



SIR PADAMPAT SINGHANIA UNIVERSITY

Udaipur

SCHOOL OF ENGINEERING

Course Curriculum of 3-Year M.C.A Degree Programme
(Batch- 2018-21)

Credit Structure

M.C.A. Core		M.C.A. Elective	
Category	Credits	Category	Credits
Departmental Core Subjects	86	Departmental Electives	8
Humanities & Basic Sciences Subjects	14	Open Electives	2
Management Subjects	3		
Total	103	Total	10
Grand Total			113

Distribution of Total Credits & Contact Hours in all Semesters

S. No.	Semester Number	Credits/Semester	Contact hours/week
1	I	18	21
2	II	21	26
3	III	20	24
4	IV	21	27
5	V	23	26
6	VI	10	20
Total		113	--

Course Structure: M.C.A. 2018-21

Semester - I

S. No.	Course Code	Course Title	L	T	P	Credit(s)
1	CA-554	Logic Design	3	0	1	4
2	CA-566	Programming in C	3	0	2	5
3	HU-551	Business Communication	2	0	0	2
4	MA-551	Numerical Methods & Computation	3	1	0	4
5	BM-575	Principles of Management	3	0	0	3
Total Credits						18
6	EP-599A	Endeavour Project(Beyond the Syllabus)				
Total Contact hours/week						21

Semester - II

S. No.	Course Code	Course Title	L	T	P	Credit(s)
1	CA-555	Data Structures	3	0	1	4
2	CA-556	Operating Systems	3	0	1	4
3	CA-579	Object Oriented Programming in C++	3	0	2	5
4	CA-593	Computer Organization & Architecture	3	0	1	4
5	MA-552	Introduction to Algebra & Matrix Analysis	3	1	0	4
Total Credits						21
6	EP-599A	Endeavour Project(Beyond the Syllabus)				3
Total Contact hours/week						26

Semester - III

S. No.	Course Code	Course Title	L	T	P	Credit(s)
1	CA-559	Discrete Mathematical Structures	3	1	0	4
2	CA-562	Database Management Systems	3	0	1	4
3	CA-581	Computer Networks	3	0	1	4
4	CA-582	Programming in JAVA	2	0	2	4
5	MA-553	Introduction to Probability Theory & Stochastic Processes	4	0	0	4
Total Credits						20
6	EP-599B	Endeavour Project(Beyond the Syllabus)				
Total Contact hours/week						24

Semester - IV

S. No.	Course Code	Course Title	L	T	P	Credit(s)
1	CA-567	Computer Graphics	3	0	1	4
2	CA-583	Design & Analysis of Algorithms	3	0	1	4
3	CA-586	Advanced JAVA	3	0	1	4
4	CA-594	Introduction to Software Engineering	3	0	0	3
5	CA-5XX	Departmental Elective - I	3	0	1	4
6	CA-585	Technical Seminar	0	0	2	2
Total Credits						21
7	EP-599B	Endeavour Project(Beyond the Syllabus)				3
Total Contact hours/week						27

Semester - V

S. No.	Course Code	Course Title	L	T	P	Credit(s)	
1	CA-577	Applied Multivariate Data Analysis	3	0	0	3	
2	CA-591	Compiler Design	3	0	1	4	
3	CA-592	Management Information System & E-Commerce	3	0	1	4	
4	CA-5XX	Departmental Elective - II	3	0	1	4	
5	CA-568	Minor Project	0	6	0	6	
6	XX-XXX	Open Elective	X	X	0	2	
Total Credits						23	
7	EP-599C	Endeavour Project(Beyond the Syllabus)					
Total Contact hours/week						26	

Semester - VI

S. No.	Course Code	Course Title	L	T	P	Credit(s)	
1	CA-580	Dissertation	0	0	10	10	
Total Credits						10	
2	EP-599C	Endeavour Project(Beyond the Syllabus)					3
Total Contact hours/week						20	

List of Departmental Elective(s) - I

S. No.	Course Code	Course Title	L	T	P	Credit
1	CA-570	Artificial Intelligence	3	0	1	4
2	CA-587	C# & .NET Framework	3	0	1	4
3	CA-588	Web Based System Designs	3	0	1	4
4	CA-589	Data Mining & Warehousing	3	0	1	4

List of Departmental Elective(s) - II

S. No.	Course Code	Course Title	L	T	P	Credit
1	CA-569	Cryptography	3	0	1	4
2	CA-572	Digital Image Processing	3	0	1	4
3	CA-575	Soft Computing	3	0	1	4

List of Open Elective(s)

S. No.	Course Code	Course Title	L	T	P	Credit
1	HU-554	Fun with Drama	0	2	0	2
2	BM-571	Professional Ethics & Morals	2	0	0	2
3	BM-576	Intellectual property Rights & Patents	2	0	0	2

Detailed Syllabus for M.C.A. Degree Programme

Semester - I

(Departmental Core Subject)

CA-554
Logic Design

L-T-P-C
3-0-1-4

Objective: *Logic design is a core subject for computer science students & provides in-depth theoretical & practical knowledge about the basic building blocks of a modern day computer. The topics range from basic logic gate design, to combinational & logic circuit design & implementation using hardware description language.*

Course Content

Binary Systems: Digital Systems, Binary Numbers, Number Base Conversions, Octal & Hexadecimal Numbers, Complements, Signed Binary Numbers, Binary Codes, Binary Storage & Registers, Binary Logic. Boolean Algebra & Logic Gates: Basic Definitions, Axiomatic Definition of Boolean Algebra, Basic Theorems & Properties of Boolean Algebra, Boolean Functions, Canonical & Standard Forms, Other Logic Operating, Digital Logic Operations, Digital Logic Gates, Integrated Circuits. Gate - Level Minimization: The Map Method, Four - Variable Map, Five - Variable Map, Product of Sums Simplification, Don't - Care Conditions, NAND & NOR Implementations, Other Two- Level Implements, Exclusive - OR Function. Combinational Logic: Combinational Circuits Analysis Procedure, Design Procedure, Binary Adder - Subtractor, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers. Synchronous Sequential Logic: Sequential Circuits, Latches, Flip-Flops, Analysis of Clocked Sequential Circuits, State Reduction & Assignment, Design Procedure. Registers & Circuits: Registers, Shift Registers, Ripple Counters, Synchronous Counters, Other Counters. Memory & Programmable Logic: Introduction, Random-Access Memory, Memory Decoding, Error Detection & Correction, Read-Only Memory,

Programmable Logic Array, Programmable Array Logic, Sequential Programmable Devices.

List of Experiments

1. Programs related to logic gates
2. Programs related to combinatorial circuit
3. Programs related to tri state buffer
4. Program related to multiplexer
5. Program related to Half Adder / Full Adder
6. Program related to Half Subtractor / Full Subtractor
7. Programs related to code conversion like binary to gray codes etc
8. Program related to comparator
9. Programs related to multiplier
10. Programs related to encoders/decoders
11. Programs related to registers & counters
12. Programs related to Flip Flops

Text/Reference Books

1. Digital Design with an Introduction to the Verilog HDL. Morris M., Mano R. & Michael D. C. 4th Ed. Pearson. 2013.
2. Digital Design & Computer Architecture. David H. M. & Sarah H. L. 2nd Ed. Morgan Kaufmann Publishing. 2012.
3. Modern digital electronics. Jain R. P. Tata McGraw-Hill. 2006.

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Semester - I

(Departmental Core Subject)

CA-566
Programming in C

L-T-P-C
3-0-2-5

Objective: *Main Objective of this course is to understand & solve logical & mathematical problems through C language. Strengthen knowledge of a procedural programming language. Design & develop solutions to intermediate level problems using the C language. Further develop your skills in software development using a procedural language.*

Course Content

C Programming Basics: Basic program construction; console I/O (printf, scanf); preprocessor directives, comments, data types, type conversions, operators; library functions; header files. Loops & Decision Statements: for loop, while loop, do loop; various forms of if statement, switch statement, break statement, continue statement, goto statement. Arrays & Strings: Declaring an array, Initializing arrays, accessing the array elements, working with multidimensional arrays, declaring & initializing string variables, arithmetic operations on characters, string handling functions (string.h). Pointers: Declaring & initializing pointers, pointer expressions, pointer increment & scale factor, pointers & arrays, pointers & strings. Functions: Defining functions, passing arguments to functions, returning values from functions, reference arguments, variables & storage classes, static functions, pointers & functions. Structures: Declaring & initializing a structure, accessing the members of a structure, nested structures, array of structures, using structures in functions, pointers & structures. Files: Reading & writing to text & binary files; character I/O, string I/O, file pointers, error handling, redirection, command line arguments.

List of Experiments

1. Basic & calculation based programs
2. Conversion based programs
3. Decision making statement & operator based programs
4. Loop based programs
5. Multi way decision making statement based programs
6. Array based programs
7. Strings based programs
8. Function based programs
9. Structure based programs
10. Pointers based programs
11. File handling based programs

Text/Reference Books

1. A Book on C. Kelly A. & Pohl I. 4th Ed. Pearson Education. 1999.
2. The C Programming Language. Kernighan B. & Ritchie D. 2nd Ed. Prentice Hall of India. 1988.
3. C: The Complete Reference. Schildt H. 4th Ed. Tata McGraw-Hill. 2000.

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Semester - I

(Humanities & Basic Sciences Subject)

HU-551	L-T-P-C
Business Communication	2-0-0-2

Objective: *To develop business communication skills with a global perspective*

Course Content

Report Writing: Characteristics & structure of a formal report; Classification & types of reports; Organization, Analysis & Interpretation of data; Revising, Editing & Proofreading in accordance with universally accepted standard practices, especially in areas like abstracting/summarizing as well as in citations, references, & bibliographies.

Presentation Skills: Types of presentation; Effective strategies for oral presentations - Audience analysis; Organizing contents; use of media; Awareness of body language, time & space; Tone, variety of pitch, rate, volume & Articulation.

Cross Cultural Communication: Opportunities & challenges of communication in a diverse world; Sensitivity to culture & diversity; Intercultural communication skills - need for attitude change & benefits; Kinesics, Proxemics, Para linguistics

Business Meetings: Notice, Agenda, Minutes of Meeting

E-Writing: E-Mail Etiquette, Advantages & Problems in e-mail communication

Text/Reference Books

1. How to Write Reports and Proposals. Forsyth P. 2nd Ed. Kogan Page. 2010.
2. Intercultural Communication in the Global Workplace. Beamer L. 5th Ed. Tata McGraw-Hill Publishing Company Ltd. 2011.
3. How to Prepare, Stage and Deliver Winning Presentations. Leech T. 2nd Ed. Prentice Hall. 2004.
4. Essentials of Business Communication. Pal R. & Korlahalli J. Sultan Chand & Sons. 2011.
5. E-Writing: 21st Century Tools for Effective Communication. Booher D. 1st Ed. Macmillan Publishers India Ltd. 2006.

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Semester - I

(Humanities & Basic Sciences Subject)

MA-551
Numerical Methods & Computation

L-T-P-C
3-1-0-4

Objective: *In this course certain numerical techniques will be discussed. These concepts play important role in Computer Science and Engineering.*

Course Content

Errors in computation, instability. Nonlinear equation in one variable: direct & iterative methods, order of convergence. Iterative methods for systems of nonlinear equations. Linear systems of equations direct & iterative methods, rate of convergence of iterative methods, illconditionedness of systems & condition numbers. Interpolation: Lagrange, Newton divided difference formula, equispaced Newton's interpolations, errors in interpolation. Approximation: least square & uniform approximations. Differentiation: differentiation using interpolation.

Text/Reference Books

1. Applied Numerical Analysis. Gerald C. F. & Wheatley P. O. 6th Ed. Wiley. 1999.
2. Introductory Methods of Numerical analysis. Sastry S. S. 5th Ed. PHI. 2012.
3. Numerical methods for Scientific & Engineering Computation. Jain M. K., Iyengar S. R. K. & Jain R. K. 5th Ed. New Age International. 2007.
4. Numerical Methods. Rao D. 1st Ed. New Age International. 2011.

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Semester - I

(Management Subject)

BM-575	L-T-P-C
Principles of Management	3-0-0-0

Objective: *It is a comprehensive introductory course on the management process from a manager's perspective, with emphasis on the skills, competencies, techniques & knowledge needed to successfully manage an organization. This course ensures that the students understand how Managers manage business organizations in the dynamic global environment.*

Course Content

Management Concept: Introduction to management. Theories of management Traditional behavioural, contingency & systems approach. Organisation as a system, Functions of Management: Planning, Organizing, staffing, Direction, Controlling & Coordination

Decision Making: Interaction with external environment. Managerial decision making & MIS, Planning approach to organisational analysis, design of organisation structure; job design & enrichment; job evaluation & merit rating.

Business Forecasting: Meaning, Importance, Types, Techniques. Management by Objectives (M.B.O), SWOT Analysis, Portfolio Matrix- BCG, GE Nine cell Planning Grid. Functional Areas of Management

Text/Reference Books

1. Management. Griffin. Biztantra. 2005.
2. Fundamentals of Management. Rao V. S. P. Excel books.2009.
3. Organisational Behaviour. Chandan J. S. Vikas Publishing House. New Delhi. 2000.
4. Principles & Practice of Management. Prasad L. M. Sultan Chand & Sons. 2005.
5. Management – A Global Perspective. Wehrich H. & Koontz H. Tata McGraw-Hill Publishing Company Limited. 2000.

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Semester - II

(Departmental Core Subject)

CA-555
Data Structures

L-T-P-C
3-0-1-4

Objective: *The objective of the course is to familiarize students with basic data structures & their uses in fundamental algorithms. It also includes a study of various searching & sorting techniques with a view to give an understanding of their significance & use.*

Course Content

Introduction to object-oriented programming through stacks, queues & linked lists. Dictionaries: skip-lists, hashing, analysis of collision resolution techniques. Trees, traversals, binary search trees, Balanced BST, Tries. Priority queues & binary heaps. Object oriented implementation & building libraries Applications to discrete event Simulation. Sorting: merge, quick, radix, selection & heap sort. Graphs: Breadth first search & connected components. Depth first search in directed & undirected graphs. Union-find data structure & applications. Directed acyclic graphs: topological sort.

List of Experiments

1. Programs related to 1-dimensional & 2-dimensional arrays
2. Program related to recursion
3. Program related to various types of searching algorithms
4. Program related to various types of sorting algorithms
5. Programs related to various types of link list creation
6. Programs related to link list inserting elements, deleting elements & counting nodes
7. Programs related to stack

8. Program related to infix, prefix & postfix
9. Program related to queues & various operations
10. Program related to circular queue & various operations
11. Program related to tree creating & various operations performed on tree
12. Programs related to graphs
13. Programs related to heap creation of min-heap or max-heap, searching etc.

Text/Reference Books

1. Data Structures, Algorithms, & Software Principles in C. Standish T. Addison-Wesley Publishing Co. 1994.
2. Data Structures & Program Design in C. Kruse R. L. 2nd Ed. PHI. 1996.
3. Data Structures & Algorithm Analysis. Weiss M. A. 2nd Ed. Addison-Wesley Publishing Co. 1998.
4. Fundamental of Data Structures in C. Horowitz E., Sahni S. & Anderson S. 2nd Ed. Universities Press. 2008.
5. Data Structures using C & C++. Tenenbaum A. M. PHI. 2008.

Detailed Syllabus for M.C.A. Degree Programme

Semester - II

(Departmental Core Subject)

CA-556
Operating Systems

L-T-P-C
3-0-1-4

Objective: *The objective of this course is to help students become familiar with the fundamental concepts of operating systems & to help them become competent in recognizing operating systems features, issues & provide them with sufficient understanding of operating system design & how it impacts application systems design & performance.*

Course Content

Overview: functions of Operating Systems, layered architecture; basic concept; interrupt architecture, system calls & notion of a process & threads; synchronization & protection issues; scheduling; memory management including virtual memory & paging techniques; input output architecture & device management; file systems; distributed file systems; Case studies of Unix , Windows NT. Design & implementation of small operating systems.

List of Experiments

1. Hardware & Software requirement of different operating system
2. Programs related to command line argument to make OS commands
3. Various DOS commands & practicing commands on command window
4. Various UNIX commands & practicing commands on terminals
5. Programs related to Shell scripts
6. Programs related to CPU scheduling
7. Programs related to deadlock in operating system
8. Programs related to memory allocation algorithms

9. Programs related to virtual memory (Page Replacement Algorithm)
10. Programs related to disk management

Text/Reference Books

1. Operating System Concepts. Silberschatz A. & Galvin P. B. 8th Ed. Wiley. 2008.
2. Operating Systems: Internals and Design Principles. Stalling W. 6th Ed. Pearson. 2008.
3. Modern Operating System. Tanenbaum A. S. 3rd Ed. Pearson. 2007.

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Semester - II

(Departmental Core Subject)

CA-579 L-T-P-C
Object Oriented Programming in C++ 3-0-2-5

Objective: *This course examines practical programming techniques & issues, emphasizing object modeling & simulation. The objectives of the course are to explore issues involved in developing large-scale object-oriented systems & to teach fundamental techniques that can simplify software development. The course provides in depth information on object oriented programming, issues, techniques, & methodologies.*

Course Content

Review: Review of basic concepts of object-oriented programming, comparison between procedural programming paradigm & object-oriented programming paradigm.

Classes & Objects: specifying a class, creating class objects, accessing class members, access specifiers: public, private, & protected, classes, objects & memory, static members, the const keyword & classes, the static objects, empty classes, nested classes, local classes, abstract classes.

Console Based I/O: concept of streams, hierarchy of console stream classes, input/output using overloaded operators >> & << & memory functions of i/o stream classes, formatting output, formatting using ios class functions & flags, formatting using manipulators.

Constructors & Destructors: Need for constructors & destructors, copy constructor, dynamic constructors, destructors, constructors & destructors with static members, initializer lists.

Operator Overloading & Type Conversion: Defining operator overloading, rules for overloading operators, overloading of unary operators & various binary operators,

overloading of new & delete operators, type conversion - basic type to class type, class type to basic type, class type to another class type.

Inheritance: Introduction, defining derived classes, forms of inheritance, ambiguity in multiple & multi-path inheritance, virtual base class, overriding member functions, order of execution of constructors & destructors.

Pointers & Dynamic Memory Management: understanding pointers, accessing address of a variable, declaring & initializing pointers, accessing a variable through its pointer, pointer arithmetic, pointer to a pointer, pointer to a function, dynamic memory management - new & delete operators, pointers & classes, pointer to an object, pointer to a member, this pointer, dangling/wild pointers.

Virtual functions & Polymorphism: Concept of binding - early binding & late binding, virtual functions, pure virtual functions, virtual destructors & polymorphism. Managing

Data Files: File streams, hierarchy of file stream classes, error handling during file operations, reading/writing of files, accessing records randomly, updating files.

Exception handling: Review of traditional error handling, basics of exception handling, Exception handling mechanism, throwing mechanism, catching mechanism, re-throwing an exception, specifying exceptions.

List of Experiments

1. Programs based on mathematical calculations & simple logical problems
2. Programs based on decision making, multiway decision making & iterative statements
3. Programs based on classes & objects
4. Programs based on constructors & destructors
5. Programs based on friend function, inline function & function overloading
6. Programs based on input output & formatting
7. Programs based on operator overloading & type conversions
8. Programs based on inheritance
9. Programs based on pointers & virtual functions
10. Programs based on file handling
11. Programs based on exception handling

Text/Reference Books

1. Object-Oriented Programming in C++. Lafore R. 3rd Ed. Galgotia publications Pvt. Ltd. 2000.
2. C++: How to Programme. Deital P. 5th Ed. Pearson. 2005.
3. Object Oriented Programming with C++. Balagurusamy E. Tata McGraw-Hill. 2013.

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Semester - II

(Departmental Core Subject)

CA-593
Computer Organization & Architecture

L-T-P-C
3-0-1-4

Objective: *The objective of the course is to understand the basic concept of Computer Organization & Architecture. It also emphasis on the design principles & various organizational issues of a Digital Computer viz: Processor Organization, Memory Organization, I/O Organization & System Bus design.*

Course Content

Register Transfer & Micro-operations: register transfer language, register transfer, bus & memory transfers, arithmetic micro-operations, logic micro-operations, shift micro-operations, arithmetic logic shift unit.

Basic Computer Organization & Design: instruction codes, computer registers, computer instructions, timing & control, instruction cycle, memory reference instructions, input output & interrupt, design of basic computer, design of accumulator logic

Programming the Basic Computer: machine language, assembly language, assembler, program loops, programming arithmetic & logic operations, subroutines, input output programming.

Micro programmed Control- control memory, address sequencing, design of control unit.

Central Processing Unit: general register organization, stack organization, instruction formats, addressing mode, data transfer & manipulation, program control, RISC.

Computer Arithmetic: addition & subtraction, multiplication algorithms, division algorithms, floating point arithmetic operations, decimal arithmetic unit, decimal arithmetic operations.

Input-Output Organization : peripheral devices, input output interface, asynchronous data transfer, modes of transfer, priority interrupt, DMA, IOP, serial communication.

Memory Organization: main memory, auxiliary memory, associative memory, cache memory, virtual memory. Memory management hardware.

List of Experiments

1. Programs related to logic gates
2. Programs related to combinatorial circuit
3. Programs related to tri state buffer
4. Programs related to multiplexer
5. Programs related to Half Adder / Full Adder
6. Programs related to Half Subtractor / Full Subtractor
7. Programs related to code conversion like binary to gray codes etc.
8. Programs related to comparator
9. Programs related to multiplier
10. Programs related to encoders/decoders
11. Programs related to registers & counters
12. Programs related to Flip Flop

Text/Reference Books

1. Computer Organization & Architecture: Designing for Performance. Stallings W. 8th Ed. Pearson Education India. 2010.
2. Computer Organization & Design. Patterson D. A. & Hennessy J. L. 4th Ed. Morgan Kaufmann. 2008.
3. Structured Computer Organization. Tanenbaum A. S. 5th Ed. Prentice Hall of India. 2009.

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Semester - II

(Humanities & Basic Sciences Subject)

MA-552
Introduction to Algebra & Matrix Analysis

L-T-P-C
3-1-0-4

Objective: *This course will help the students to build a strong foundation in mathematics & develop abstract thinking skills.*

Course Content

Group theory: Product of sets; mappings & their compositions; Groups, subgroups, Normal subgroups, Factor subgroups, Lagrange's theorem, Homomorphism & Isomorphism theorems, Permutation groups, Matrix groups, Abelian groups. Rings & Fields, Ideals, Homomorphism, Euclidean domains, Finite & Infinite fields, Polynomial rings Matrix rings.

Linear Algebra & Matrix Theory: Vector spaces, subspaces, direct sums, bases & dimension, Linear transformation, Matrix of the linear transformation, Change of basis, rank-nullity theorem. Eigen values & Eigen vectors, The Characteristic & Minimal polynomials, Diagonalization. Finite dimensional inner product spaces, Gram Schmidt orthogonalization process, Linear functional, Adjoints of linear operators. Self-adjoint & normal linear operators. Normal linear spaces, Examples of Banach & Hilbert spaces.

Text/Reference Books

1. Elementary linear algebra with applications. Anton H. 8th Ed. John Wiley. 1995.
2. Matrix & Linear Algebra. Dutta K. B. 7th Ed. PHI. 2006.
3. A first course in abstract algebra, John B. Farleigh. 7th Ed. Pearson Education. 2002.
4. Linear Algebra. Hoffmann K. & Kunze R. PHI. 1971.
5. Applied Linear Algebra. Peter J. Olver & Shakiban C. 1st Ed. PHI. 2005
6. Linear algebra - A Geometric approach. Kumaresan S. 1st Ed. PHI. 2000.

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EP-599A/EP-599B/EP-599C

L-T-P-C

Endeavour Project (Beyond the Syllabus)

0-0-0-3

Our University is continuously looking at innovative ways to deliver knowledge to our students, making learning & delivery mechanism innovative, interesting & easy with truly 'out of the box' teaching-learning process. This beyond the syllabus initiative uses all working second Saturdays as class days.

Endeavour is a compulsory interdisciplinary project for all students of the University. Respective Heads of the Department shall select students & form groups. Each project shall be supervised by a faculty member.

The faculty of SPSU will select a contemporary topic, which is preferably industry relevant & associate a company or professional who can provide application-oriented perspective. The topic chosen may be from wide range of subjects. For example: - Biodiversity, Social subjects, Media & advertisement, Environment, Scientific, Technical, Management, Architecture, Tourism or any other subject or their combination.

The project is evaluated in two phases: Internal Evaluation & External Evaluation. This ensures descriptive assessment of the projects performance & challenges faced during the implementation of the project. The project will be spread over two semesters beginning from the odd semester (July to November) & ending in the even semester (December to May) every year. The grade obtained in this course may be used to improve the student's semester grade point average.

The final report should include the reasons for the choice of the title, the concept, the structure, the results with working models/drawings etc. & its practicality. The role & responsibility of every individual of the group should be indicated clearly. The report should be written in the prescribed format/guidelines, certified by the faculty member & presented as a seminar.

The project is evaluated as per the approved procedure & marks obtained are computed in the even semester.

Detailed Syllabus for M.C.A. Degree Programme

Semester - III

(Departmental Core Subject)

CA-559
Discrete Mathematical Structures

L-T-P-C
3-1-0-4

Objective: *The aim of this course is to enable students to develop logical & mathematical reasoning abilities & apply them in practice. This course covers elementary discrete mathematics for computer science & engineering. It emphasizes mathematical definition & proofs as well as applicable methods.*

Course Content

Propositional Logic: Language of Propositional logic, truth table, natural deduction, Predicate logic: language of predicate logic, Logical inference with Quantifiers. Proof Techniques; Combinatorics: Counting techniques: recurrence relation & its application to analysis of algorithm; Basic Discrete Probability, probabilistic counting. Graph theory: Graph as a discrete structure, modeling applications using Graphs, Hamiltonian graphs, planar graphs, Graph coloring, Network flows, matching.

Algebra: Groups & Examples, Cosets & Normal subgroups, Lagrange theorem, cyclic groups, permutation groups, Finite Abelian groups, Homomorphism, Matrix groups. Rings, Ideals, Fields, Finite fields, Polynomial rings, Unique Factorization. Introduction to lattices & Boolean algebra.

Text/Reference Books

1. Concrete Mathematics. Graham R. L., Knuth D. E. & Patashnik O. 2nd Ed. Addison-Wesley. 1994.
2. Discrete Mathematics with Applications to Computer Science, Tremblay J. P. & Manohar R. P. Tata McGraw-Hill. 1997.
3. Elements of Discrete Mathematics, Liu C. L. 2nd Ed. Tata McGraw-Hill. 2000.

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Semester - III

(Departmental Core Subject)

CA-562
Database Management Systems

L-T-P-C
3-0-1-4

Objective: *This course introduces the student to the concepts of database management system focusing on database design, query processing, structured query language, transaction processing, concurrency control, recovery techniques & various data models. At the end of the course the student will be able to understand database design & normalization techniques, use standard Query language & its various versions, understand importance of backup & recovery techniques.*

Course Content

The world of Database Systems, The E-R Model, The three database models, Representation & Evaluation of Relationship, The Relational Database Model, Functional Dependencies, Multi-valued & join Dependency, Normalization Theory, Concurrency Control in Relational Databases, Object Oriented Data Models.

List of Experiments

1. Study of the basics of Structured Query Language (SQL).
2. Write SQL commands implementing DDL statements.
3. Write SQL commands implementing DML statements.
4. Write SQL commands implementing Integrity Constraints.
5. Write SQL commands implementing Simple Select statements.
6. Write SQL commands implementing Aggregate functions.
7. Write SQL commands implementing Select statement with conditions.
8. Write SQL commands implementing Character, Numeric, & Date functions.
9. Write SQL commands implementing commands for renaming.

10. Write SQL commands implementing commands for various set operations.
11. Write SQL commands implementing commands using Order By Clause.
12. Write SQL commands implementing single row & multiple sub-queries.
13. Write SQL commands implementing join operations & correlated sub-queries.
14. Write SQL commands implementing Group By & Having Clause.
15. Write SQL commands for Creating & dropping views.

Text/Reference Books

1. Database System Concepts. Silberschatz A., Korth H. F. & Sudarshan S. 5th Ed. McGraw-Hill. 2006.
2. Database Management Systems. Ramakrishnan R. & Gehrke J. 3rd Ed. McGraw-Hill. 2003.
3. Database Modeling & Design, Elmasri R., Navathe S. B. & Theorey T. J., 2nd Ed. Morgan Kaufmann Publishers. 1994.
4. Database Systems: The Complete Book. GarciaMolina H., Ullman J. D. & Widom J. 1st Ed. Pearson Education. 2007.

Detailed Syllabus for M.C.A. Degree Programme

Semester - III

(Departmental Core Subject)

CA-581

Computer Networks

L-T-P-C

3-0-1-4

Objective: *Upon completing the course, the student will be familiar with the basics of data communication & various types of computer networks; understand the challenges of network communication & the operation of the protocols that are used inside the Internet, will have experience in designing communication protocols; will be exposed to the OSI Model & TCP/IP protocol suite Model & will be able to design different types of Network topologies.*

Course Content

Network Concepts: Goals & applications of Computer Networks; Topologies; Categories of Networks - LAN, MAN, WAN, point-to-point & broadcast networks; Introduction to SMDS, X.25 Networks, ISDN, frame relay & ATM networks. Network Architecture: Concept of protocols & services; OSI model & functions of its layers; TCP/IP reference model. Data communication concepts: Components of a data communication system; transmission modes; transmission media - guided & wireless media; introduction to switching (circuit, message & packet) & multiplexing (frequency division & time division); concept of Modems. Framing & Error control: Framing techniques; Error control-error detection & correction. Data Link Control: Acknowledgments; Sliding Window protocols. Medium Access Control & LANs: Multiple Access protocols of MAC sub layer - ALOHA, 1-persistent, p-persistent & non-persistent CSMA, CSMA/CD, Collision free protocols, Limited contention protocols, Wavelength Division Multiple Access, MACA, GSM, CDPD, CDMA. IEEE Standard 802 for LANs & MANs- Ethernet, token bus, token ring, DQDB. Transmission control protocol (TCP); user datagram protocol (UDP); Internet protocol (IP). Sub netting & super netting, IPv4 & IPv6 packet header &

addressing, Routing: Deterministic & Adaptive routing; Centralized & distributed routing; shortest-path; flooding; flow based; optimal; distance vector, link-state, hierarchical; routing for mobile hosts; broadcast & multicast routing; Congestion control: Principles of congestion control; Traffic shaping; choke packets; load shedding; RSVP.

List of Experiments

1. Basic configuration of various network connecting devices
2. Basics of routing & switching
3. Configuration of VLAN,VTP & STP
4. IPv4 & IPv6 addressing concepts & implementation using network topologies
5. Configuration & verification of static & dynamic routing (RIP, EIGRP, OSPF)
6. Configuration & verification of inter VLAN routing (router on a stick)
7. Configuration & verification of DHCP, ACL & NAT

Text/Reference Books

1. Computer Networks: A Systems Approach. Peterson L. L. & Davie B. S. 4th Ed. Elsevier India. 2007.
2. Computer Networks. Tanenbaum A. S. 4th Ed. Pearson India. 2003.
3. Computer Networking: A Top Down Approach. Kurose J. F. & Ross K. W. 3rd Ed. Pearson India. 2005.
4. Internetworking with TCP/IP Vol. 1. Comer D. E. 5th Ed. Prentice Hall of India. 2006.
5. An Engineering Approach to Computer Networking. Keshav S. 1st Ed. Pearson India.1999.
6. Data Communications & Networking. Forouzan B. 4th Ed. Tata McGraw-Hill. 2006.

Detailed Syllabus for M.C.A. Degree Programme

Semester - III

(Departmental Core Subject)

CA-582
Programming in JAVA

L-T-P-C
2-0-2-4

Objective: *This course is designed to provide knowledge of the essential features of Java. This also provides the skills required to use Java libraries in order to develop efficient applications.*

Course Content

Overview of Java: Fundamentals of Java technology, analyzing & executing a simple Java technology application, Define modeling concepts: abstraction, encapsulation, & packages, code reusability, define class, member, attribute, method, constructor, & package, Scope & life time of a variable, invoking a method on a particular object, API online documentation. Identifiers, Keywords, Types & Flow Control, Arrays: comments, valid & invalid identifiers, keywords, eight primitive types, literals, primitive variable & reference variable, variable declaration, Object creation, initialization, reference variables, instance & local variables, initialization of an instance variables, operators, legal & illegal assignments of primitive types, boolean expressions & their requirements in control constructs, assignment compatibility & required casts in fundamental types, use if, switch, for, while, & do constructions & the labeled forms of break & continue as flow control structures in a program. Declare & create arrays of primitive, class, or array types, array initialization, multidimensional array, copying one array to another. Classes & inheritance: Class fundamentals, declaring objects, assigning object reference variables, constructor & method overloading, static variables, methods, & initializers, final classes, final methods, & final variables, enumerated types, abstract classes & methods, the this keyword, garbage collection, using objects as parameters, argument passing, returning objects, recursion, Inheritance basics, using super, creating a

multilevel hierarchy, method overriding, dynamic method dispatch, using abstract, using final with inheritance, the object class. Packages, Interfaces, Exceptions & Assertions: Packages, access protection, importing packages, interfaces, define exceptions, use of try, catch, & finally statements, exception categories, common exceptions, defining own exceptions, assertions, appropriate & inappropriate uses of assertions, enable assertions at runtime. Multithreading: Define a thread, creating separate threads, controlling the code & data that are used by that thread, thread execution, difficulties when multiple threads share data, inter thread communication, synchronization. Console I/O & File I/O: Fundamentals of I/O: command-line arguments & system properties, Properties class, construct node & processing streams, serialize & deserialize objects, streams for reading & writing. Read & writing data from the console, describe files & file I/O. Collections & Generics Framework: Describe the general purpose implementations of the core interfaces in the Collections framework, map interface, the legacy collection classes, Comparable & Comparator interfaces, generic collections, type parameters in generic classes, Refactor existing non-generic code. GUIs Using the Swing API & Events: JFC Swing technology, define swing, swing packages, containers, components, & layout managers, top-level, general-purpose, & special-purpose properties of container, swing single-threaded model, building a GUI using Swing components. Define events & event handling, Java SE event model, GUI behavior, event listeners, concurrency in Swing-based GUIs, SwingWorker class. Networking: Code to set up the network connection, TCP/IP, use of ServerSocket & Socket classes to implement TCP/IP clients & servers.

List of Experiments

1. Programs related to class, objects, command line argument, polymorphism, inheritance & function overriding
2. Programs related to super keyword
3. Programs related to constructors, this keyword, abstract class & final keyword
4. Programs related to packages, sub packages & interface
5. Programs related to following access controls w.r.t. to class: private, no modifier, protected, public

6. Programs related to following exception handlers: try-catch, try-finally, try-catch-finally, throws & throw
7. Programs related to different String & StringBuffer/StringBuilder methods
8. Programs related to various I/O classes, interfaces & functions
9. Programs related to serializable & transient
10. Programs related to different methods of URL & InetAddress class
11. Programs related to TCP & UDP
12. Programs related to various AWT & Swing components
13. Programs related to multithreading using Thread class & Runnable interface
14. Programs related to synchronization

Text/Reference Books

1. Core Java(TM), Volume I & II (Sun Core Series). Horstmann C. S. & Cornell G., 9th Ed. 2012.
2. Java How to Program. Deitel H. M & Deitel P. J. 7th Ed. Prentice Hall. 2007.
3. The Complete Reference: Java. Schieldt H. 9th Ed. Tata McGraw-Hill. 2014.

Detailed Syllabus for M.C.A. Degree Programme

Semester - III

(Humanities & Basic Sciences Subject)

MA-553	L-T-P-C
Introduction to Probability Theory & Stochastic Processes	4-0-0-4

Objective: *The main objective of this course is to make the students familiar with probability theory, statistics & Random Processes which have applications in Computer Science & Engineering.*

Course Content

Axioms of probability, Probability space, conditional probability, independence, Baye's rule, Repeated trials, Bernoulli trials, Random variables: discrete r.v., probability mass functions, c.d.f., common distributions, continuous r.v., probability density & distributions of r.v., joint distributions, order statistics, expectation; moments, transforms, conditional expectations, stochastic processes, Markov chains & Markov processes (birth, death, etc.), Queuing models.

Text/Reference Books

1. Stochastic Processes. Medhi J. 3rd Ed. New Age International. 2009.
2. A First Course in Probability. Ross S. 6th Ed. Pearson Education India, 2002.
3. An Introduction to Probability Theory & its Applications. Feller W. 3rd Ed. Wiley. 1968.
4. Probability & Statistics with Reliability, Queuing, & Computer Science Applications. Trivedi K. S. 2nd Ed. Wiley India. 2008.
5. Stochastic Processes. Ross S. M. 2nd Ed. Wiley. 1996.

Detailed Syllabus for M.C.A. Degree Programme

Semester - IV

(Departmental Core Subject)

CA-567
Computer Graphics

L-T-P-C
3-0-1-4

Objective: *This course is designed to discuss the principles & methods of computer graphics & its applications in solving problems requiring visualization of complex objects using two dimensional & three dimensional representation methods, rendering & coloring them.*

Course Content

Graphics pipeline; Graphics hardware: Display devices, Input devices; Raster Graphics: line & circle drawing algorithms; Windowing & 2D/3D clipping: Cohen & Sutherland line clipping, Cyrus Beck clipping method; 2D & 3D Geometrical Transformations: scaling, translation, rotation, reflection; Viewing Transformations: parallel & perspective projection; Curves & Surfaces: cubic splines, Bezier curves, B-splines, Parametric surfaces, Surface of revolution, Sweep surfaces, Fractal curves & surfaces; Hidden line/surface removal methods; illuminations model; shading: Gouraud, Phong; Introduction to Ray-tracing; Animation; Programming practices with standard graphics libraries like OpenGL.

List of Experiments

1. Basic functions of computer graphics
2. Programs for drawing a line using Digital Differential Analyzer Algorithm (DDA), Bresenham's line drawing algorithm, generalized Bresenham's algorithm
3. Programs for the Bresenham's circle & generalized ellipse algorithms
4. Programs for basic household objects like table, chair & sofa using built-in primitives

5. Programs for fish, kite, hut, car/jeep & clown using basic built-in primitives
6. Programs for performing 2D transformations like translation, rotation, scaling, shear & reflection
7. Programs for point clipping algorithm, Cohen-Sutherland line clipping algorithm & Liang-Barsky line clipping algorithm
8. Programs for performing 3D transformations like translation, rotation, scaling, shear & reflection
9. Programs for the concept of Bezier & Spline curves
10. Program for the concept of ray casting
11. Program for shadow algorithm
12. Creation of suitable animation or a scene or a game to demonstrate the learned skills

Text/Reference Books

1. Computer Graphics with OpenGL. Hearn D. & Baker M. P. 3rd Ed. Pearson. 2009.
2. Interactive Computer Graphics: A Top-Down Approach using OpenGL. Angel E. 5th Ed. Pearson. 2009.
3. Computer Graphics: Principles & Practice in C. J. D. Foley J. D., Dam A. V., Feiner S. K. & Hughes J. F. 2nd Ed. Addison-Wesley. 1995.

Detailed Syllabus for M.C.A. Degree Programme

Semester - IV

(Departmental Core Subject)

CA-583 L-T-P-C
Design & Analysis of Algorithms 3-0-1-4

Objective: *The objective of this course is to enhance analytical skills & to enable the students to design algorithms for various applications, & to analyze the algorithms. It introduces mathematical aspects & techniques for analysis of algorithms.*

Course Content

RAM model & complexity: $O(\log n)$ bit model, Integer sorting & string sorting, Review of fundamental data structures: Red-black trees, merge able heaps, interval trees
Fundamental design methodologies & their implementations: Search Techniques, Dynamic Programming, Greedy algorithms, Divide & Conquer, Randomized Techniques. Algorithms for set manipulations, their implementations & applications: Union-Find Randomized data structures: Skip Lists, Universal Hash functions, Graph Algorithms with implementation issues; Depth-First Search & its applications, minimum Spanning Trees & Shortest Paths. Convex hulls, sorting, Selection Matrix multiplication, pattern matching, integer & polynomial arithmetic, FFT. Introduction to the Theory of Lower Bounds, NP-Completeness & Reductions. Approximation algorithms.

List of Experiments

1. Time complexity, Big O notations, worst, best, average case
2. Time complexity of sorting algorithms (Insertion, quick, merge sort)
3. Concepts of dynamic programming
4. Programs related to travelling salesperson problem using dynamic programming
5. Programs related to divide & conquer technique
6. Programs related to sorting algorithms using divide & conquer technique

7. Programs related to greedy algorithms
8. Programs related to knapsack problem using greedy method
9. Programs related to 8 queen's problem using the backtracking
10. Program related to Floyd's algorithm
11. Programs related to BFS, DFS, Dijkstra, Bellman Ford algorithms
12. Programs related to graph colouring problem
13. Programs related to string matching algorithms
14. Programs related to spanning tree algorithms (Prim's & Kruskal's)

Text/Reference Books

1. The Design & Analysis of Computer Algorithms. Aho A. , Hopcroft J. & Ullman J. Pearson. 2002.
2. Algorithm Design. Kleinberg J. & Tardos E. Addison-Wesley Publishing Co. 2005.
3. Data Structures & Algorithm Analysis. Weiss M.A. 2nd Ed. Addison-Wesley Publishing Co. 1998.
4. Introduction to Algorithms. Thomas H. C., Charles E. L., Ronald L. R., Stein & Clifford. 3rd Ed. PHI. 2010.
5. Computer Algorithms: Introduction to Design & Analysis. Basse S. & Gelder A. V. 3rd Ed. Pearson.1999.

Detailed Syllabus for M.C.A. Degree Programme

Semester-IV

(Departmental Core Subject)

CA-586
Advanced JAVA

L-T-P-C
3-0-1-4

Objective: *This course is designed to familiarize students with concept of Java to Database connectivity, Bean, RMI, MVC & EJB such that a student can write applications with advanced Java libraries.*

Course Content

JDBC & Java Beans: JDBC versus ODBC, different types of drivers, two tier versus three tier model, creating JDBC program. Java Beans – properties of java beans, study existing java beans, creating own java beans. Distributed computing: Overview of current technologies (J2EE, RMI, CORBA, DCOM), RMI & ORBs, patterns for distributed components, defining interfaces to active objects, remote RMI interfaces, RMI, clients, server, & registry. Creating simple RMI application. Servlets: Advantages of Servlets over CGI, Servlet API, life cycle of servlet. Creating simple Servlet, installing & configuring Apache Tomcat 4 as a standalone servlet, processing the request: form data, generating the response, handling cookies, session tracking. JSP: Introduction to JSP, JSP processing, JSP Application Design, JSP scripting elements: expression, scriptlets & declarations, JSP directives, Implicit JSP objects, Error Handling, JDBC using JSP, using of java beans in JSP. Fundamentals of EJB: Introduction to J2EE architecture, EJB introduction, understanding stateful & stateless session beans life cycle, writing stateless session bean, introduction to entity beans, writing first entity bean.

List of Experiments

1. Implementation of JDBC

2. Implementation of graphical & non graphical java beans
3. Implementation of RMI application that interacts with database
4. Implementation of servlet that interacts with database
5. Implementation of various servlet initialization parameters (ServletContext & ServletConfig Parameter)
6. Implementation of filters & multiple filters
7. Implementation of session tracking using cookies, hidden forms & URL re writing
8. Implementation of JSP scriplets, JSP expression & JSP declarations
9. Implementation of following JSP implicit objects: request, response, config, application , session, pageContext, page (only define), exception
- 10.Implementation of exception handling in JSP
- 11.Implementation of JSP page & JSP include directives
- 12.Implementation of following JSP action tags: jsp:forward, jsp:include, jsp:useBean, jsp:setProperty, jsp:getProperty
- 13.Implementation of MVC architecture (use JSP, Servlet & Java class having business logic) & interaction with the database
- 14.Implementation of stateless, state full & singleton EJB

Text/Reference Books

1. Beginning ASP.NET 4 in VB 2010. MacDonald M. Apress. 2010.
2. Java How to Program. Deitel P. & Deitel H. 9th Ed. Pearson. 2011.
3. J2EE: The Complete Reference. Keogh J. Tata McGraw-Hill. 2002.
4. Java Server Pages. Bergsten H. 2nd Ed. O'Reilly Media. 2002.
5. Head first servlet & JSP. Basham B., Sierra K. & Bates B. 2nd Ed. O'Reilly Media. 2008.

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Semester - IV

(Departmental Core Subject)

CA-594	L-T-P-C
Introduction to Software Engineering	3-0-0-3

Objective: *The objective of this course is to introduce software engineering, explain its importance in building large programs, to understand the process of developing new technology & the role of experimentation, to set out the answers to key questions about software engineering, to introduce ethical & professional issues & to explain why they are of concern to software developers.*

Course Content

Software processes, Review and introduction to software processes, the waterfall model, the evolutionary model, component-based software engineering, choosing a process, fundamental activities of software processes, improving software processes. An introduction to software life cycle models; analysis, design, coding & testing methods, software size estimation; cost & schedule estimation; project management; risk management; formal technical reviews; configuration management & change control; & software reliability estimation. Emphasis on large development projects.

Text/Reference Books

1. Fundamentals of Software Engineering. Rajib M. 4th Ed. PHI Publication. 2009.
2. Software Engineering: A Practitioners Approach. Pressman R. S. 7th Ed. McGraw-Hill. 2009.
3. Software Engineering. Sommerville I. 9th Ed. Addison Wesley. 2010.

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Semester - IV

(Departmental Core Subject)

CA-585

Technical Seminar

L-T-P-C

0-0-2-2

The purpose of technical seminar is to develop the skills to collect, organize and present the technical contents in front of an audience effectively. The student is expected to do an in-depth study on a specialized area of his/her interest by doing literature survey, understanding different aspects of the problem and arriving at a status report under the guidance of a faculty member of the department. While doing this, the student will learn the investigation methodology, how to study relevant research papers, correlate the work of various researchers and perform a critical analysis to make a status report and present in the form of a seminar. The evaluation will be done as per the approved procedure.

Detailed Syllabus for M.C.A. Degree Programme

Semester - V

(Departmental Core Subject)

CA-577 L-T-P-C
Applied Multivariate Data Analysis 3-0-0-3

Objective: *The course is intended for learners to grasp more in-depth knowledge in the area of multivariable statistics used for data analysis. The learner shall know about various methods of collecting, sampling, refining & reducing the data before analysis. The multivariate regression techniques shall be blended with real time data to give feel of the subject & its real time application.*

Course Content

To give a concise account of the multivariate statistical technique & use these for data analysis. Multivariate data & multivariate statistics, Principal component analysis, Cluster analysis, The generalized linear model, Regression & analysis of variance, Discrimination & classification, Factor analysis, Minor component analysis, Independent component analysis.

Text/Reference Books

1. Multivariate Statistical Methods. Donald M. F. 2nd Ed. McGraw-Hill. 1990.
2. Multivariate Analysis. Dillon, Goldstein & Dryden. 1984.
3. Applied Multivariate Statistical Analysis. Johnson & Wichern. 6th Ed. Prentice Hall. 2007.

Detailed Syllabus for M.C.A. Degree Programme

Semester - V

(Departmental Core Subject)

CA-591
Compiler Design

L-T-P-C
3-0-1-4

Objective: *This course discusses principles & techniques involved in the designing of analysis & synthesis phases of compilation .It design & implementation of a lexical analyzer, syntax analyzer, semantic analyzer, code generation schemes ,type checking & for the optimization of codes & run-time environment.*

Course Content

Introduction: Compilers, Analysis of the source program, the phases of a compiler, Compilation & interpretation. Lexical Analysis: The need for lexical analyzers. Tokens & their attributes. Specification & recognition of tokens, Expressing tokens through regular expressions. Notion of a recognizer. Finite state Machines as recognizers. Converting regular expressions to deterministic finite automate (DFA). Minimization of DFA. Generation of lexical analyzer from DFA. Introduction to LEX.

Syntax Analysis: The need for syntax analysis & its scope. Introduction to basic concepts in parsing, context free grammars (CFG), derivations & parse trees, ambiguous grammars, top down & bottom up parsing. Top down parsing: LL (1) parsers & their automatic generation, recursive descent parsing. Bottom up parsing. Basics of shift reduce parsers. Introduction to the LR. Family of parsers. LR (0) items & the SLR (1) parsing table. Look ahead symbols & their propagation. LALR (1) & LR (1) parsers. Introduction to YACC.

Error Analysis: Introduction to error analysis, detection, reporting & recovery from compilation errors. Classification of errors-lexical, syntactic & semantic with examples. Desirable features of error reporting. Lexical errors & their handling. Detection of syntactic errors in LL & LR parsers. General syntactic error recovery methods such as

panic mode error recovery & error recovery through use of error symbols (as in YACC).
Semantic errors & their handling.

Static Semantics & Intermediate Code Generation: The need for various static semantic analyses in declaration processing, type analysis, name & scope analysis & intermediate code generation. Limitations of context free grammar specifications. Augmenting CFGs- attribute & attribute grammars. S-attributed definitions & their evaluation in different parsing strategies. Semantic analyses through S-attribute grammars, type analysis, name & scope analysis, intermediate code generation. Limitations of S-attributed definitions, L-attributed definition & their evaluation. Semantic Analysis through L-attribute definition declaration processing.

Runtime Environment: Need for runtime memory management. Address resolution of runtime objects at compile time. Language features influencing runtime memory management, data types, scoping rules, recursion, parameter-passing mechanism. Division of memory into code, stack & heap areas. The notion of an activation record. Static & stack allocation of memory. Handling languages with non-trivial nesting & scope rules-static & dynamic links, displays. Handling different parameter passing mechanisms, call by value, call by reference, & call by value, result. Memory allocation for dynamic data structures. Architectural support for memory management.

Code Generation: Code generation for expressions, operand descriptors, handling of partial results. Issues in efficient code generation, instruction costs, register utilization & evaluation order. The Sethi Ullman algorithm. The machine model, kinds of operands, address abilities & instruction costs. Cover of an expression tree. The dynamic programming approach for optimal code generation tree. The dynamic programming approach for optimal code generation. Introduction to retargetable code generation. Code generation for control structures.

Code Optimization: The need for code optimization. Fundamental optimizing transformations. Local & global optimization. Control flow analysis, concepts from graph theory. Data flow analysis, setting up data flow equations. Solution of data flow equations. Performing global optimizations. Global register assignment, live ranges of runtime values. Graph coloring heuristics for assignment.

Text/Reference Books

1. Compilers Principles, Techniques & Tools. Aho A. V., Lam M. S., Sethi R. & Ullman J. D. 2nd Ed. Pearson. 2007.
2. Principles of Compiler Design. Raghavan V. Tata McGraw-Hill Education. 2010.
3. Crafting a Compiler with C. Fischer C. N. & LeBlanc R.J. Pearson Education. 2009
4. Engineering a Compiler. Cooper K. D. & Torczon L. 2nd Ed. Morgan Kaufmann Publishers. 2011.
5. Compiler Design in C. Holub A. I. 2nd Ed. Prentice-Hall. 1990.

Detailed Syllabus for M.C.A. Degree Programme

Semester - V

(Departmental Core Subject)

CA-592	L-T-P-C
Management Information System & E-Commerce	3-0-1-4

Objective: *This course familiarizes students with the basic concepts of MIS & E-Commerce with special emphasis on their application rather than technical aspects. It presents information technologies as a tool for gaining strategic advantage in business. It also addresses the basic operational, tactical & strategic applications of IT in modern organizations. The second track exposes students to some fundamental issues in the e-commerce environment from security, legal, ethical, & international perspectives.*

Course Content

Management Information Systems - Need, Purpose & Objectives- Contemporary Approaches to MIS – Business processes & Information Systems –Information systems function in Business-Use of Information Systems for competitive advantage - MIS as an instrument for the organizational change: Management issues – Types of Business Information Systems.

Enhancing Decision Making: Information, Management & Decision Making - Models of Decision Making - Classical, Administrative & Herbert Simon's Models - Attributes of information & its relevance to Decision Making - Types of information, Decision Support Systems - Group Decision Support Systems --- Executive Support Systems.

E-commerce: Introduction, Definition, emergence of Internet, commercial use of Internet, history of e-commerce, advantages & disadvantages of e-commerce. Business models for e-commerce: B2C, B2B, C2C, C2B, brokerage model, aggregator model, info-mediaries, communities, value-chain model, manufacturer model, advertising model, subscription & affiliate model.

Enabling technologies: Internet Client server applications, networks, Uniform Resource Locator (URL), search engines, software agents, Internet Service Providers (ISP), broadband technologies, Electronic Data Interchange (EDI).

E-marketing: characteristics, methods, e-marketing value-chain, site adhesion, browsing behavior model, e-advertising, e-branding, e-marketing strategies. E-security: Security risks, risk management issues, legal & ethical issues, security mechanisms, encryption, digital signature, digital certificates, E-payment systems: token-based system, card-based system, e-cash. E-cheque, e-banking, risks, data protection.

List of experiments

1. Exercises on use of formula & functions.
2. Exercises on Filters
3. Exercises on Sorting
4. Exercises on Conditional formatting
5. Introduction to Whatif analysis
6. Exercises on Goal Seek ,Scenario & data tables
7. Exercises on Pivot Tables
8. Exercises on Charts
9. Design of various types of MIS reports
10. Introduction to Linear programming tools in common spreadsheet softwares

Text/Reference Books

1. Management Information Systems. Laudon & Laudon.7th Ed. Pearson Education Asia. 2003.
2. E-commerce: An Indian Perspective. Joseph P.T. 2nd Ed. Prentice Hall India. 2007.

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Semester - V

(Departmental Core Subject)

CA-568
Minor Project

L-T-P-C
0-6-0-6

Students will choose an area of their interest in consultation with a faculty member of the department, who will act as the Supervisor. The area of interest could be confined to his/her discipline or may be interdisciplinary.

In the Minor project the student shall define a computer application problem, which may be in the existing application/tool or propose to develop a new application to offer some service/product. The student should provide a complete description of the methodologies to be applied for modification in the existing tool/service/product etc. The student will compile the work plan and result/ outcome in the form of a report and present the same in the form of a seminar for evaluation at the end of the semester. The evaluation will be done as per the approved procedure.

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Semester - VI

(Departmental Core Subject)

CA-580
Dissertation

L-T-P-C
0-0-10-10

Dissertation provides an opportunity to the students to demonstrate independence and originality in thought and application. Students will select topics from the field of computer application and based on a thorough review of literature on that topic, they will identify the problems and decide on plans of research for dissertation. Under the supervision of faculty members, they will execute their plans involving theoretical and/or experimental work. The results obtained will be analysed to arrive at a conclusion which should have some novelty in the field of computer application.

Dissertation will be prepared as per the prescribed format/ guidelines and will be presented in the form a seminar.

The Dissertation work will be evaluated continuously over the span of the semester as per the approved procedure.

Detailed Syllabus for M.C.A. Degree Programme

Semester - IV

(Departmental Elective - I)

CA-570
Artificial Intelligence

L-T-P-C
3-0-1-4

Objective: *This course is designed to discuss the principles & methods of Artificial Intelligence & its applications in finding solution to the logical problems. This course also covers introduction to intelligent systems including Fuzzy Logic based & Artificial Intelligent systems.*

Course Content

Problem solving, search techniques, control strategies, game playing(minimax), reasoning, knowledge representation through predicate logic, rule-based systems, semantic nets, frames, conceptual dependency formalism. Planning. Handling uncertainty: Bayesian Network, Dempster-Shafer theory, certainty factors. Fuzzy logic. Learning through Neural nets- Back propagation, radial basis functions, neural computational models - Hopfield Nets, Boltzman machines. PROLOG programming.

List of Experiments

1. Exercises on Facts, Rules, & Queries
2. Exercises on Unification & Proof Search
3. Exercises on Recursion
4. Exercises on Lists
5. Exercises on Prolog Arithmetic
6. Exercises on Append Lists
7. Exercises on Reversing Lists
8. Exercises on Definite Clause Grammars
9. Exercises on Context Free Grammars

10. Exercises on Terms

Text/Reference Books

1. Artificial Intelligence. Rich E., Knight K. & Nair S B. 3rd Ed. Tata McGraw-Hill. India.
2. Computational Intelligence: a logical approach. Poole D., Mackworth A. & Goebel R. Oxford University Press. 2004.
3. Artificial Intelligence: Structures & Strategies for complex problem solving. Luger G. 4th Ed. Pearson Education 2002.
4. Artificial Intelligence: A new Synthesis. Nilsson J. Elsevier Publishers. 1998.

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Semester - IV

(Departmental Elective - I)

CA-587
C# & .NET Framework

L-T-P-C
3-0-1-4

Objective: *ASP.NET is Microsoft's next-generation technology for creating server-side web applications. It's built on the Microsoft .NET Framework. ASP.NET is a part of .NET framework that allows one to develop high performance web-based applications. ASP.NET is the most competitive & complete Web development technology ever created, & hence, it is indispensable for developers. The course highlights Introduction to core .NET concepts, Syntax & Data Types, Classes & Objects, Windows Programming, Events & Delegates, File Handling, Exception Handling, Multithreading & ADO.NET.*

Course Content

.Net Architecture & .Net Framework, Common Language RunTime(CLR), Microsoft Intermediate Language Code(MSIL), Just In Time Compilers(JIT), Framework Class Library(FCL), Common Language Specification(CLS), Common Type System(CTS), Garbage Collection(GC), Namespaces in C#, Basic Data Types & their Mapping to CTS, Variables, Constant, Naming Conventions for Variables & Methods, Operators in C#, Prefix & Postfix Notation, Saving ASP.NET with Aspx suffix, Inserting ASP.NET code into web pages, ASP.NET in Action.

C# With ASP.NET, Storing Information in C#, Converting Between Types: Implicit & Explicit Conversion, Arrays, Structs, Enumerations, Control Structures & Procedural Programming, Comparison Operators, Logical comparisons, For, While, Do While, foreach, Break & Continue, Defining Functions, Variable Scope, Event, Event Driven Programming, ASP.NET Events, Events in HTML, Server Control Events, Event Driven programming &PostBack, Understanding exceptions in C# (& how they differ from

Java) ,Review of try-catch-finally for handling exceptions ,Using custom exceptions ,Managing unhandled exceptions

Classes and Objects: Definition, Creating objects, Constructors & destructors, Nesting, Overloaded constructors, Inheritance & Polymorphism – classical, multilevel, hierarchical inheritances, Subclass, Subclass constructors, Overriding methods, Abstract Classes & Methods, Interfaces, Interfaces & Inheritance – Operator Overloading, Multithreading, Delegates – Declaration Methods, Initialization & Invocation, Multicast delegates, I/O operations – Console Input/Output, Formatting.

Forms in Real World, Web pages, HTML forms, Web Forms, The HTTP Protocol, Where ASP.NET fits in with .Net Framework, HTML Forms<form > tag, Action Attribute, Method Attribute, HTML Form Controls, How <form> tag works in ASP. Net, HTML controls ,HTML server controls ,Web server controls ,Common ,Event handling ,The List controls ,The Placeholder & Panel Controls ,The Table, TableRow, & TableCell Controls ,The AdRotator Control ,The Calendar Control ,User input validation ,Cascading style sheets ,Error Handling

Reading from data Sources, Understanding Modern Databases, .NET Data Providers, ADO.NET Objects, Dataset & DataTable Objects, Microsoft SQL Server & ADO.NET, Catching Errors, Manipulating Data Sources, Disconnect data, Methods of Updating data, Datasets & Datatables, Using Access, SQL, XML

ASP.NET Server Controls, HTML server controls vs. ASP.NET sever controls, User Controls, Page Lifecycle, Page_Load, Event handling, Page_Unload, Control families ASP.NET Security Authentication: Implementing Basic Authentication, Integrated Windows Authentication, & Encryption Using SSL, Microsoft Passport Authentication, Technologies supported by Passport.

List of Experiments

1. Programs related to objects & classes
2. Programs related to functions
3. Programs related to procedure to store information in C#
4. Programs related to structured data type array, struct & enumeration
5. Programs related to control structure & procedural programming

6. Programs related to shared members & class relationship
7. Programs related to event driven programming & post back statements
8. Programs related to reading from data sources
9. Programs related to manipulating data sources
10. Introduction to .Net framework & anatomy of an ASP.NET page
11. Programs related to forms & HTML server controls
12. Programs related to objects & structured data in ASP.NET

Text/Reference Books

1. Beginning ASP.NET 4 in VB 2010. MacDonald M. Apress. 2010.
2. Pro ASP.NET 4 in C# 2010. MacDonald M. & Freeman F. 4th Ed. Apress .2010.
3. Professional C# 4.0 & .NET 4. Christian Nagel C., Evjen B., Glynn J., Watson K. & Skinner M. 1st Ed. Wrox. 2010.

Detailed Syllabus for M.C.A. Degree Programme

Semester - IV

(Departmental Elective - I)

CA-588
Web Based System Designs

L-T-P-C
3-0-1-4

Objective: *The objective of this course is to provide the basic understanding of developing the static web pages & art of making the webpage dynamic using different set of technologies.*

Course Content

Introduction to Web Technology, HTML, Basic tags, CSS, Table, Forms. Introduction to client side scripting, Introduction to JavaScript, variables, strings, functions, statements, operators, arrays, introduction to DOM, data & objects, regular expressions, exception handling, cookies, events. Data validation, messages & confirmations, rollover buttons, moving objects, a text-only menu system. Introduction to PHP, Web Server, Installation & configuration files, syntax, operators, variables, constants, control structures, language constructs & functions, Arrays, user-defined & built-in functions, string patterns, Ajax basics. Data base programming: Introduction to MySql, database connectivity using MySql. Web hosting basics, types, DNS, maintaining a website.

List of Experiments

1. Designing of HTML webpage with different tags.
2. Designing of HTML webpage by using cascading style sheets
3. Designing a webpage using HTML5 & CSS3
4. Basic programs related to JavaScript
5. Implementation of JavaScript programs for text validation
6. Implementation of JavaScript programs for event handling
7. Implementation of PHP programs

8. Programs related to PHP & MYSQL integration
9. Programs related to AJAX
10. Creation of a website to demonstrate the learned skills

Text/Reference Books

1. Web Programming: Building Internet Applications. Bates C. 2nd Ed. Wiley India. 2002.
2. Ajax Bible. Steven H. 1st Ed. Wiley India Pvt. Ltd. 2007.
3. HTML5 & CSS3 Castro E. & Hyslop B. 7th Ed. Peachpit Press. 2012.

Detailed Syllabus for M.C.A. Degree Programme

Semester - IV

(Departmental Elective - I)

CA-589	L-T-P-C
Data Mining & Warehousing	3-0-1-4

Objective: *This course introduces the concepts of data mining, with detailed coverage of basic tasks, metrics, issues, & implications. Core topics like classification, clustering & association rules are treated thoroughly. It also introduces the concept of data warehousing with special emphasis on architecture & design.*

Course Content

Data Mining : Introduction , Kind of data, Classification of Data Mining Systems, Task Primitives, Integration of Data Mining with database or data warehouse. Data Preprocessing: Why Preprocessing, Descriptive Data Summarization, Data Cleaning, Data Integration & Transformation, Data Reduction, Data Discretization & Concept Hierarchy Generation, Introduction to Data Warehousing: Introduction, Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Further Development, Data Warehousing to Data Mining. Mining Frequent Patterns, Associations & Correlations: Basic Concepts & a Road Map, Efficient & Scalable Frequent Item set Mining Methods, Mining Various Kinds of Association Rules, & Association Mining to Correlation Analysis, Constraint Based Association Mining. Classification & Clustering: Classification & Prediction, Issues, Decision Tree Induction, Bayesian Classification, Association Rule Based, Other Classification Methods, Prediction, Classifier Accuracy, Cluster Analysis, Types of data, Categorization of methods, Partitioning methods, Outlier Analysis.

List of Experiments

1. Experiments related to Association Rule Mining

2. Experiments related to Classification
3. Experiments related to Clustering
4. Experiments related to Data preprocessing
5. Experiments related to text classification
6. Experiments related to J48 implementation
7. Experiments related to Nominal attribute preprocessing
8. Experiments related to ARFF data type description & creation etc.
9. Experiments related to document mining from the collection of various documents of users interest.
10. Experiments related to data cube implementation

Text/Reference Books

1. Data Warehousing, Data Mining & OLAP. Berson A. & Smith S. J. 10th Ed. Tata McGraw-Hill. 2007.
2. Insight into Data mining Theory & Practice. Soman K. P., Diwakar S. & Ajay V. Easter Economy Ed. Prentice Hall of India. 2006.
3. Introduction to Data Mining with Case Studies, Gupta G. K. Easter Economy Ed. Prentice Hall of India. 2006.

Detailed Syllabus for M.C.A. Degree Programme

Semester - V

(Departmental Elective - II)

CA-569	L-T-P-C
Cryptography	3-0-1-4
Pre-requisite	CA-559

Objective: *This course is designed to familiarize the students with encryption & decryption techniques & to update their knowledge in modern cryptosystems, their analysis & applications to other fields. It presents various cryptographic tools used to provide security services.*

Course Content

To update knowledge in modern cryptosystems their analysis & applications to other fields. Course contents Applying the corresponding algorithms/ programmes. (Laboratory/design activities could also be included) Classical cryptosystems, Preview from number theory, Congruences & residue class rings, DES- security & generalizations, Prime number generation. Public Key Cryptosystems of RSA, Rabin, etc. their security & cryptanalysis. Primality, factorization & quadratic sieve, efficiency of other factoring algorithms. Finite fields: Construction & examples. Diffie-Hellman key exchange. Discrete logarithm problem in general & on finite fields. Cryptosystems based on discrete algorithm problem such as Massey-Omura cryptosystems. Algorithms for finding discrete logarithms, their analysis. Polynomials on finite fields & their factorization/irreducibility & their application to coding theory. Elliptic curves, Public key cryptosystems particularly on Elliptic curves. Problems of key exchange, discrete logarithms & the elliptic curve logarithm problem. Implementation of elliptic curve crypto systems. Counting of points on Elliptic Curves over Galois Fields of order 2^m . Other systems such as Hyper Elliptic Curve & cryptosystems based on them. Combinatorial group theory: investigation of groups on computers, finitely presented groups, coset

enumeration. Fundamental problems of combinatorial group theory. Coset enumeration, Nielsen & Tietze transformations. Braid Group cryptography. Cryptographic hash functions. Authentication, Digital Signatures, Identification, certification infrastructure & other applied aspects.

List of Experiments

1. Implementation of GCD (repeated subtraction, Euclidean algorithm)
2. Programs related to extended Euclidean algorithm
3. Programs related to generation of prime numbers
4. Programs related to modular arithmetic functions (addition, subtraction, multiplication)
5. Programs related to multiplicative inverses, modular addition, multiplication & division
6. Design of modular arithmetic functions for matrices
7. Programs related to monoalphabetic, polyalphabetic & transposition ciphers
8. Programs related to Euler's Phi (totient) function
9. Programs related to factorization methods (Trial division, Fermat, Pollard p-1, Pollard rho)
10. Programs related to Chinese remainder theorem
11. Programs related to public-key ciphers & key exchange protocols

Text/Reference Books

1. Cryptography & Network Security. Forouzan B. A., 2nd Edition. Tata McGraw-Hill. 2010.
2. Cryptography & Network Security. Stalling W., 4th Edition. Pearson. 2006.
3. Cryptography & Network Security. Kahate A. 3rd Edition. Tata McGraw-Hill. 2003.

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Semester - V

(Departmental Elective - II)

CA-572	L-T-P-C
Digital Image Processing	3-0-1-4
Pre-requisite	CA-567

Objective: *The images have created a special niche in the modern day society, where ideas can be portrayed through images. Digital Image Processing provides an insight into understanding, processing, morphing & improving the digital images through state of the art image processing algorithms & techniques. The learner comes to know the basic principles behind the working image recognition systems including Facial, Iris & finger impression etc.*

Course Content

Digital Image Fundamentals; Image Enhancement in Spatial Domain: Gray Level Transformation, Histogram Processing, Spatial Filters; Image Transforms: Fourier Transform & their properties, Fast Fourier Transform, Other Transforms; Image Enhancement in Frequency Domain; Color Image Processing; Image Warping & Restoration; Image Compression; Image Segmentation: edge detection, Hough transform, region based segmentation; Morphological operators; presentation & Description; Features based matching & Bayes classification; Introduction to some computer vision techniques: Imaging geometry, shape from shading, optical flow; Laboratory exercises will emphasize development & evaluation of image processing methods.

List of Experiments

1. The basic built-in functions available for image processing in Scilab to read, write & manipulate, understanding various image formats & conversion to gray scale & other formats
2. Programs related to the concept of Image transforms through singular value decomposition, Haar, Walsh & Hadamaard transforms, DFT etc
3. Programs related to the statistical description of digital image through random fields, Karhunen-Loeve transform, independent component analysis
4. Programs related to image enhancement through histogram manipulation, reducing high frequency noise
5. Programs related to linear, non-linear filtering techniques like convolution, derivative, wiener & dithering
6. Programs related to image segmentation & edge detection through Sobel filters
7. Programs related to morphological image processing
8. Programs related to basic color image processing
9. Programs related to the basics of 3D image representation
10. Programs related to the concept of image compression
11. Case Study: Human face Detection system & Signature verification system.

Text/Reference Books

1. Digital Image Processing Pratt. William K. 4th Ed. Willey Publisher. 2007.
2. Fundamentals of Digital Image Processing. Jain A. K. 2nd Ed. PHI. 1989.

Detailed Syllabus for M.C.A. Degree Programme

Semester - V

(Departmental Elective - II)

CA-575	L-T-P-C
Soft Computing	3-0-1-4
Pre-requisite	CA-570

Objective: *The objective of this course is to teach basic concepts of neural networks, fuzzy systems, Evolutionary algorithms & their applications.*

Course Content

Introduction to Soft Computing: Rationale & Basics of Learning: Neural Networks: Multi-layer Feed-forward Networks, Recurrent Networks, Self-organizing Networks; Fuzzy Logic: Basics, inferencing scheme, Neuro-Fuzzy systems; Evolutionary Algorithms: GA & Optimization, Evolutionary Systems, Genetic Programming; Introduction to RoughSets, Rough-Fuzzy representations, Belief Networks; Principles of SVM; Applications.

List of Experiments

1. Programs related to exhaustive search method , random walk method & steepest descent method
2. Programs related to binary coded GA , real-coded GA & crossover
3. Program related to crisp & fuzzy sets
4. Program related to fuzzy clustering
5. Program related to training of neural networks
6. Program related to multi-layer feed-forward networks
7. Program related to radial basis function networks
8. Program related to self-organizing map
9. Program related to recurrent neural networks

10. Program related to fuzzy-genetic algorithm

Text/Reference Books

1. Soft Computing. Pratihari D. K. 1st Ed. Narosa. 2009.
2. Neuro Fuzzy & Soft Computing. Jang J. S. R. et al. 1st Ed. PHI. 1997.
3. Principles of Soft Computing. Sivanandam S. N. & Deepa S. N. 2nd Ed. Wiley India. 2011.

Detailed Syllabus for M.C.A. Degree Programme

Semester - V

(Open Elective)

HU-554
Fun with Drama

L-T-P-C
0-2-0-2

Objective: *To stimulate imagination, cultural enrichment & explore multidimensional use of language through drama.*

Course Content

Script writing: Story, structure, character development, dialogue, visuals & language with emphasis on critical & analytical thinking, problem-solving & communication skills

Direction: Techniques & art of play direction with emphasis on methods of actor coaching, rehearsal procedures & presentation of several scenes of varying dramatic styles

Enactment: Controlled use of body & voice, analysis & interpretation of roles, characterization & emotional projection

Analysis: Insightful analysis of various aspects of translating a play from script to stage, director's concepts, visual composition, attention to character development & narrative structure & power of the unspoken word

Text/Reference Books

1. Drama Techniques in Language Learning. Maley A. & Duff A. 3rd Ed. Cambridge University Press. 2005.
2. Drama (Resource Book for Teachers). Wessels C. Oxford University Press. 1987.

Detailed Syllabus for M.C.A. Degree Programme

Semester - V

(Open Elective)

BM-571	L-T-P-C
Professional Ethics & Morals	2-0-0-2

Objective: *The aim of this course is to enable students understand the evolution of modern day corporations & link it to ethical aspects of organizational functioning. The course throws light on ethical misdemeanors by large organizations & factors that caused those actions. It sensitizes students to ethical theories & actions of ethical organizations. Finally, it discusses engineer's responsibility for safety.*

Course Content

What is profession? - Engineering & Professionalism - Two models of Professionalism

Three Types of Ethics or Morality.

The Negative face of Engineering Ethics - The Positive Face of Engineering Ethics.

Responsibility in Engineering - Engineering Standards - The Standard Care.

Blame-Responsibility & causation

Engineering Ethics – Variety of moral issues – types of inquiry moral dilemmas – moral autonomy – The problems of Many Hands – Kohlburg's theory – Gilligan's theory

Impediments to Responsible Action

Engineering as social experimentation – Framing the problem – Determining the facts.

Codes of ethics – clarifying Concepts – Application issues – Common Ground –

General principles – Utilitarian thinking respect for persons

Engineer's Responsibility for Safety – Social & Value dimensions of Technology

Technology Pessimism – The Perils of Technological Optimism.

The Promise of Technology – Computer Technology Privacy & Social Policy – Risk

Benefit Analysis – Collegiality & loyalty

Texts/Reference Books

1. Business Ethics: Facing Up to the Issues. Moon C. & Bonny C. Economist Books. 2001.
2. The Fundamentals of Ethics. Shafer-Landau R. 3rd Ed. Oxford University Press. 2014.
3. Ethics in Public Management. Frederickson H.G. & Ghere R.K. M.E. Sharpe. 2005.
4. The Elements of moral Philosophy. Rachels J. & Rachels S. 8th Ed. McGraw Hill Education. 2014.
5. Ethical Theory: An Anthology. Shafer-Landau R. 2nd Ed. Wiley-Blackwell. 2012.

Detailed Syllabus for M.C.A. Degree Programme

Semester - V

(Open Elective)

BM-576
Intellectual Property Rights & Patents

L-T-P-C
2-0-0-2

Objective: *The aim of this course is to help students the immense business significance of protecting intellectual property. It sensitizes students the different kinds of intellectual properties, & how these are protected with focus on copyright protection, patenting, industrial design & trade secrets. Finally, the course discusses the dangers of IPR creating monopoly situations & challenges for the less developed countries in their attempts to compete with the developed world.*

Course Content

Introduction to Intellectual Property Law – The Evolutionary Past - The IPR Tool Kit- Para -Legal Tasks in Intellectual Property Law – Ethical obligations in Para Legal Tasks in Intellectual Property Law - Introduction to Cyber Law – Innovations & Inventions Trade related Intellectual Property Right

Introduction to Trade mark – Trade mark Registration Process – Post registration Procedures – Trade mark maintenance - Transfer of Rights – Inter-parties Proceeding – Infringement - Dilution Ownership of Trade mark – Likelihood of confusion - Trademarks claims – Trademarks Litigations – International Trade mark Law

Introduction to Copyrights – – Principles of Copyright Principles -The subjects Matter of Copy right – The Rights Afforded by Copyright Law – Copy right Ownership, Transfer & duration – Right to prepare Derivative works – Rights of Distribution – Rights of Perform the work Publicity Copyright Formalities & Registrations - Limitations - Copyright disputes & International Copyright Law – Semiconductor Chip Protection Act

Introduction to Trade Secret – Maintaining Trade Secret – Physical Security – Employee Limitation - Employee confidentiality agreement - Trade Secret Law - Unfair Competition – Trade Secret Litigation – Breach of Contract – Applying State Law

Text/Reference Books

1. Managing intellectual Capital: Organizational, Strategic & Policy Dimensions. Teece D. J. Oxford University Press. 2000.
2. Profiting from Intellectual Capital: Extracting Value from Innovation. Sullivan P. H. John Wiley. 1998.
3. Intellectual property law in India. Narang P. S. Georgia Law Agency. 2001.
4. Copyright in a Global Information Economy. Chen J. E. & Loren L. P. 4th Ed. Wolters Kluwer Law & Business. 2015.
5. Clearance & Copyright. Donaldson M. C. & Calliff L. A. 4th Ed. Silman-James Press. 2014