alternative, sign test, Wilcoxon two sample rank sum test, Wald-Wolfiwitz run test, Mann-Whitney-Wilcoxon test, median test. K-S two sample test.

Unit 6:
One sample U statistic, Kernel and symmetric Kernel, variance of U statistic, two sample U statistics, linear rank statistics and their distribution properties under null hypothesis.

Text Books:
1. Mathematical Statistics- Ferguson T. S., Academic Press, New York.
2. Non-parametric methods in Statistics- Fraser, D.A.J. , John Wiley.
3. Non Parametric Statistical inference- Gibben J.D., Marcel Dekker, Inc., New York.

Reference Books:
1. An Outline of Statistical Inference- Goon A.M., Gupta M.K., The World Press Pvt. Ltd.
2. Foundations, Concepts and Methods- Berger, J.O. Statistical Decision Theory, Springer.
3. Statistical Design Theory and Bayesian Analysis- Berger, J.O., 2nd ed., Springer.

DEC-15: Software Quality Assurance and Testing

Course Objectives
To understand the testing concepts with software quality measures and quality assurance. To understand the defect management and improve software quality. To understand the testing tools.

Course Outcomes
This course will give deep knowledge about software testing concepts with various kinds of software tools and techniques. This course also guides students to learn software quality measures and quality improvement strategies.

Course Contents

Unit 1 Introduction
Introduction, Nature of errors, an example for Testing, Definition of Quality, QA, QC, QM and SQA, Software Development Life Cycle , Software Quality Factors Verification and Validation Definition of V andV, Different types of V and V Mechanisms, Concepts of Software Reviews, Inspection and Walkthrough.

Unit 2 Software Testing Methods and strategies
Testing Fundamentals, Test Case Design, White Box Testing and its types, Black Box Testing and its types, Strategic Approach to Software Testing, Unit Testing, Integration Testing, Validation Testing, system Testing.

Unit 3 Software Metrics and Defect Management
Concept and Developing Metrics, Different types of Metrics, complexity metrics, Definition of Defects, Defect Management Process, Defect Reporting, Metrics Related to Defects, Using Defects for Process Improvement.

Unit 4 Quality Improvement
Introduction, Pareto Diagrams, Cause-effect Diagrams, Scatter Diagrams, Run charts.

Unit 5 Software Quality Assurance and Quality Costs
Concepts, Quality Movement, Background issues and SQA activities Software Reviews, Formal Technical Reviews, Formal approaches to SQA Statistical Quality Assurance, Software Reliability, SQA Plan, The ISO 9001 Quality Standard, Six sigma, Informal Reviews, Quality Cost Measurement, Utilizing Quality Costs for Decision-Making .

Unit 6 Testing Tools
Testing Tools, Introduction to Junit, Apache Jmeter, Winrunner, Loadrunner, Rational Robot

Text Books
1. Software Engineering A Practitioners Approach-, Roger S. Pressman, Tata McGraw Hill
2. Software Engineering for Students- A Programming Approach - Douglas Bell, Pearson.
3. Software engineering: An Engineering approach- J.F.Peters, W.Pedrycz, Wiley Press.

Reference Books:
1. Quality Management- Donna C. S. Summers, 5th ed., Prentice-Hall.
2. Total Quality Management- Dale H. Besterfield, Prentice Hall.
3. Software testing- Yogesh Singh, Cambridge publication
4. Software Testing and Quality Assurance Theory and Practice- Kshirsagar Naik, Priyadarshi Tripathy, Nirali Prakashan.

PSC-MCA-17 Lab 9: Mobile and Web application development lab

Lab Course Objectives

Today's applications are increasingly mobile. This course teaches students how to build mobile apps for Android that is today's mobile operating platforms. Students learn to write both web apps and native apps for Android using Eclipse and the Android SDK, to write native apps for android mobiles, Touches, and Tablets and to write web apps for platforms.

1. Develop an application that uses GUI components, Font and Colours

2. Develop an application that uses Layout Managers and event listeners.

3. Develop a native calculator application.

4. Write an application that draws basic graphical primitives on the screen.

5. Develop an application that makes use of database.

6. Develop an application that makes use of RSS Feed.

7. Implement an application that implements Multi threading

8. Develop a native application that uses GPS location information.

9. Implement an application that writes data to the SD card.

10. Implement an application that creates an alert upon receiving a message.

11. Write a mobile application that creates alarm clock

PSC-MCA-18 Lab 10: Java Programming

Lab Course Objectives

Students completing the course should know: The model of object oriented programming abstract data types, encapsulation, inheritance and polymorphism. Fundamental features of an object oriented language like Java: object classes and interfaces, exceptions and libraries of object collections

1. Design the following static web pages required for an online book store web site. a) HOME PAGE: The static home page must contain three frames. b) LOGIN PAGE c) CATOLOGUE PAGE: The catalogue page should contain the details of all the books available in the web site in a table. d) CART PAGE: The cart page contains the details about the books which are added to the cart. e) REGISTRATION PAGE

2. Write JavaScript to validate the fields of the above registration page. Write JavaScript to validate the fields of the Login page.

3. Design a web page using CSS which includes the following: a) Use different font, styles: b) Set a background image for both the page and single elements on the page. c) Control the repetition of the image with the background repeat property. d) Define styles for links e) Working with layers f) Add a customized cursor

4. Write an XML file which will display the Book information. Write a Document Type Definition (DTD) to validate the above XML file. Display the XML file in a table. Use XML schemas XSL and CSS for the above purpose.

5. Create a simple visual bean with a area filled with a colour. The shape of the area depends on the property shape. If it is set to true then the shape of the area is Square and it is Circle, if it is false. The colour of the area should be changed dynamically for every mouse click. The colour should also be changed if we change the colour in the "property window ".

6. a) Install TOMCAT web server and APACHE. b) Access the above developed static web pages for books web site, using these servers by putting the web pages developed in week-1 and week-2 in the document root.

7. Assume four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 and pwd4 respectively. Write a servlet for doing the following. 1. Create a Cookie and add these four user id's and passwords to this Cookie. 2. Read the user id and passwords entered in the Login form and authenticate with the values available in the cookies.

8. Install a database (Mysql or Oracle). Create a table which should contain at least the following fields: name, password, email-id, phone number Write a java program/servlet/JSP to connect to that database and extract data from the tables and display them. Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration page.

9. Write a JSP which insert the details of the 3 or 4 users who register with the web site by using registration form. Authenticate the user when he submits the login form using the user name and password from the database

10. Create tables in the database which contain the details of items (books) of each category. Modify your catalogue page (week 2) in such a way that you should connect to the database and extract data from the tables and display them in the catalogue page using JDBC

11. Write a JSP program that demonstrates the concept of Session Tracking

12. Developing application using DHTML Filters

13. Creating animations using CSS3

14. Designing a scientific calculator using java script

OE-5-A Cyber Law and IT Protection

Course Objectives:
This objective of this course is to share knowledge of cybercrime, ethical hacking, cyber security, and cyber forensics and cyber laws.

Course Outcomes:
To facilitate understand and critical understanding about Cyber crimes, Ethical Hacking, cyber security, forensics and cyber laws. Exploration of the legal and policy developments in various countries for cyber space.

Unit-1 Introduction to Internet and Cyber Law
Modern Era: The Scene and Problems, Need for Cyber Laws, Historical Perspective, Impact of the Internet and Information Technology (IT) on Business and Society, The Character and Use of Internet Technologies.

Unit-2 Legal Aspects of electronic Records/ Digital signatures
Recognition of Electronic Records, UNCITRAL Model Law, Position in the US, Position in the Australia, Electronic Records and digital signature and Their use by Government and its Agencies in India, Retention of electronic Records in India, Central government Power to make Rule in India.

Unit-3 The Role and Regulations of Certifying Authorities in India
The Scenario, The role of Certifying Authority, Appointment of controller and His Function, Obtaining License to Issue Electronic/ digital signature certificates in India, Renewal and Suspension of License of the Certifying Authority, Procedure and Guide Lines for Certifying Authority.

Unit-4 Protection of Intellectual Property Rights in Cyberspace in India
The cyberspace, The Relevance of Domain Names in Intellectual Property Rights, Deception by Squatting in Cyberspace, Protection of Copyright on Cyberspace, Rights of Software Copyright Owners.

Unit-5 International Efforts Related to Cyberspace Laws
United Nation Commission on International Trade Law, The Organization for Economic Cooperation Development, World Trade Organization and E-Commerce, The World Intellectual Property Organization and E-Commerce.

Unit-6 Penalties, Compensation and Adjudication of Violations of Provisions of IT Act
Penalty and Compensation for Damage to Computer, Compensation to Failure to Furnish to Protect Data, Penalty for Failure to Furnish Information, Return or any Other Penalty, Adjudication of disputes under the It Act.

Text Books:
   1. Cyber Law and IT Protection- Harish Chander, PHI Learning Private Limited.

Reference Books:
   1. Understanding Cyber Law and Cyber Crime- Garima Tiwari , Lexis Nexis.
   2. Text Book on Cyber Law- Pawan Duggal, Second Edition , Universal Publication.

OE-5-B: Computer Application in Business

Course Objectives:
To create awareness about role of IT in business and to introduce concepts and techniques of e-commerce

Course Outcomes:
By the end of this course, the student should be able to: Have awareness about role of IT in business Have knowledge of basic concepts of e-commerce Be aware of different types of e-commerce web sites and different modes of payments Be aware of security and legal issues in e-commerce.

Course Contents:
Unit 1:
History of e-commerce, definition, classification- B2B, B2C, C2C, G2C, B2G sites, ecommerce in education, financial, auction, news, entertainment sectors, Doing e-Commerce.

Unit 2:
Electronic payment systems, relevance of currencies, credit cards, debit cards, smart cards, e-credit accounts, e-money, security concerns in e commerce, authenticity, privacy, integrity, non-repudiation, encryption, secret key cryptography, public key cryptography, digital signatures, firewalls

Unit -3:
Mass marketing, segmentation, one-to-one marketing, personalization and behavioural marketing, web advertising, online advertising methods, advertising strategies and promotions,

Unit -4:
Special advertising and implementation topics.

Unit 5:
Mobile Commerce: attributes and benefits, Mobile Devices, Computing software, Wireless Telecommunication devices, Mobile finance applications, Web 2.0 Revolution,

Unit-6
Social media and industry disruptors, Virtual communities, Online social networking: Basics and examples, Web 3.0 and Web 4.0, Civil law, intellectual property law, common law and EC legal issues

Text Books:
1. Frontiers of Electronic Commerce- Ravi Kalakota, Andrew B. Whinston, Pearson Education.
2. Electronic Commerce–A Managerial Perspective- Erfan Turban, Pearson Education .

Reference Books
1. Electronic Commerce – a Manger's guide- R Kalokota, Andrew V. Winston,Pearson Education.

OE-5C: Seminar/ Survey/ Activity

Guidelines for Seminar
1. Students need to confirm Seminar Topic with consent of guide
2. Student should submit the seminar report in hard copy (spiral binding) and Soft Copy (Report + Presentation) as per the guideline below
   2.1 Introduction of Seminar Topic
   2.2 Abstract of study
   2.3 Survey/Analysis
   2.4 Detail Study
   2.5 Results
   2.6 Conclusion
   2.7 References
3. Student should Give Presentation (With PPT)

Guidelines for Survey
1. Students need to finalize Survey topic with consent of guide
2. Student should submit Survey Report in Hard Copy (Spiral Binding) and Soft Copy (Survey Report + Presentation) as per the guidelines below
   2.1 Introduction of Survey Topic
   2.2 Abstract of Survey
   2.3 Analysis with Expected Population and Sample size
   2.4 Detail study/ Comparison
   2.5 Results
   2.6 Conclusion
   2.7 References
   2.8 Annex- collected samples (evidences)
3. Student should Give Presentation (With PPT)

Any other Activity Suggested by Teacher/ Mentor/ Guide

OE-5D:
(Other Similar Open Electives offered by other Schools / MOOC/ Swayam / Spoken tutorial platforms)

Students can choose one of these open electives. But they need to take prior permission from School Director before joining one of these elective courses. \they must produce successful completion certificate / credits earned to the School after completing the underwent course.

PSC-MCA-19: Major Project Development

General Instruction Regarding Preparation of Project Report

1] Hard Binding with Black Colour and Gold letters

Project Report

On

PROJECT TITLE

Submitted By

Name of the Student

MASTER OF COMPUTER APPLICATION

स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ, नांदेड.

School of Computational Science

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY

NANDED (M. S.) 431606

Year 2018-19

Guidelines for front page

Font : **Times New Roman**

Font Size:**14 Pt**. For- (Project Report On, Submitted By, School of Computational Science, Swami Ramanand Teerth Marathwada University, Nanded (M. S.) 431606, year 2018-19)

16 Pt. For - Name of the Student

18 Pt. For- Project Title and Master Of Computer Application (All Caps)

No Border for the pages, No header and Footer, Line spacing – Multiple at 1.5

2] Spine/Side view of the Report –

MCA

**Project
TITLE**

**2018 -
2019**

3. Blank white thick page

4. Next Page -

<div align="center">

Project Report

On

PROJECT TITLE

Submitted By

Name of the Student

[Seat No.]

Guided By

Name of the Guide

In partial fulfilment for the award of

MASTER OF COMPUTER APPLICATION

</div>

<div align="center">

School of Computational Science

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY

NANDED (M. S.) 431606

Year 2018-19

</div>

5. Certificate Page

CERTIFICATE

(TNR-18/Caps/Bold/Centre)

(Certificate Text – TNR-12)

This is to certify that, the project "Title of the Project (in Bold)" submitted by

(Name of the student) (TNR-12/Bold)

Is a bonafide work completed under my supervision and guidance in partial fulfilment for award of Master of Computer Application Degree of Swami Ramanand Teerth Marathwada University, Nanded.

Place   : Nanded

Date   :

(Name of the Guide)   **(Name of Director)**

(Do not prefix any Prof/Lect etc)

    Guide   **Director**

CONTENTS

(TNR-16/Bold/Centre)

(All above – if applicable and Give list only) – (TNR-12/Bold)

Chapter Titles in (TNR-14/Caps/Bold) and Subtopics (TNR-12/Bold)

6. CONCLUSION

    6.1 Conclusion

    6.2 Future Scope

    6.3 Applications/Utility

    6.4 User Manual

    6.5 Operations Manual / Menu Explanation

    6.6 Forms and Report Specifications

    6.7 Drawbacks and Limitations

    6.8 Proposed Enhancements

  REFERENCES

  ANNEXURES

  ACKNOWLEDGEMENT

Instructions –
- For subtopics, each first letter of the word should be capital except the words such as and, of, for etc.
- For sub-sub topic only first letter of the title should be capital. for ex.

      1. INTRODUCTION

      1.1 Introduction of Cryptography

        1.1.1 General aspect

- After the last chapter of conclusions in the contents, it may have appendix or data sheets as per the requirement.
- Text for all chapters should be in TNR-12 and topic headings should be in TNR-14/Bold.

7. About References – (This should be towards end of the report)
- **References** should be placed in Square Bracket [ ] at appropriate places in various chapters.
- Reference Page Title should be in TNR-14/Bold

                        References

- References must be in the standard format such as

      [1] A.S. Tanenbaum, "Computer Networks", 2nd Edition, PHI
      [2] Web Site – http://www.cnn.com

These reference numbers should appear at appropriate places in the Project report.

8. Acknowledgement -   (This should be at the end of the report and 1 page only)

<div align="center">

Acknowledgement

(TNR-14/**Bold**/Centre)

</div>

(Names of the student with **Signature**

Roll No.)

(After Acknowledgement there should be 2 Blank pages in the report.)

9. Instructions about paper to be used.

- Page Size – A/4, Executive Bond, Super white, more than 70 GSM.
- Use front face for printing

10. Instructions about Page Numbering/Figure Numbering etc..

1) First page of first chapter should not have a printed page no.
2) From second chapter the page no should be printed at the centre-bottom top-right corner of the page.
3) The title of the **table** should be at the **top** …

Table 2.1 Timing Analysis

4) The title of **figure/photograph/graph** should be at the **bottom.**
5) The titles should start at top/bottom with no additional line spacing.

11. About Size of the Report –

Normally the Project Report would be approximately 60 pages. It may be in the range of 60 to 70 pages (including appendix, data sheets etc.). This may change in exceptional cases.

12. No. of Copies to be prepared –

1 Copy for Department

1 Copy for Guide

1 Copy for student

13. General Guidelines

- Paper size A4 , Left margin – 1.5"
- Right Margin -0.5"
- Top Margin – 1"
- Bottom Margin – 1"
- Text should be justified.
- Line Spacing 1.5

==============================

Director
School of Computational Sciences
S.R.T.M.University,Nanded (M.S.)