

**MATS UNIVERSITY**  
**BACHELOR OF COMPUTER SCIENCE (CS) HONORS**  
**REGULATIONS**

### **Introduction**

The sole aim of the course is to produce world class IT professionals who will take care of the computing needs of the Royal Government and the industries. The Computer Science undergraduate program aims to provide students with the educational experiences that will enable them to cope with the rapidly changing subject of Computer Science. The course provide students with up-to- date training in the discipline so as to prepare them to take on entry level positions in the local Information Technology sector, (with the exception of hardware engineer and technician) and to grow into other positions with one or two years working experience. Due to computerization of government offices and private industries the employment market needed a large number of skilled professionals to take care of the IT needs of the government and the private sectors. This production-oriented approach to training prepares students for a successful animation career in the entertainment industry.

### **Program Objective**

Students will effectively utilize their knowledge of computing principles and mathematical theory to develop sustainable solution to current and future computing problems. Graduates will assume professional leadership roles.

### **Program Outcome** Student have

- An ability to apply knowledge of computing and mathematics appropriate to the discipline
- An ability to design, implement and evaluate a computer based system, process, component or program to meet desired needs
- An ability to analyze a problem and identify and define the computing requirements appropriate to its solution
- Recognition of the need for, and an ability to engage in, continuing professional development
- An ability to apply design and development principles in the construction of software systems of varying complexity.
- An ability to use current techniques, skills and tools necessary for computing.

### **1. Scope and Content**

- 1.1** The regulations documented here are applicable to the B.Sc.(CS) Honors programme offered by the university.
- 1.2** The applicability of the Regulations must be understood in the context of the given Scheme of study and the Syllabus of the programme.
- 1.3** The Regulations given here are in addition to the rules and regulations notified at the time of the admission.
- 1.4** The authorities of University may modify, add, delete, expand or substantiate any part of the Regulations and syllabi, at any time.

### **2. Course Content**

The programme shall be for duration of six semesters, spread out in three years. Each semester of the programme shall consist of either all or some of the following components:

- 2.1** Core Subjects
- 2.2** AECC (Ability Enhancement Compulsory Course)
- 2.3** SEC( Skill Enhancement Course)
- 2.4** DSE ( Discipline Specific Electives) /Choice Based
- 2.5** GE( Generic Electives)
- 2.6** Lab Course
- 2.7** Project Work/

#### **2.1 Core Subjects**

Core subjects comprises of subjects that form an integral part of the programme. These subjects provide a strong ground in basic disciplines of study.

#### **2.2 AECC (Ability Enhancement Compulsory Course)**

The students who have not done English up to class XII are to opt for Hindi Communication. They can opt Environment studies and other languages also .

#### **2.3 SEC( Skill Enhancement Course)**

This will facilitate student mobility across institutions within and across countries and also enable potential employers to assess the performance of students.

## 2.4 DSE ( Discipline Specific Electives) /Choice Based

Elective courses may be offered by the main discipline/subject of study is referred to as Discipline Specific Elective. The University/Institute may also offer discipline related Elective courses of interdisciplinary nature (to be offered by main discipline/subject of study)

## 2.5 GE( Generic Electives)

An elective course chosen generally from an unrelated discipline/subject, with an intention to seek exposure is called a Generic Elective. P.S.: A core course offered in a discipline/subject may be treated as an elective by other discipline/subject and vice versa and such electives may also be referred to as Generic Elective.

## 2.6 Lab Courses

These subjects are totally practical-based subjects. The learning of these subjects will be performed in laboratories/practical sites with equipments/resources. These subjects shall support the practical implementation of the core/core-bracket subjects. The processes of evaluation of their subjects will depend on the nature of that individual subject.

## 2.7 Project Work

The project work shall be done for a duration as specified by the Coordinator, in the area, related to the main subject of study or the specialization. The project work shall give the student an insight to the situations existing in the field/marketed/industries, etc.

## 3. Eligibility for Admission and Mode of Selection

- 3.1 The minimum qualification required to be eligible for admission is a pass in the HSC or 10+2 (with maths as compulsory subject) examination of a Board of a State Government, or a course recognized as equivalent thereto by the University, desirably with the relevant or related subjects as one of the subjects of study.
- 3.2 The method of selection for the course shall normally be by means of a Personal interview. However, the admission might also be by means of an entrance test.

## 4. Attendance and Examination

A student is eligible to appear for the term-end examinations, only if he/she has put in a minimum of 75% attendance in each subject individually.

## 5. Assessment and Examination

### 5.1 Credits

Credit Points will be awarded for all the subjects. One credit is equivalent to ten classroom contact hours.

Each core subjects will carry either 6 or 4 or 2 credits, each core bracket subject will carry 3 credits and practical courses will carry either 6 or 4 or 2 credits depending on the number of hours of teaching and training.

### 5.2 Pattern of Assessment

Assessment of student's performance will be based on two components i.e. Internal Assessment and Term-end Examination conducted at the end of each semester.

A six-credit subject will comprise of an Internal Assessment component of 30 marks and a Term-end Examination components of 70 marks.

A four-credit subject will comprise of an Internal Assessment component of 30 marks and a Term-end Examination components of 70 marks.

A two-credit subject will comprise of an Internal Assessment component of 15 marks and a Term-end Examination components of 35 marks.

### 5.3 Purpose of Internal Assessment

The Term-end Examination will be conducted as per the University regulations. Sessional tests, assignment, mid-term examination, etc. will be conducted in each subject during the course of each semester, for the.

### 5.4 Assessment for Core Bracket Subjects

Depending on the participation and performance of students, the faculty of the Core Bracket subject will grade the student in term of a five-point scale as given below:

Marks Secured	Grade Point	Letter Grade
80 and above	10	Outstanding(O)
70 and above but below 80	9	Excellent (A+)
60 and above but below 70	8	Very Good (A)
55 and above but below 60	7	Good (B+)
50 and above but below 55	6	Above Average (B)

45 and above but below 50	5	Average (C)
40 and above but below 45	4	Pass(P)
Below 40	0	Fail (F)
	0	Absent (AB)

This assessment is purely based on internal assessment of the subject faculty/coordinator.

### 5.5 Assessment of Project Work

The project work will carry a total of 100 marks. Of this, 70 marks are for the study/report and 30 marks will be awarded for performance in the viva-voce examination.

### 5.6 Eligibility to Appear for the Term-End Exam

Students, who have put in a minimum of 75% attendance in each subject, shall be eligible to appear for the Term-end examination.

## 6. Eligibility for Pass

- 6.1 A student shall be declared to have passed in a subject, if he/she secures at least 40% marks in the term-end examination and an aggregate of 40% including internal assessment.
- 6.2 When a student reappears for the failed subject(s), the internal assessment marks originally secured by him/her in the first appearance in the subject(s), if any, will be carried forward.
- 6.3 A student shall be declared to have passed in Core Bracket subject, if he/she secures at least a pass grade.
- 6.4 Promotion of the student to the next semester, is not automatic, but is dependent on certain other conditions.

## 7. Classification of Successful Students

7.1 On successful completion of the programme, the students will be classified as below:

Distinction	Those securing an aggregate marks of 75% and above in all the subjects;
First Class	Those securing an aggregate mark of less than 75%, but above 60% in all the subjects;
Second Class	Those securing an aggregate mark of less than 60%, but above 50% in all the subjects;
Pass	Those securing an aggregate mark of more than 40% in all the subjects;

### 7.2 Ranks

Only students who have passed each of the semester examination at the first appearance, shall be eligible for award of Ranks. The first three ranks shall be notified.

## 8. Award of Qualification

Students will be awarded the Bachelor Degree of B.Sc.(CS) Honors, upon fulfillment of the following criteria:

- a. Must have passed all the subjects of the six semester with a minimum of 40% on each subject including Internal assessment and secured 45% in aggregate;
- b. Must have secured at least a pass grade in all the Core Bracket subjects.
- c. Must have secured a minimum of 40% marks in the project work (wherever applicable).
- d. Must have complied with all other assessment guidelines and criteria notified during the conduct of the programme.

## 9. Maximum period for the completion of the Programme

The maximum period for the completion of the programme shall be five years from the date of joining the programme.

## 10. General Guidelines

### 10.1 Academic Integrity and Ethics

- a. A student who has committed an act of academic dishonesty will be deemed to have failed to meet a basic requirement of satisfactory academic performance. Thus, academic dishonesty is not only a basis for disciplinary action but also is relevant to the evaluation of student's level of performance and progress.
- b. Where there has been violation of the basic ethos and principles of academic integrity and ethics, the Director/Board of Examiners/Course coordinator may use their discretion in terms of disciplinary action to be taken.
- c. Academic dishonesty includes, but is not necessarily limited, to the following:
  - i. Cheating or knowingly assisting another student in committing an act of cheating;
  - ii. Unauthorized possession of examination materials, destruction or hiding of relevant materials;
  - iii. Act of plagiarism;
  - iv. Unauthorized changing of marks or marking on examination records.

**10.2 Attendance**

- a. Students are required to attend and participate in all scheduled class sessions, guest lecturer, workshops, outbound learning programs and club/ forum activities of both academic and non-academic nature.
- b. Students may be dropped from the programs due to excessive and non-intimated absences.
- c. Students must notify the program coordinator in writing, the reasons for absence, if any, from class sessions, activities and assessment components.
- d. On notification of absences ( including anticipated absences) , the Director/ Programmer coordinator would determine whether the absences could be rectified or whether it is possible to satisfactorily complete the subject with the number of identified absences.

**10.3 General**

- a. The students are expected to spend a considerable amount of time in research, reading and practice.
- b. All students are expected to develop and maintain a positive profession attitude and approach throughout the Programme and in conduct of all other activities.
- c. Attendance alone is not sufficient. Students are expected to participate, to help the class learn and understand the topics under consideration.
- d. Food and drinks are not permitted in the classroom/ conference hall.
- e. All students are expected to dress as per stipulated dress code.

<b>BACHELOR OF HONORS IN COMPUTER SCIENCE - BSC(HON'S) CS</b>						
<b>SEMESTER -I</b>						
Subject Code	Subject	Credit	L+T+P	Univ.	Int. Marks	Total Marks
		1 Cr= 1 hrs		Exam Marks		
<b>CORE COURSES</b>						
CS101	BASICS OF COMPUTER AND PROGRAMMING LANGUAGE	4	3+1+0	70	30	100
CS102	BASIC ANALOG AND DIGITAL ELECTRONICS	4	3+1+0	70	30	100
CS103	MATHEMATICAL FOUNDATION COURSE FOR COMPUTER SCIENCE I	4	3+1+0	70	30	100
<b>AECC (ABILITY ENHANCEMENT COMPULSORY COURSE)</b>						
CS104	ENVIRONMENTAL STUDIES	2	1+1+0	35	15	50
<b>SEC( SKILL ENHANCMENT COURSE)</b>						
<b>DSE ( DISCIPLINE SPECIFIC ELECTIVES) /CHOICE BASED</b>						
<b>GE( GENERIC ELECTIVES)</b>						
CS105	OFFICE AUTOMATION CERTIFICATION	6	2+0+4	70	30	100
<b>LAB COURSES</b>						
CS106	BASICS OF COMPUTER AND PROGRAMMING LANGUAGE LAB	2	0+0+2	35	15	50
CS107	MATHEMATICAL FOUNDATION COURSE FOR COMPUTER SCIENCE I LAB	2	0+0+2	35	15	50
		<b>24</b>		<b>385</b>	<b>165</b>	<b>550</b>

<b>BACHELOR OF HONORS IN COMPUTER SCIENCE - BSC(HON'S) CS</b>						
<b>SEMESTER -II</b>						
Subject Code	Subject	Credit	L+T+P	Univ.	Int. Marks	Total Marks
		1 Cr= 1 hrs		Exam Marks		
<b>CORE COURSES</b>						
CS201	OBJECT ORIENTED PROGRAMMING IN C++	4	3+1+0	70	30	100
CS202	SYSTEM ANALYSIS AND DESIGNING	4	3+1+0	70	30	100
CS203	STATISTICS AND PROBABILITY	4	3+1+0	70	30	100
<b>AECC (ABILITY ENHANCEMENT COMPULSORY COURSE)</b>						
CS204	COMMUNICATIVE ENGLISH	2	1+1+0	35	15	50
<b>SEC( SKILL ENHANCMENT COURSE)</b>						
<b>DSE ( DISCIPLINE SPECIFIC ELECTIVES) /CHOICE BASED</b>						
<b>GE( GENERIC ELECTIVES)</b>						
CS205	DESKTOP PUBLISHING	6	2+0+4	70	30	100
<b>LAB COURSES</b>						
CS206	OBJECT ORIENTED PROGRAMMING IN C++ LAB	2	0+0+2	35	15	50
CS207	STATISTICS AND PROBABILITY LAB	2	0+0+2	35	15	50
		<b>24</b>		<b>385</b>	<b>165</b>	<b>550</b>

<b>BACHELOR OF HONORS IN COMPUTER SCIENCE - BSC(HON'S) CS</b>						
<b>SEMESTER -III</b>						
Subject Code	Subject	Credit	L+T+P	Univ.	Int. Marks	Total Marks
		1 Cr= 1 hrs		Exam Marks		
<b>CORE COURSES</b>						
CS301	DATABASE MANAGEMENT SYSTEM	4	3+1+0	70	30	100
CS302	PRINCIPLES OF OPERATING SYSTEM	4	3+1+0	70	30	100
CS303	MATHEMATICAL FOUNDATION COURSE FOR COMPUTERSCIENCE II	4	3+1+0	70	30	100
<b>AECC (ABILITY ENHANCEMENT COMPULSORY COURSE)</b>						
<b>SEC( SKILL ENHANCMENT COURSE)</b>						
CS304	ENTREPRENEURSHIP	2	1+1+0	35	15	50
<b>DSE ( DISCIPLINE SPECIFIC ELECTIVES) /CHOICE BASED</b>						
<b>GE( GENERIC ELECTIVES)</b>						
CS305	COMPUTATIONAL ACCOUNTING STATISTICAL TOOLS	6	2+0+4	70	30	100
<b>LAB COURSES</b>						
CS306	DATABASE MANAGEMENT SYSTEM LAB	2	0+0+2	35	15	50
CS307	MATHEMATICAL FOUNDATION COURSE FOR COMPUTER SCIENCE II LAB	2	0+0+2	35	15	50
		<b>24</b>		<b>385</b>	<b>165</b>	<b>550</b>

<b>BACHELOR OF HONORS IN COMPUTER SCIENCE - BSC(HON'S) CS</b>						
<b>SEMESTER -IV</b>						
Subject Code	Subject	Credit	L+T+P	Univ.	Int. Marks	Total Marks
		1 Cr= 1 hrs		Exam Marks		
<b>CORE COURSES</b>						
CS401	UNIX/LINUX PROGRAMMING	4	3+1+0	70	30	100
CS402	DATA COMMUNICATION AND NETWORKING	4	3+1+0	70	30	100
CS403	OPERATIONS RESEEARCH	4	3+1+0	70	30	100
<b>AECC (ABILITY ENHANCEMENT COMPULSORY COURSE)</b>						
<b>SEC( SKILL ENHANCMENT COURSE)</b>						
CS404	SUMMER NTERNSHIP	2	1+1+0	35	15	50
<b>DSE ( DISCIPLINE SPECIFIC ELECTIVES) /CHOICE BASED</b>						
<b>GE( GENERIC ELECTIVES)</b>						
CS405	CLIENT SERVER ARCHITECTURE IMPLEMENTATION AND NETWORK TROUBLE SHOOTING	6	2+0+4	70	30	100
<b>LAB COURSES</b>						
CS406	UNIX/LINUX PROGRAMMING LAB	2	0+0+2	35	15	50
CS407	OPERATIONS RESEEARCH LAB	2	0+0+2	35	15	50
		<b>24</b>		<b>385</b>	<b>165</b>	<b>550</b>

<b>BACHELOR OF HONORS IN COMPUTER SCIENCE - BSC(HON'S) CS</b>						
<b>SEMESTER -V</b>						
Subject Code	Subject	Credit	L+T+P	Univ.	Int. Marks	Total Marks
		1 Cr= 1 hrs		Exam Marks		
<b>CORE COURSES</b>						
CS501	COMPUTER GRAPHICS	4	3+1+0	70	30	100
CS502	WEB DESIGNING	4	3+1+0	70	30	100
<b>AECC (ABILITY ENHANCEMENT COMPULSORY COURSE)</b>						
<b>SEC( SKILL ENHANCMENT COURSE)</b>						
<b>DSE ( DISCIPLINE SPECIFIC ELECTIVES) /CHOICE BASED</b>						
CS503	Elective I	6	4+1+1	70	30	100
CS504	Elective II	6	4+1+1	70	30	100
<b>GE( GENERIC ELECTIVES)</b>						
<b>LAB COURSES</b>						
CS505	COMPUTER GRAPHICS LAB	2	0+0+2	35	15	50
CS506	WEB DESIGNING LAB	2	0+0+2	35	15	50
		<b>24</b>		<b>350</b>	<b>150</b>	<b>500</b>

<b>BACHELOR OF HONORS IN COMPUTER SCIENCE - BSC(HON'S) CS</b>						
<b>SEMESTER -VI</b>						
Subject Code	Subject	Credit	L+T+P	Univ.	Int. Marks	Total Marks
		1 Cr= 1 hrs		Exam Marks		
<b>CORE COURSES</b>						
CS601	PROGRAMMING IN JAVA	4	3+1+0	70	30	100
CS602	INTRODUCTION TO MICROSOFT .NET FRAMEWORK AND C#	4	3+1+0	70	30	100
<b>AECC (ABILITY ENHANCEMENT COMPULSORY COURSE)</b>						
<b>SEC( SKILL ENHANCMENT COURSE)</b>						
<b>DSE ( DISCIPLINE SPECIFIC ELECTIVES) /CHOICE BASED</b>						
CS603	Elective III	6	4+1+1	70	30	100
CS604	Elective IV	6	4+1+1	70	30	100
<b>GE( GENERIC ELECTIVES)</b>						
<b>LAB COURSES</b>						
CS605	PROGRAMMING IN JAVA LAB	2	0+0+2	35	15	50
CS606	INTRODUCTION TO MICROSOFT .NET FRAMEWORK AND C# LAB	2	0+0+2	35	15	50
		<b>24</b>		<b>350</b>	<b>150</b>	<b>500</b>

**CS 101**  
**Basics of Computer and Programming Language**

**Course Objective:**

The objective of the course is to introduce the concepts of computer fundamental & their applications for the efficient use of office technology. Along with student get information basics of C language.

**Course Outcome:**

- Student will be able to identify various important parts of computer device.
- Student will be able To find right kind of storage device.
- Student will get hands on experience for basic application software
- Student get skill of problem solving
- Student get ability to write basic program in 'C' language.

**Module-I**

Introduction to Computers: Characteristics of Computers, Uses of computers, Types and generations of Computers. Block Diagram of computer, Logical organization of a computer, I/O devices, memory hierarchy, registers,–memory: primary, secondary, storage devices, etc.

**Module-II**

Program, Software, User Interface with the Operating System, System Tools. Binary representation of integers and real numbers, 1's Complement, 2's Complement, Addition and subtraction of binary numbers, BCD, ASCII, Unicode;

**Module-III**

Problem Solving Approaches: Notion of an algorithm, problem solving using top-down design and decomposition into sub-problems, stepwise methodology of developing an algorithm, methodology of developing an algorithmic solution from a mathematical specification of the problem, use of recursion for problems with inductive characterization. Basic operations of a programming environment.

**Module-IV**

Programming through 'C' Language, Introduction, Structure of 'C' Program, Character sets, Keywords, Identifiers, Constants, Variables, Data Types, Program Structure. Control statement: for, do, while, do-while, Decision statement if, if-else, switch-Case. Jump statement: break, continue, go to, exit. Operators: Arithmetic, Relational, Logical and Assignment; Increment, Decrement and Conditional, Operator Precedence and Associations; Expressions. Expression evaluation and type conversion. Formatted input and output.

**Module-V**

Statements: Assignment, Initialization, String handling with arrays, String handling functions, Functions – Arguments passing, Return values and their types, recursion. Enumerated data types. Structures. Arrays of structures. Arrays within structures. Pointers: Declaration and initialization, Accessing variables through pointer arithmetic, Pointers and arrays, String, Pointer to Functions and Structures, Dynamic Storage Allocation. File handlings: Opening, Closing, I/O operations. Introduction, OOPS languages, characteristics of OOP's languages, OOP's paradigm, Concepts: object, class, data abstraction, data encapsulation, inheritance, and polymorphism. Benefits of OOP's.

**Reference Books**

- Fundamentals of Computers, By V. Rajaraman, Fourth Edition, PHI.
- Computer Fundamentals: Architecture and Organization, By B. Ram, New Age International.
- Computer System Architecture, By M. Morris Mano, Prentice Hall of India Third edition / Pearson Education 3rd
- C++: The Complete Reference, By Herbert Schildt, Tata McGraw Hill.

**CS102**  
**BASIC AND DIGITAL ELECTRONICS**

**Course Objective**

The objective of this course is to introduce the organization of a computer and its principal components, viz, ALU, Control, Memory and Input/output. The course will also enable the student to understand the design components of a digital subsystem that required realizing various components such as ALU, Control, etc.

**Course Outcome**

- An ability to understand theory of Digital Design and Computer Organization to provide an insight of how basic computer components are specified.
- An ability to understand the functions of various hardware components and their building blocks
- An ability to understand and appreciate Boolean algebraic expressions to digital design



- An in depth understanding of sequential! Combinational circuits

**MODULE I:** Introduction to semiconductor devices, Intrinsic and extrinsic Semiconductors, conductivity, drift, diffusion, Diodes and transistors, Energy band diagram, characteristics of junction diodes, p-n junction diode, Bipolar transistors, Transistor currents, static characteristics, amplification action, classification and characteristics of amplifiers, biasing schemes, modes of operations, General idea about FET, OP-AMP

**MODULE II:** Electronic circuits – Half wave and Full wave rectifiers, full wave bridge rectifier, ripple factor, amplifiers, operational amplifier, oscillators, conditions for oscillation, filters, shunt capacitor filter, series inductor filter, voltage multipliers, silicon controlled rectifiers, properties of R-L-C circuits, inverters, regulators, Basic OP-AMP shunt regulator.

**MODULE III:** Basic Digital building blocks – Introduction to Number system, binary number system and binary arithmetic, conversion from one number system to other, different codes used in computers, Boolean algebra, logic gates, flip flops, JK, RS, Master slave flip flops, truth table, An introduction to timing diagrams, Setup and hold times. Logic families - TTL, CMOS, TTL, ECL etc.

**MODULE IV:** Combinational Circuits – Truth table, implementation of digital functions, half adder, full adder, parallel binary adder, subtractor, half subtractor and full subtractor, encoder, decoder, multiplexer, de-multiplexer, Other basic building blocks.

**MODULE V:** Sequential Circuit – Sequential logic elements, flip flops, registers, shift registers, ring counter, counters using flip flop, ripple and synchronous counters, up-down counters state diagrams and state machines.

**Text Book:**

1. B.L. Theraja “Principles of Electronic devices and circuits”, S. Chand.

**Reference Books:**

1. Ryder J.D., “Electronics fundamentals and applications” Prentice Hall.
2. Millman, J. and Halkias, C.C. “Integrated Electronics” McGraw Hill.
3. Andrew Singmin, “Beginning Analog Electronics”.
4. Andrew Singmin, “Beginning Digital Electronics”.

**CS103**

**MATHEMATICAL FOUNDATION COURSE FOR COMPUTER SCIENCE I**

**Course Objective**

The objective of mathematics is to demonstrate an understanding of the theory underlying exact approaches to optimization problems, prove & interpret standard results in graph theory & develop, implement & critically evaluate the correctness and performance.

**Course Outcome**

- Familiarity with Determinant and Matrices.
- Formulate Limit, Continuity and Differentiability.
- Demonstrate a working knowledge Definite and Indefinite Integrals.

**Module-I**

Definition of the limit of a function ( $\epsilon - \delta$ ) form, Continuity, Types of discontinuities, Properties of continuous functions on a closed interval, Differentiability & Continuity . Rolle’s theorem – Lagrange’s and Cauchy’s First Mean Value Theorems – Taylor’s theorem (Lagrange’s form), Maclaurin’s theorem and expansions, Evaluation of limits by L’Hospital’s rule, Successive differentiation. Leibnitz rule and its applications to problems of

$$\text{type } e^{ax+b} \sin x, e^{ax+b} \cos x, (ax + b)^n \sin x, (ax + b)^n \cos x.$$

**Module-II**

Polar coordinates – Angle between the radius vector and the tangent – Angle

of intersection of curves (polar form) – Polar sub-tangent and polar subnormal, Perpendicular from pole on the tangent, Pedal equations, Derivative of an arc in Cartesian, parameter and polar forms, Equation of a conic in polar form Convexity, Concavity and Curvature of plane curves – Formula for radius of curvature in Cartesian, parametric, polar and pedal forms, Centre of curvature, Evolutes and involutes, Envelopes.

### Module-III

Functions of several variables, limits and continuity of functions of two and three real variables, partial differentiation (two variables), partial derivative as a slope, partial derivative as a rate, higher order partial derivatives (notion only), equality of mixed partials. Second degree equations, classification into conics using the discriminant.

### Module-IV

Reduction Formulae of the type  $\int (\sin x)^n dx$ ,  
 $\int (\cos x)^n dx$ ,  $\int (\tan x)^n dx$ ,  $\int (\sec x)^n dx$ ,  $\int (\log x)^n dx$ ,  
 $\int (\sin x)^n (\cos x)^n dx$  etc., Application of Integral Calculus: Length of arcs, Surface areas and Volumes of solids of revolutions for standard curves in Cartesian and Polar forms, Improper Integrals – beta and gamma functions – properties – relation between beta and gamma functions.

### Module-V

Approximations and Errors in Computation: Introduction, Errors, Order of Approximations; Solution of algebraic and transcendental Equations: Introduction, Bisection Method, Regula Falsi Method, Secant Method, and Newton-Raphson Method.

#### Lab Work :

1. Find the roots of the equation by bisection method.
2. Find the roots of the equation by secant/Regula-Falsi method.
3. Find the roots of the equation by Newton's method.
4. Find the roots of the equation by Regula-Falsi method.

### Reference Books

- M. J. Strauss, G. L. Bradley and K. J. Smith, Calculus (3rd Edition), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education), Delhi, 2007.
- H. Anton, I. Bivens and S. Davis, Calculus (7th Edition), John Wiley and Sons (Asia) Pte. Ltd., Singapore, 2002.
- G. B. Thomas and R. L. Finney, Calculus and Analytical geometry, 10th ed.: Addison – Wesley, 2000
- G. K. Ranganath, Text book of B.Sc., Mathematics, Revised ed. New Delhi, India: S Chand and Co., 2011.
- Frank Ayres and Elliott Mendelson, Schaum's Outline of Calculus, 5th ed. USA: Mc. Graw Hill., 2008.
- N. P. Bali, Differential Calculus, New ed. New Delhi, India: Laxmi Publications (P) Ltd. 2010
- H. K. Pathak, Calculus, Shiksha Sahitya Prakashan, Meerut India.

## CS104

### Environmental Studies I

#### Course Objective

Expose the basic concept of environment-resource, pollution, management and law and discussing issues endangering life on earth.

#### Course Outcome

Student will

- Understand basic principle of science which govern natural resources
- Understand resource management and sustainability conflict
- Understand human interference in natural environment

**MODULE I:** Multidisciplinary nature of environmental studies, Definition, scope and importance Natural Resources: Renewable and non-renewable resources.

**MODULE II:** Environmental Pollution Definition: Cause, effects and control measure of - Air pollution, water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards.

**MODULE III:** Ecosystem: Structure and function of an ecosystem, Ecological succession, Food chains, food webs and ecological pyramids.

**MODULE IV -**, Water conservation, global warming, acid rain, and ozone layer depletion,. Environment and human health, Women and Child Welfare. Role of Information Technology in Environment and human health

**MODULE V:** Biodiversity: - Definition, Types, and Value of biodiversity: Hot-spots of biodiversity. Threats to biodiversity: Conservation of biodiversity:

**Reference Books:**

1. Agarwal K.C. 2001 Environmental Biology Nidi Publ. Ltd. Bikaner.
2. Bharucha Erach, the Biodiversity of India, Mapin Publishing Pvt. Ltd. Ahmedabad 380 013, India, Email: mapin@icenet.net(R)
3. Bruinner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p.
4. Clark R.S., Marine Pollution, Clarendon Press Oxford (TB).
5. Cuningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 200,
6. Dr A.K. Environmental Chemistry, Wiley Estem Ltd.
7. Down to Earth, Centre for Science and Environment (R)
8. Gloick, H.P. 1993 Water in crisis, Pacific Institute for studies in Deve, Environment & Security. Stockholm Eng. -Institute. Oxford Univ, Press. 473p.
9. Hawkins R.E. Encyclopedia of Indian Natural History, Bombay Natural History Society, Mumbai (R).
10. Heywood, V.H. & Watson, RT. 1995 Global Biodiversity Assessment, Cabridge Univ. Press 1140p.
11. Jadhav H. &Bhosale, V.H. 1995, Environmental Protection and Laws. Himalaya Pub.House. Delhi 284p.
12. Mckinney M.L. & School RM. 1996, Environmental Science systems & Solutions, Web enhanced edition, 639p.
13. Mhaskar A.K., Matter Hazardous, Techno-Science Publication (TB).
14. Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co. (TB).
15. Odum, E.P. 1971, Fundamentals of Ecology, W.B. Saunders Co. USA, 574p.
16. Rao M.N. &Datta, A.K. 1987, Waste Water treatment. Oxford & IBH Publ. Co. Pvt. Ltd.
17. Sharma B.K., 2001, Environmental Chemistry, Goel Publ. House, Meerut.
18. Survey of the Environment, TheHidu (M).
19. Townsend C., Harper J. and Michael Begon, Essentials of Ecology, Blackwell Science (TB).
20. Trivedi R.K. Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol.I and II, Environment Media (R).
21. Trivedi RK., and P.K. Goel, Introduction to air pollution, Techno-Science Publications (TB).
22. Wagner K.D., 1998, Environmental Management. W.B. Saunders Co. Philadelphia, USA 499p.)Magazine (R)Reference (TB) Textbook.

**CS105**

**OFFICE AUTOMATION CERTIFICATION**

**CS201**

**OBJECT ORIENTED PROGRAMMING IN C++**

**Course Objective**

Developing programmatic solution for real problems by developing object oriented software using class encapsulation and inheritance. It will be based on basic knowledge of algorithms and procedural programming language.

**Course outcome**

- Student will understand fundamental concept of OOP
- Student will be able to apply object oriented programming in problem solving
- Student will be able to design applet and event handling mechanism in programs

**Module I:** Object Oriented Concepts and evolution, Object Oriented Design methods, class and object definition, Program Components and Interfaces, Annotation for object-oriented Design. OOP Paradigm, Advantages of OOP, Comparison between Functional Programming and OOP Approach, Characteristics of Object Oriented Language.

**Module II:** C++ Identifier and keywords, Constants, input/output Statement, Preprocessor Directives, Comments, Data type and type conversion, Expression and operators, Library functions, Variable declaration, conditional loop statements, Jumping statements

**Module III:** Defining a function, types of functions, Structure, Passing arguments to and returning values from functions, Reference Arguments, Overloaded functions, Inline functions, Default Arguments, recursion, Variable and Storage classes, Storage class specifier, Arrays, pointers and structures, unions

**Module IV:** Classes, member functions, objects, Constructors, copy constructors, objects as function arguments Array Fundamentals, Arrays as class member data, Arrays of objects,, strings, overloading Unary & Binary operators, Data conversion, Pitfalls of overloading & Conversion

**Module V:** Arrays of class objects, pointers and classes, nested classes, constructors, destructors, inline member functions, static class member, friend functions, and dynamic memory allocation, Inheritance, Class hierarchy, derivation, Derived class and their constructs, overriding member functions, class hierarchies, Public & Private Inheritance, Inheritance levels

#### Reference Books:

- Yedidyah Langsam Moshe J. Augenstein, Aaron M. Tenenbaum, "Data Structures using C & C++", PHI New Delhi, 2nd Edition.
- G.S.Baluja, "Data Structures Through C", Dhanpat Rai & Co., 4th Edition.
- Seymour Lipschutz, "Data Structures", Schaum's Outline Series, Tata Mc Graw Hill Publishing Company Ltd.
- Robert Lafore, "Object Oriented Programming in Turbo C++", Galgotia Publications, 994.
- D. Ravichandran, "Programming with C++", TMH, 1996.
- Bjarne Strastrup, "The C++ Programming Language", Addison- Wesley Publication Co., 1995. Object Oriented Programming in C++: Barkakati, Nabajoti (Prentice Hall of India) 1996
- D. Parasons, "Object Oriented Programming with C++", BPB Publication.
- Schildt Herbert, "C++: The Complete Reference", 4th Ed., Tata McGraw Hill, 1999 "Programming C++" by Yeshwanth Kanetkar

### CS202

#### System Analysis and Design

##### Course Objective

Students acquire an overview of principles, methods and techniques of systems development, and gather experience from a development project

##### Course Outcome

- Describe and define phases of the system development life cycle
- Familiarity with system analyst jobs
- Student get ability to perform feasibility study
- Students get ability to determine methods for evaluating the effectiveness and efficiency of a system

**MODULE I:** Introduction, Concept, Characteristics of System, Elements of a System, Types of System, System development Cycle, The role and qualities of System Analyst, System Planning and the Initial Investigation, introduction, dimensions of planning, initial investigation: needs identification, determining the user's information requirements

**MODULE II:** Information gathering, various information gathering tools and its comparative study, Structured Analysis and its tool – Data flow Diagram, Data dictionary, decision tree and structured English, decision tables, Pros and cons of each tool, feasibility study, system performance, system constraints, system objectives, feasibility considerations, analysis, report, oral representation

**MODULE III:** Data analysis, cost/benefit analysis, categories, procedure for cost/benefit determination, system proposal, the process of Design, logical and physical design, Methodologies – structured, Form-Driven Methodology, Audit Considerations: Processing controls and data validation, Audit trail and Documentation Control, input design, input data, media and input devices, output design.

**MODULE IV:** Forms design ,classification of forms, requirements of forms design, types of forms, forms control, file structure, file organization, types, database design, key terms, logical and physical views of data, normalization, data structure, The role of the Database Administrator, System Testing, nature of test data ,test plan, Quality assurance, quality assurance goals in the system life cycle, levels of quality assurance, implementation and software maintenance ,review, maintenance and enhancement, reducing maintenance cost.

**MODULE V:** Hardware/software selection and the Computer Contract, Hardware Suppliers, Software suppliers, software industries, types of Software, procedure of hardware and software selection, the evaluation process, rental option , lease option, purchase option, project scheduling and software , project management, system security, threats to system, disaster/recovery planning.

Text Books:

1. Elias M Ewad – System Analysis and Design
2. Workbook on Systems Analysis & Design, 2nd edition Vinod Kumar Garg, S. Srinivasan, prentice hall publication.

Reference Books:

1. Introduction to system analysis and design, 4th edition – Igor hawryszkiewicz
2. Essentials of systems analysis and design, 2nd edition - Joseph s. valacich, joey f.george , Jeffrey a. hoffer (php)

## CS203

### Statistics and probability

#### Course Objective

This course is designed to provide the non- science/ mathematics/ engineering/ business student a intense foundational introduction to the fundamental concepts in Mathematics

#### Course Outcome

- Apply central tendency in real life
- Get ability to measure the dispersion of the data.
- Apply statistical method to solve statistical and probabilistic problem

**Module I:** Measures of Central Tendency Concept of central tendency of statistical data: Statistical average, characteristics of a good statistical average., Arithmetic Mean (A.M.) Definition, effect of change of origin and scale, combined mean of a number of groups, merits and demerits., Geometric Mean (G.M.) Definition, merits and demerits. Harmonic Mean (H.M.) Definition, merits and demerits., Mode: Definition, graphical method of determination of mode, merits and demerits. Median: Definition, formula for computation graphical method of determination of median, merits and demerits., Empirical relation between mean, median and mode. , Partition Values: Quartiles, Deciles and Percentiles

**Module II:** Measures of Dispersion Concept of dispersion, characteristics of good measure of dispersion, Range: Definition, merits and demerits. Semi-interquartile range (Quartile deviation). Mean deviation: Definition, merits and demerits, Variance and standard deviation: Definition, merits and demerits, effect of change of origin and scale, Combined variance Measures of dispersion for comparison: coefficient of range, coefficient of quartile deviation and coefficient of

mean deviation, coefficient of variation(C.V.) Moments Raw moments for grouped and ungrouped data. Moments about an arbitrary constant for grouped and ungrouped data. Central moments for grouped and ungrouped data, Relations between central moments and raw moments (upto 4-th order)

**Module III:** Bivariate data, bivariate frequency distribution. Concept of correlation between two variables, positive correlation, negative correlation. Scatter diagram, conclusion about the type of correlation from scatter diagram. Karl Pearson's coefficient of correlation ( $r$ ): Definition, computation for grouped and ungrouped data and interpretation. Spearman's rank correlation coefficient Regression Concept of regression, lines of regression, fitting of lines of regression by the least squares method, interpretation of slope and intercept. Regression coefficient ( $b_{yx}$ ,  $b_{xy}$ ); properties

**Module IV:** Analysis of time series, introduction, component of time series, measurement of trend, free-hand and graphic method, method of semi averages, method of moving averages, method of least squares, Method of least squares; Legendre's principle of least squares, fitting of straight line, second degree curve, an exponential curve, power curve.

**Module V:** Distribution of random Variables: Moment Generating Function, Cumulant generating Function. Their important properties. Uses and relationship between them. Characteristic FUNCTION. Its properties without proof, Uniform Distribution: Uniform Discrete Distribution: - Definition, Mean, variance and moment generating function, Poisson distribution as a limiting case of Binomial Distribution, moments of Poisson distribution, mode of Poisson distribution, recurrence relation for moment of Poisson distribution, moment generating and cumulant generating function, additive property of Poisson distribution, recurrence formula for the probabilities of Poisson distribution, Binomial Distribution: Definition, moments, Moment generating function cumulants, Additive property of Binomial distribution, Recurrence Relation for the probabilities of Binomial distribution, Mode, Problems.

#### Reference Books

- S. P. Gupta: Statistical Methods
- Goon Gupta and Das Gupta: Fundamentals of Statistics, Vol. 1, The World Press Pvt. Ltd., Kolkata.
- Gupta and Kapoor: Fundamentals of Mathematical Statistics, Sultan Chand and Sons, New Delhi.
- Statistics: Theory and Application: D. C. Sancheti, V. K. Kapoor
- Fundamental of Statistics: D. N. Elhance
- Programmed statistics - B.L. Agrawal, (New Age International Publication New Delhi.)
- Introduction to the theory of Statistics, Mood A.M., Graybill F.A. and Boes F.A..
- Mathematical Statistics :- H.C. Saxena (Sultan Chand & Sons New Delhi)
- New Mathematical Statistics (First Edition) Arora Sanjay and Bansilal.
- Statistics :- a Beginners Text Volume - II B.R. Bhat T. Shivenkataramena
- K.S. Madhav Rao.(New Age International (p) Ltd.
- Introduction to Discrete Probability and Probability Distributions:-
- Madhav B. Kulkarni, Surendra B. Ghatpande. (SIPE Academy, Nasik.)

## CS204 Communicative English

### Course Objective

Course objective is to give understanding of communication. Help in abstract preparation, project reports and basic communication letter

### Course Outcome

- Student will understand objective of communication and various media.
- Student will be able to write technical proposal
- Student will be able to draft memo and other official document
- Student will be able to understand interview skill

### MODULE I:

- What is Communication (An introduction)
- The Communication Process (communication cycle)
- Objectives of communication (types)
- Media of communication (oral, written, audio, audiovisual, face to face)
- Types of communication (Downward, upward, horizontal, grapevine, consensus)
- Principles of communication
- Barriers of communication

### MODULE II :

- Body language (facial expressions, gestures)
- Listening and its advantage
- Written presentation of technical material
- Punctuation & use of capital letters(practical exercises)

### MODULE III :

- Abstract preparation
- Précis writing
- Agenda of meeting(definition, draft for a given occasion)
- Minutes of meeting (jotting down, minutes book)
- Tools of internal communication – ( memo, circular, notes, orders)
- Basic structure of letter(an introduction to different formats)

### MODULEIV :

- Requisition letters
- Quotations
- Acknowledgements
- Applications
- Project proposal
- (Basics for different type of letters to be given with practice)

### MODULE V :

- Interview skills
- Project Reports
- Resume writing
- Report writing
- Feature write-ups

(Basics for different type of letters to be given with practice)

Note:- The above tasks would be carried out through certain exercises, to name a few- movie screening, dissertation on a selected novel, presentations and public speaking.

Also, the following practices would be observed:

1. A set of exercises in both oral and written communication.
2. Self- managed reading/ writing.
3. Audio and video presentations.

4. Use of print media for explanation of certain topics.

### REFERENCE BOOKS

1. Business Communication – K.K.Sinha.
2. Effective Business communication – Herta.A.Murphy,HERBER.W.
3. Effective Business Communication – AshaKaul.
4. Business Correspondence and report writing – R.C. Sharma and Krishna Menon.
5. Communication Skills – Rajendra Pal, J.S.Korlahalli.
6. Letters for all occasions – S.K.Puri.
7. Business Communication – UrmilaRai, S.M. Rai.
8. Business Communication – M.S.Ramesh, C.C.Pattanshetti.
9. Essential Communication Skills – Shirley Taylor.
10. Essentials of Business Communication – Rajendra Pal and J.S.Korlahalli.

### Recommended talks -

The following Debate and Talk shows are also recommended to improve communication skills

- The Cross Fire
- The Big Question
- Hard Talk on BBC World

The following **movies** are recommended to understand the cross-cultural communication

- East is East
- Hyderabad Blues
- Bend it like Beckham

### Internal Evaluation Pattern and Type of Test

**MODULE I:** As per the need of the course structure, it is necessary to conduct both written and oral tests. Oral test: Listening and grammar tests would be taken with the help of audio and audio-visual aids (comprising of 10 marks)

Written test: Test on the MODULE, framed on topics covered and exercises on the topics (would be a blend both of objective and subjective questions, comprising of 10 marks).

**MODULE II:** As per the need of course structure, it is necessary to conduct both written and oral tests. Assignment: On topics covered (comprising of 10 marks).

Written test: Test on the MODULE, (framed on the topics covered and exercises on the topics would be a blend both of objective and subjective questions, comprising of 10 marks)

**MODULE III:** Oral test: On use of phonetic symbols and use of dictionary for correct pronunciation (comprising of 10 marks) Written test: Test on the MODULE, (framed on the topics covered. Exercises on the topics, would be a blend both of objective and subjective questions, comprising of 10 marks).

**MODULE IV:** Oral test: On use of phonetic symbols and use of dictionary for correct pronunciation (comprising of 10 marks) Written test: Test on MODULE, framed on the topics covered. Exercises on the topics, would be a blend both of objective and subjective questions, comprising of 10 marks).

**MODULE V:** Presentations: On various topics given (comprising of 10 marks).

Written test: Test on MODULE (framed on topics covered. Exercises on the topics, would be a blend both of objective and subjective questions, comprising of 10 marks).

### TEXT BOOK:

1. Compiled Version of Functional English to be used as work and text book By – AnjanaRohatgi & Shilpi Bhattacharya

### REFERENCE BOOKS:

1. English Grammar & Composition by- Wren & Martin
2. A Practical English Grammar by- A.J. Thompson & A. V. Martinet



3. Intermediate grammar usage & Composition by- M. L. Tickoo, A. E. Subramaniam, & P. R. Subramaniam

### **Literature Review**

1. A Love Affair in London - Khushwant Singh
2. On Being Remembered - A. G. Gardiner
3. On the Rule of Road - A. G. Gardiner
4. Shall I compare Thee to a Summers Day - Shakespeare
5. Orientation (Wings of Fire) - Arun Tiwari
6. Mr. Collins proposes to Elizabeth - Pride & Prejudice (Jane Austen)
7. Ode to Nightingale - Keats

**Note:** Literature pieces can be changed frequently in order to maintain students' interest in the subject.

## **CS205 Desktop Publishing**

### **Course Objective**

Objective of the course is to provide basic software handling which is useful in day to day work requirement other than office work.

### **Course Objective**

- Student get ability to understand the uses of desktop publishing
- Student get ability to operate coral draw
- Student get ability to work on Photoshop
- Manipulate text and graphics to create a balanced and focused layout.
- Create fliers, brochures, and multiple page documents.

### **MODULE I**

Introduction to DTP, Introductions to Printing, Types of Printing, Offset Printing, Working of offset Printing, Transparent Printout, Negative & Positives for Plate were making, Use of Desk Top Publishing in Publications, Importance of D.T.P in Publication, Advantage of D.T.P in Publication, Mixing of graphics & Image in a single page production, Laser printers - Use, Types, Advantage of laser printer in publication.

### **MODULE II**

Introduction to adobe PageMaker/In-Design, PageMaker tool box, PageMaker palettes Menus, Icons and dialog box, the control palette, page layout, creating and saving documents, typography, Modifying character attributes, importing graphics, Editing and cropping images, Using the picture palette , The color palette.

### **MODULE III**

Introduction to Coral Draw graphics, Features of Corel Draw, Corel Draw Interface, Tool Box, Effects, Drawing and Coloring, Creating Basic Shapes, Working with Bitmaps, Applying effects on Bitmaps, Introduction o Text Tool, Artistic and paragraph text, Wrapping Text around Object.

### **MODULE IV**

Introduction to Basics of Quark express, navigating a QuarkXPress Document, Setting Up the Document, multi-page documents, formatting text, Manipulating Graphics.

### **MODULE V**

Introduction to Photoshop, Understanding Tools & Workspace, Image/Photo Editing-Mixing-Enhancements, Converting Color to b/w and b/w to Color, Shortcuts to work Efficiently, Creating Web Graphics.

### **TEXT & REFERENCE BOOKS:**

1. Adobe PAGE MAKER .
2. PRAKHAR COMPLETE COURSE FOR DTP (CORELDRAW, PAGEMAKER, Quark express PHOTOSHOP)

### **Practical LAB:**

1. Complete Page Maker S/W
2. Complete Adobe Photoshop

Hindi Typing on Page Maker and MS-Word.

## CS 301

### Database Management System

#### Course objective

Student understand and use relational database system to organize and store data in computer. Course objective is to provide concept of functional dependencies and normalization and basic SQL operation.

#### Course Outcome

- Student will be able to construct ER Diagram
- Role of relational algebra in developing good database.
- Student will be able to normalize data and reduce redundancy
- Create table and write basic query method

#### MODULE I

File Management Systems, Advantages and Purpose of DDMS - Overall System Structure - Entity Relationship Model -Mapping Constraints - Keys - E-R Diagrams. Relational Model - Structure - Formal Query Language - Relational Algebra - Tuple and Domain Relational Calculus.

#### MODULE II

Relational Database Design - Pitfalls - Normalisation Using Functional Dependencies - First Normal Form-Second Normal Form-Third Normal Form-Fourth Normal Form And BCNF.  
Data Models : Relational, Hierarchical, Network; File Organization : Sequential, Indexed Sequential, Random, Inverted; ANSI/SPARC Architecture, Physical, Conceptual and External Models

#### MODULE III

Structured Query Language - Basic Structure - Set Operations - Aggregate Functions - Date, Numeric, and Character Functions - Nested Sub queries -Modification Of Databases - Joined Relations-DDL - Embedded SQL, About PL/SQL, PL/SQL Block Structure, Program Constructs, Variables: Declaration, Naming Rules, Assigning Values to Variables, Initialization, and Keywords.

#### MODULE IV

Data types, %TYPE attribute, PL/SQL Record Structure, Referencing Non-PL/SQL variables, DBMS\_OUTPUT.PUT\_LINE; Writing Executable Statements: PL/SQL Block Syntax and Guidelines, SQL Functions in PL/SQL, PL/SQL Functions, Data type Conversion, Blocks and Variable Scope, Operators in PL/SQL. Creating procedures, Developing stored procedures and its advantages.

#### MODULE V

Various Operation of PL/SQL, Naming Conventions, Commit and Rollback Statements, SQL Cursor, and Cursor Attributes; Different Control Structures: different formats of IF statements, Iterative Control LOOP Statement. PL/SQL – PL/SQL Block – procedure, function – Cursor management – Triggers and types of triggers – Exception Handling.

#### Reference books

1. Singh-Database systems: Concepts, Design & applications, Pearson Education.
2. Abraham Silberschatz, H.F.Korth And S.Sudarshan-Database System Concepts Mcgraw Hill Publication
3. Gerald V.Post - DBMS-Designing And Business Applications - Mcgraw Hill Publications
4. Michael Abbey And Michael.J.Corey-Oracle- A Beginners guide TMH

## CS 302

### Principles of Operating System

#### Course Objective

Students will get understanding of system programs, scheduling, memory management and understand Unix operating system

#### Course Outcome

- Students understand the working process of system calls
- Students understand process management concepts including scheduling, synchronization, deadlock

- the different memory management techniques used in Operating Systems.
- the different I/O management techniques used in Operating Systems.
- the tradeoffs in design and implementation concepts used in the development of Operating Systems

#### **MODULE I**

Introduction - types of operating systems - operating systems services - systemcalls and system programs

#### **MODULE II**

Process management - Process concepts - process scheduling - operation on process Inter process communication - CPU scheduling - scheduling algorithms - Deadlocks

#### **MODULE III**

Memory Management - Single and multiple partitioned allocation - paging - segmentation - Virtual Memory Management - Demand paging and Page Replacement Algorithms

#### **MODULE IV**

Information management - File concept - Access methods - Directory structure - allocation methods - free space management - disk scheduling.

#### **MODULE V**

UNIX: Unix system - A Case Study

#### **Text Book**

Abraham Silberschatz and P. B. Galvin - Operating system concepts - Addison Wesley Publication.

### **CS 303**

#### **Mathematical Foundation Course for Computer Science II**

#### **Course Objective**

Student will learn mathematical function required in different computer science courses.

#### **Course outcome**

- Students will apply knowledge of computing and mathematics appropriate to the discipline
- Students get ability to analyze a problem and identify the computing requirement
- Students get ability to use current techniques, skills and tools necessary for computing practices

#### **Module-I**

The algebraic and order properties of  $\mathbb{R}$ , suprema and infima, the completeness property of  $\mathbb{R}$ , the archmedian property, density of rational numbers in  $\mathbb{R}$ , characterization of intervals, neighborhoods, open sets, closed sets, limit points of a set, isolated points, closure, complements, idea of uncountability of  $\mathbb{R}$ , Sequence, bounded sequence, limit of sequence, limit superior and limit inferior of a sequence, convergent sequences, limit theorems, monotone sequences, monotone convergence theorem, definition of Cauchy sequence, Cauchy's convergence criterion, subsequence, convergence and divergence criteria, monotonic subsequences. Bolzano – Weierstrass theorem,

#### **Module-II**

Pointwise and uniform convergence of sequence of functions, uniform convergence and continuity, uniform convergence and differentiation, uniform convergence and integration, Cauchy criterion for uniform convergence, series of functions and convergence, Weierstrass M-test, Weierstrass approximation theorem (statement only). Abel's theorem (without proof), exponential and logarithmic functions

#### **Module-III**

Definition of infinite series , sequence of partial sums , convergences of infinite series , Cauchy criterion , absolute and conditional convergence, convergence via bounded-ness of sequence of partial sums, tests of

convergence : comparison test, limit comparison test , ratio test , Cauchy's nth root test(proof based on limit superior) .

#### **Module-IV**

Riemann integral, integrability of continuous and monotonic functions, The fundamental theorem of integral calculus, mean value theorems for integral calculus. Improper integrals, convergence of improper integrals, tests of convergence for improper integrals and proper integrals, Abel's and Dirichlet's tests for improper integrals

#### **Module-V**

Taylor's theorem with Lagrange and Cauchy form of remainders, binomial series theorem, expansions of exponential, logarithmic and trigonometric functions, convex functions, applications of mean value theorems and Taylor's theorem to monotone functions. Power series: Differentiation and integration of Power series, radius of convergence, interval of convergence

#### **Reference Books**

- R.G. Bartle and D.R. Sherbert, introduction to Real Analysis (3rd Edition ), Jhon Wiley and Sons (Asia) Pte. Ltd. Singapore, 2002.
- K.A Ross, Elementary Analysis : The theory of Calculus ,
- Undergraduate Texts in Mathematics , Springer(SIE), Indian reprint, 2004.
- Walter Rudin , Principle of Mathematical Analysis (third edition)
- International Editions 1976 McGraw-Hill Book Company.
- Thomson-Bruckner <sup>2</sup> , Elementary Real Analysis, Published by Prentice Hall
- S Nanda , V P Saxena, Real Analysis, Allied Publishers Limited.

### **CS 304**

#### **Entrepreneurship**

##### **Course objective**

Graduates will learn basic entrepreneurial concept and become able to use skill to take leading role.

##### **Course outcome**

- Graduates get ability to become entrepreneur
- Graduates understand issues faced by Indian entrepreneur and global scenario.
- Graduates know about entrepreneurship development programme.

**MODULE I:** Introduction- Entrepreneur-entrepreneurship-and-enterprise: conceptual issues. Entrepreneurship versus Management . Entrepreneurship versus Intrapreneurship. Qualities of an entrepreneur: Role of entrepreneurship in economic development. Role and functions of entrepreneur in relation to new venture creation, especially in the developing country context. Small business as the seedbed of entrepreneurship – contemporary discourse on small and medium enterprises.

**MODULE II:** Theories of entrepreneurial Emergence: Economic, Sociological and Psychological Perspectives. Entrepreneurial competencies motivations, performance and rewards: The concept, metrics and role in entrepreneurial manifestation and sustenance entrepreneurship as a creative and dynamic process. Innovation and entrepreneurial orientation in a developing economy.

**MODULE III:** Global Entrepreneurship monitor (GEM) Project and total Entrepreneurship Index (TEI). India's rank and the issues facing Indian Entrepreneurship. Prominent business families and communities. Issues involved in family business, especially those pertaining to accessing support for one's business ideas, assuming and asserting one's role in family business, and, leadership succession. The contemporary role models in Indian business: their values. Business philosophy and behavioural orientations.

**MODULE IV:** Entrepreneurial Development Programmes: their role, relevance and achievements; Role of Government in Organizing EDPs; Critical Evaluation; Problems and Constraints.

**MODULE V:** Reach of the various promotional programmes, evaluation of their effectiveness and the ways and mean of accessing the available help. Role of industries/entrepreneur's associations and self-help groups. The idea of business and sources of business ideas. Opportunity sensing via personal observation, vicarious experience, primary surveys and secondary data analysis. Role of business consultants/ mentors, entrepreneurship trainers, and, family-and community networks in identifying business opportunities. Compatibility of the business idea with the personal profile of the entrepreneur. Tools and techniques of Economy- sector- Industry analysis and projections.

**Text/Reference Books:**

- Harell (1995), 'For Entrepreneurs Only', New Jersey Career pub.
- Vikram Sarabhai, (1974), 'Management for development' Vikas pub.
- Rajagopal, Entrepreneurship and Rural Markets
- Ovmerod A, (1992), 'Textile, Project Management', the textile Institute.
- Rerry and Franklin, (2002), 'Principals of Management'. AITBS.  
Acharya B.K and Gonekan P.B. (1985) " Marketing and sale Management", Bombay, Himalaya publication house

**CS305**

**Computational accounting statistical tool**

**CS401**

**Unix/ linux programming**

**Course Objective**

Students familiarize with the Linux environment, learn the fundamentals of shell scripting/programming and learn basic linux administration

**Course Outcome**

- Work confidently in Unix/Linux environment
- Write shell scripts to automate various tasks
- Get ability in basics of linux administration

**Module I**

Introduction to Linux, Versions of Linux, Kernel architecture, Booting process, Boot strap loader- LILO, Grub. Dual Booting, Logging in, File system- Structure of the file system, ext2, ext3, ResierFS, Journaling capability, Linux Shell, Various shells and its features, Type of files in Linux, Basic file handling commands, wild cards, finding files, Commonly used commands like who, pwd, cd, mkdir, rm, ls, mv, cat, lp, cp, sed, awk, pr, lex, yacc, make, etc.

**Module II**

Some useful commands: colon commands, cut, copy, and paste, opening multiple files, mapping keys, searching for strings, replacement strings, Grep etc. Users groups and privileges: File ownership, permission, the superuser, adding a user, adding users to groups, modifying privileges, who, whoami, su and sudo, Processes in Linux, Process fundamentals, connecting processes with pipes, Redirecting input output. Background processing, managing multiple processes, changing process priority, scheduling of processes at command, batch commands, kill, kill all.

**Module-III**

About X, setting up X, configuring X, starting and stopping X, The X file manager, The XFM Application window, Useful X Application, Standard options, logging in to X directly, The K desktop environment, integrated desktop, installing KDE, The KDE desktop, Automatically mounting disks, using KWM, The KDE control centre, KDE applications

**Module-IV**

What is the shell, shell commands, shell variables, shell programming, conditions in Bash, “For” loops, Return codes, parameters, Packages and archives: The Tar command, Gzip compression, Bzip2, other compression programs, RPM, Glint, Software installation with Glint, DEP Packages, source packages,

#### **Module-V**

Memory Management in Linux, Scheduling Jobs: Cron, The system crontab, user crontabs, more about crontabs, organizing the system crontab. Kernel configuration: Why reconfigure the kernel, config and menu config, using Xconfig, Building the new kernel, MODULEs, Booting the new kernel, kernel upgrading.

#### **Text/Reference Books:**

1. “Linux in easy steps” by David Nash, IDG Books India.
2. “Operating systems – incorporating Unix& Windows” Colin Ritchie bpb.
3. “Red Hat System Administration and Network Administration”, Tarrycolin and Curtwal.
4. “The Unix” by Sumitabha Das.

## CS402

### Data Communication and networking

#### Course Objective

Objective is to provide concept of data communication and familiarized with the basic protocol of computer networks.

#### Course Outcome

- Identify the different component in a communication system and their respective tools
- Describe the technical issues related to the local area networks
- Identify the common technologies available in establishing LAN infrastructure

#### Module I

Analog and Digital signals, Wired and Wireless transmission channels, Modulation - Analog and Digital, Multiplexing- Analog and Digital, Signal encoding techniques, Transmission Media types (wired & wireless) - properties & specialty of various media – types, comparative study. Introduction, FDMA, TDMA, FDMA/TDMA, CDMA, multiple access examples.

#### Module II

Network Topology-Bus, Star, Ring, Star-bus, Star-ring, Mesh – Features, Advantages and disadvantages of each type, Network adapters – working principals, configuration and selection. Network Connectivity Devices: Modem, Amplifiers, Repeater, Hub – Active, Passive and Intelligent, Bridge, Router, Gateway, Switches, Brouters, Network Scaling - No. of nodes, distance, software, speed, special requirements.

#### Module III

Network Protocols-Hardware Protocols, software Protocols. The theoretical Network Model – OSI, IEEE 802 standards, Introduction to IBM's SNA, Apple's AppleTalk, Real World Networks- Ethernet, Fast Ethernet, Token Rings, FDDI, ATM, ARCnet

#### Module IV

TCP/IP Reference Model, Various TCP/IP protocols- IP, TCP, UDP, ARP, ICMP. TCP/IP Services Protocols- DHCP, DNS, WINS, FTP, SMTP, TELNET etc., IP Addressing and Concept of classes, Subnet and masking, IPv6, IPv4 vs. IPv6.

#### Module V

Satellite Systems: History, Applications, Basics: GEO, LEO, MEO; Routing, Localization, Handover, Examples.

#### Texts & References Books:

- William Stallings, "Data computer communication", Prentice Hall India, 8th Edition.
- Andrew & Tanenbaum, "Computer Network".

## CS403

### Operation Research

#### Course Objective

Objectives of the course is to introduce the fundamental concepts of Optimization Techniques, make the learners aware of the importance of optimizations in real scenarios.

#### Course Outcome

- formulate optimization problems
- understand and apply the concept of optimality criteria for various type of optimization problems
- solve various constrained and unconstrained problems in single variable as well as multivariable
- apply the methods of optimization in real life situation

### **Module I**

Linear Programming Problem (L.P.P.): Mathematical Formulation. Concepts of Solution, Feasible Solution, Basic Feasible Solution, Graphical Solution for problems with one or two variables, Simplex method of solving, Concept of Duality. Its use in solving LPP. Relationship between optimum solutions to Primal and Dual. Economic interpretation of Dual

### **Module II**

Transportation Problem: Concept, Mathematical Formulation, Concepts of Solution, Feasible Solution, Optimal Solution by MODI Method: Initial Basic Feasible Solution by North-West Corner Rule, Matrix Minima Method, Vogel's Approximation Method. Optimality Test. Improvement Procedure.

### **Module III**

Assignment problem: Concept. Solution by Complete Enumeration Method and Hungarian Method. Adjustments when Problem is of Maximization type and/or Unbalanced

### **Module IV**

Sequencing: Processing n Jobs through 2 and 3 Machines and 2 jobs through m Machines, Travelling salesman Problem.

### **Module-V**

CPM and PERT: Objective and Outline of the techniques. Diagrammatic representation of activities in a project: Bar Diagram (Grant Chart) and Network Diagram. Slack time and Float times. Determination of Critical path. Probability consideration in project scheduling Project cost analysis, Updating, Resource allocation

### **Reference Books**

- Operations Research: S. D. Sharma
- Operations Research: Kanti Swarup, P. K. Gupta
- Operations Research: V. K. Gupta

## **CS405**

### **Client Server Architecture Implementation and Network Troubleshooting**

## **CS501**

### **Computer Graphics**

#### **Course objective**

Graduates understand the graphic working process inside the computer and how algorithms are helpful in drawing different graphical design.

#### **Course outcome**

- Students will know basic concept of graphics in computer domain
- Students will draw line using algorithm
- Students will transform 2D object.
- Students understand 3D image processing basics.

#### **Module-I**

Definition, Application, Pixel, Frame Buffer, Raster and Random Scan display, Display devices - CRT, Color CRT Monitors, Emissive and Non-emissive display units, LED, LCD, Plasma.

#### **Module-II**

Scan Conversion of line- DDA and Bresenham's algorithm for line drawing, Scan conversion of circle- Bresenham's circle generating algorithm, Polygon Filling-Scan line polygon filling algorithm.

#### **Module-III**

2-Dimensional transformation, Translation, Rotation, Scaling, Homogeneous Coordinates and its usefulness, Reflection, Shear, Concept of 3D Graphics, 3D Display Units, 3-Dimensional transformation, Translation, Rotation Scaling, Reflection, Shear

#### **Module-IV**

Window to view port transformation, clipping, line clipping, Cohen – Sutherland line clipping, Polygon clipping, Sutherland and Gary Hodgman polygon clipping algorithm



## Module-V

Hidden Surface removal—Depth comparison, Z-Buffer Algorithm , Back-Face Removal, The Painter's Algorithm, Scan-Line Algorithm, Subdivision Algorithm.

## Graphics practical Using C/C++

1. Program for DDA line drawing
2. Program for Bresenham's line Drawing
3. Program for Bresenham's Circle
4. Program for polygon scan line filling
5. Program for translation transformation for an object
6. Program for rotation transformation for an object
7. Program for scaling transformation for an object
8. Program for polygon drawing
9. Program for Cohen – Sutherland line clipping
10. Program for polygon clipping

## TEXTS & REFERENCES BOOKS:

- Computer Graphics by Donald Hearn and M. Pauline Baker
- Computer Graphics by Zhigang Xiang and Roy Plasock , Schaum's Outlines.

## CS502

## Web designing

### Course objective

Graduates get exposure for web pages, CSS, Java script and protocols.

### Course Outcome

- Graduates get ability to make web pages
- Graduates get ability to develop web pages using Java script
- Graduates get skill in XML

## Module-I

Web application development: URL, Web Server, Communicating with the web server, concept of Client and Server Side, HTML based web pages covering basic tags - HTML, TITLE, BODY, H1...H6, Paragraph <P>, Line Break <BR>, Section Separator <HR>, FONT, TABLE, LIST <UL>, <OL>, FORM creation, Frames, iFrame; Creating and accessing static pages using HTML. Introduction to DHTML and XML

## Module-II

Introduction to JavaScript language. JavaScript vs. VBScript, JavaScript vs. Java, JavaScript versions, JavaScript Comments, Variables: Variables overview, declaring variables, Types of variables, Casting variables. expressions, operators, statements and inbuilt functions. JavaScript Events, Catching Errors, JavaScript Alert box, Prompt & confirm. Expressions: Arithmetic operators, Assignment operators, Logical operators, Expressions and precedence, Statements: If statement, For statement, While statement, Break/Continue

## Module-III

Introduction to PHP, History of PHP, Versions of PHP, Features of PHP, Advantages of PHP over Other Scripting Languages, Installation and Configuration of PHP, Data Types in PHP, PHP Syntax, Comments, PHP Variables and Constants, Scope of Variables, PHP String, String Manipulation, PHP Operators, Precedence of Operators, Expressions, Creating a PHP Script, Running a PHP Script.

## Module-IV

Basic HTML, Embedding PHP in HTML, Passing Information between Pages, PHP \$\_GET, PHP \$\_POST, PHP Conditional Statements, PHP Looping Statements, Break, Continue, Exit, PHP Functions: Built-in and User Defined Function, Regular Expression Functions, Mathematical, Date and Time Functions, PHP Arrays: Creating Array and Accessing Array Elements

## Module-V

Working with Database:PHP-Supported Databases; Using PHP & My SQL: Installation and Configuration of My SQL on Windows, Checking Configuration, Connecting to Database, Selecting a Database, Adding Table and Altering Table in a Database, Inserting, Deleting and Modifying Data in a Table, Retrieving Data, Performing Queries, Processing Result Sets

## Texts & References Books:

- "Using Html", by Lee Anne Phillips,
- "Teach Yourself Javascript In 24 Hrs". By Michael Moncur, Techmedia, PHI.
- Mastering PHP, BPB Publication.

**CS503**  
**Elective I**

- Advance DBMS
- Wireless Communication
- Digital Signal processing
- Computer Animation Concepts

**Advanced DBMS**

**Course Objective**

Students will understand basic concept of database management, query processing and transaction processing.

**Course outcome**

- Student get ability draw ER Diagram for any given problem
- Student get ability to create database using defined step
- Student get ability of optimizing query
- Student can understand issues related with data storage and recovery from crashes

**Module-I**

Relational Model: Introduction, Structure of Relational Data Base, Relational Algebra, Relational Calculus. Relational Query Languages- Introduction, Codd's Rules, Structured Query Language, Embedded Structured Query Language ER Model: Basic Concepts, Conversion of ER Model into Relations, ER Diagram Symbols.

**Module-II**

Data Base Design: Introduction, Software Development Life Cycle, Database Development Life Cycle, Automated Design Tools. Functional Dependency and Decomposition, Functional Dependency, Decomposition. Normalization: Introduction, Normal Forms - BCNF - 4 NF - 5 NF.

**Module-III**

Query Processing and Optimization: Introduction, Query Processing, Syntax Analyzer, Query Decomposition, Query Optimization. Transaction Processing and Concurrency Control: Transaction Concepts, Concurrency Control, Locking Methods, Timestamp Methods, Optimistic Methods.

**Module-IV**

Data Base Recovery Systems: Introduction, Recovery Concepts, Types of Failures, Types of Recovery, Recovery Techniques, Buffer Management. Data Base Security: Goals, Firewalls, Data Encryption.

**Module-V**

Active Database Concepts and Triggers, Temporal Databases, Spatial Databases, Multimedia Databases, Deductive Databases, XML Databases: XML Data Model, DTD, XML Schema, XML Querying, Geographic Information Systems, Genome Data Management.

**References**

1. S.K. Singh, "Database Systems Concepts, Design and Applications", Pearson Education Pte. Ltd., New Delhi: 2006.
2. C.J. Date and others, "An Introduction to Database Systems", Eighth Edition, Pearson Education Pvt. Ltd., New Delhi: 2006.

# Wireless Communication

## Course Objective

Objective of the course is to provide an overview of wireless communication networks area and its applications in communication engineering.

## Course Outcome

- Student will understand the basic of wireless communication networks
- Student become able to understand the infrastructure to develop mobile communication system and the characteristic of different multiple access techniques in mobile communication.

## Module-I

Introduction to communications systems, analog and digital communication systems, Applications of communication systems, Introduction to Wireless/mobile/radio Communications Systems: Evolution, Analog-to-Digital Conversion: Sampling theorem, Pulse-Amplitude Modulation, Channel bandwidth for PAM signal, Quantization of signals, Pulse-code modulation (PCM), The PCM system, Companding, PCM signals, Differential PCM.

## Module-II

Wave Propagation: Modes of Propagation, Plane Earth Reflection. Space wave and Surface Wave, Reflection and refraction waves by the ionosphere Tropospheric Wave, Large scale path loss: propagation models, reflection, diffraction, scattering.

## Module-III

Examples of Wireless Communication systems: paging system, cordless systems, cellular systems, Comparison of common wireless communication systems, Multiple Access Techniques: FDMA, TDMA, CDMA, SDMA, Block diagram of Transmitter and Receiver.

## Module-IV

Digital Modulation Techniques: Binary Frequency-Shift Keying (BFSK), Binary Phase-Shift Keying (BPSK), Differential Phase-Shift Keying (DPSK), Quadrature Phase-Shift Keying (QPSK), Quadrature Amplitude Shift Keying (QASK), Spread spectrum modulation techniques: Pseudo-noise sequence, direct sequence spread spectrum (DS-SS), frequency hopped spread spectrum (FH-SS), performance of DS-SS, performance of FH-SS.

## Module-V

IEEE 802.11, Bluetooth Technology, IEEE 802.15 Wireless Personal Area Network (WPAN), IEEE 802.16 fixed broadband wireless access standard, Basic Principles of Satellite Communication: an overview of satellite system, satellite frequency bands for communication, Communications via satellite, characteristic features of communication satellites, Coverage area and satellite networks, Geometric distances, Communication time, and satellite visibility. Orbital Theory: Orbital mechanics, locating the satellite in the orbit w.r.t. earth look angle determination.

## References

1. Jordan Edwards C. and Balmain Keith G., "Electromagnetic Waves and Radiating Systems", Prentice Hall (India).
2. T.S. Rappaport, "Wireless Communication-Principles and practice", Pearson.
3. Haykin S & Moher M., "Modern wireless communication", Pearson,

## Digital Signal Processing

### Course Objective

Student get familiar with the most important methods in DSP, including digital filter design, transform-domain processing and importance of Signal Processors.

### Course Outcome

- Represent discrete-time signals analytically and visualize them in the time domain.
- Understand the meaning and implications of the properties of systems and signals.
- Understand the Transform domain and its significance and problems related to computational complexity

### Module-I

Basic elements of DSP, concepts of frequency in Analog and Digital Signals, sampling theorem, Discrete, time signals, systems. Analysis of discrete time LTI systems, Z transform – Convolution (linear and circular), Correlation.

### Module-II

Frequency Transformations: Introduction to DFT, its properties, Filtering methods based on DFT, FFT, Algorithms Decimation – in – time Algorithms, Decimation – in – frequency Algorithms, Use of FFT in Linear Filtering, DCT.

### Module-III

Structures of IIR, Analog filter design, Discrete time IIR filter from analog filter, IIR filter design by Impulse Invariance, Bilinear transformation, Approximation of derivatives (HPF, BPF, BRF) filter design using frequency translation.

### Module-IV

Structures of FIR, Linear phase FIR filter, Filter design using windowing techniques, Frequency sampling techniques, Finite word length effects in digital Filters.

### Module-V

Multirate signal processing, Speech compression, Adaptive filter, Musical sound processing, Image enhancement.

### References

1. John G. Proakis & Dimitris G.Manolakis, “Digital Signal Processing – Principles, Algorithms & Applications”, Fourth edition, Pearson education / Prentice Hall, 2007.
2. Alan V.Oppenheim, Ronald W. Schaffer & Hohn. R.Back, “Discrete Time Signal Processing”, Pearson Education, 2nd edition, 2005.
3. Andreas Antoniou, “Digital Signal Processing”, Tata McGraw Hill, 2001.

## Computer Animation Concepts

### Course Objective

Students will know basic principles and concepts and the production system.

### Course Outcome

- Student will understand principles of animation
- Student will get understanding of principle of movement
- Student will get creative ability to create animation.

### Module-I

The History of Animation,Introduction to Animation Workflow,Principles of Animation,, The Fundamental Principles of Animation, Timing, Ease In and Out (or Slow In and Out),Arcs, Anticipation, Exaggeration,Squash and Stretch,Secondary ,ActionFollow Through and Overlapping Action,Straight Ahead Action and Pose-To-Pose Action,Staging Appeal,Personality, Animating force acting on objects , object weight, construction,

flexibility, object behaviour when force acts on them. Principles of Timing. Timing governing acting and movement. The use of anticipation, action, reaction.

### **Module-II**

**Principles of Movement**, Understanding the meaning of movement and movement in Nature and what movement expresses, Awareness of how mood and feeling can be conveyed through movement and animate and inanimate object behavior, the laws of motion in the context of animation; animation; cause and effect thrown objects, rotating, force, oscillating movement, friction, resistance. Studying the tendency of weight to move in a particular manner.

### **Module-III**

**Experimental Animation**, Flip Books, Cut-out animation (cardboard sets, houses, layouts designing), clay animation, stop motion shooting technique, animation set designing (table top), Clay character modeling, table-top model lighting Clay Modelling Clay Animation, Experimental Animation work with different media, Water Colours ,Poster Colours ,Water proof Colours, Oil pastel Colours,Pencil Colours,Charcoal ,Pen and Ink Using Dry brush.

### **Module-IV**

Tangents, Dope Sheet, Present and Future Work, Introduction to subject, theme, plot. Definition and explanation of story writing, Presentation of the plot for animation, Characterization, Case studies with successful writers(Animation Movie)Reference SheetsComputer Generated Animation Workflow

### **Module-V**

**Digital Creativity**,The high-tech role of computer animation,A guide to advanced computer animation techniques,Performance animation,inverse-kinematics,dynamic equations of motion, morphing technique, Facial animation,Cloth animation,task-level animation system,Passive dynamics, Active dynamics.motion capture animation,motion capture animation technology,motion capture animation, softwares.keyframe animation.

### **Text Books/References**

- “The Advanced Art of Stop-Motion Animation”Ken.A.Prieb”
- “The Animator's Survival Kit” Richard Williams

## **CS 504**

### **Elective II**

- Data Mining and Data Warehousing
- Network Security
- Image processing
- 2D and 3D Animation

### **Data Mining and Data Warehousing**

#### **Course Objective**

Students get the basic concept of data mining information for decision making purpose

#### **Course outcome**

- Understand data mining techniques
- Learn how to gather and analyze large sets of data to gain useful business understanding
- Identify business application in data mining
- Overview of developing areas- web mining, text mining and ethical aspects of data mining

### **Module-I**

Introduction: Motivation, Data Mining Applications, Data Mining Functionalities, Classification on data mining systems, Task Primitives, Major Issues, Data Preprocessing.

### **Module-II**

Data Warehouse and OLAP: Data warehouse, Multidimensional data model, Data Warehouse architecture, OLAP Technology, Data Cube Computation.

### **Module-III**

Association Analysis: Basic Concepts, Frequent Item set mining methods, Types of association rules.

#### **Module-IV**

Classification: Introduction, Statistics and Probability, Decision Tree Induction, Bayesian Classification, Classification by Back propagation, Rule Based Classification, Support Vector Machines.

Cluster Analysis: Partitioning methods, Hierarchical Methods, Density based methods, Neural Network Based Methods.

#### **Module-V**

Advanced Topics: Introduction to Temporal Data Mining, Spatial data mining, Text Mining, Web Mining.

#### **References**

1. Jaiwei Han, Micheline Kamber, "Data Mining: Concepts and Techniques", Elsevier, 2006.
2. Margaret Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education, New Delhi, 2007.
3. Alex Berson, "Data Warehousing, Data Mining and OLAP," Tata Mc Graw Hill , 2004.
4. Arun K Pujari, "Data Mining Techniques", Universities Press.

## **Network Security**

#### **Course Objective**

Enable the students to learn fundamental concepts of computer security and cryptography and utilize these techniques in computing systems.

#### **Course outcome**

Students will have knowledge and understanding of: Classical and modern encryption techniques, Confidentiality using symmetric encryption, Basics of number theory, Public key cryptosystems, Message authentication, E-Mail, IP and web security, System security, Intruders, Malicious software, Firewalls.

#### **Module-I**

Network concepts, Threats/Attacks in networks, Services and Mechanisms, Network security controls, Importance of security, Threat models, Security concepts, Security Services, Integrity check, digital Signature, authentication, Hash algorithms, Denial-of-service attacks and defenses, Malware overview, Viruses, Worms and Botnets.

#### **Module-II**

Application Layer Security, Transport Layer Security, IP Layers and functions – Versions, IP Addressing: class-full addressing, class-less addressing, Delivery, Forwarding and Routing of IP packets, ARP, RARP, Internet Protocol, Datagram, Fragmentation, IP Packets, ICMP, IGMP, TCP and UDP, Physical Layer Security.

#### **Module-III**

Overview of authentication, Authentication of people, Security Handshake pitfalls, Strong password protocols, Public key infrastructure, Kerberos: purpose, authentication, server and ticket granting server, keys and tickets, use of AS and TGS, replicated servers..

#### **Module-IV**

IP security: Overview, Architecture, Authentication Header, Encapsulating Security Payload, Key management. IPSec, Web security: Web security considerations, Secure Socket Layer

and Transport Layer Security, Secure electronic transaction, Web issues.

### **Module-V**

System Security: Intruders, Viruses and related threats, virus countermeasures, Malicious software, Firewalls: Firewall design principles, Firewall configurations, Trusted systems, Password management, Intrusion Detection and Prevention Systems.

### **References**

1. Kaufman, c., Perlman, R., and Speciner, M., Network Security, Private Communication in a public world, 2<sup>nd</sup> ed., Prentice Hall PTR., 2002.
2. Stallings, W., Cryptography and Network Security: Principles and Practice, 3<sup>rd</sup> ed., Prentice Hall PTR., 2003.
3. Stallings, W. Network security Essentials: Applications and standards, Prentice Hall, 2000.
4. Cryptography and Network Security; McGraw Hill; Behrouz A Forouzan.

## **Image Processing**

### **Course Objective**

Objective of the course describe and explain basic principles of digital image processing, image enhancement and compression.

### **Course Outcome**

- Student will understand terminology of digital image processing
- Implement image process and analysis algorithms
- Apply image processing algorithms in practical applications

### **Module-I**

Introduction: Background, Digital Image Representation, Fundamental Steps in Image Processing, Elements of a Digital Image Processing System, Digital Image Fundamentals: Elements of Visual Perception, A Simple Image Model, Sampling and Quantization, Some Basic Relationships between Pixels, Imaging Geometry. Image resolution, colour perception & processing.

### **Module-II**

Image processing: pixel based transformation, geometric transformation, local processing (edge detection, subpixel location estimation) restoration (degradation, inverse fitting & Wiener filtering), binary image processing: thresholding, runlength encoding, distance transforms, medial axis transforms, morphological operations, region segmentation & representation: split & merge algorithm, region growing,

### **Module-III**

Image filtering- histogram modification, linear and Gaussian filters, contours, digital curves, polyline splitting, Image Transforms: Introduction to the Fourier Transform, The Discrete Fourier Transform, Some Properties of the Two-Dimensional Fourier Transform, Other Separable Image Transforms, Hadamard, discrete cosine, wavelets and other orthogonal transforms,.

### **Module-IV**

Image Enhancement : Spatial Domain Methods, Frequency Domain Methods, Some Simple Intensity Transformations, Histogram Processing, Image Subtraction, Image Averaging, Background, Smoothing Filters, Sharpening Filters, Lowpass Filtering, Highpass Filtering, Generation of Spatial Masks from Frequency Domain Specifications.

### **Module-V**

Image Compression Models, Compression image (predictive compression methods, vector quantization, hierarchical & progressive methods, JPEG & MPEG), case studies.

### **References**

1. W.K.Pratt. "Digital Image Processing", 3/e Edn., John Wiley & sons, Inc. 2006.
2. M. Sonka, et. al, "Image Processing, Analysis and Machine Vision", 2/e, Thomson, Learning, India Edition, 2007.
3. Rafael. C. Gonzalez & Richard E. Woods, "Digital Image Processing", 2/e Pearson Education, New Delhi, 2006.

# 2D and 3D Animation

## Course objective

Students will bring their career and apply their abilities in every creative field of science and art.

## Course Outcome

- Produce work to a client brief in accordance with the production standards required across the pipeline.
- Communicate confidently, strategically and creatively to clearly convey intentions.
- Initiate and develop creative solutions to animation and pipeline problems

## Module-I

The History of Animation, Introduction to Animation Workflow, Principles of Animation, The Fundamental Principles of Animation, Timing, Ease In and Out (or Slow In and Out), Arcs, Anticipation, Exaggeration, Squash and Stretch, Secondary Action Follow Through and Overlapping Action, Straight Ahead Action and Pose-To-Pose Action, Staging Appeal, Personality, Animating force acting on objects, object weight, construction, flexibility, object behavior when force acts on them. Principles of Timing. Timing governing acting and movement. The use of anticipation, action, reaction.

## Module-II

Principles of Movement, Understanding the meaning of movement and movement in Nature and what movement expresses, Awareness of how mood and feeling can be conveyed through movement and animate and inanimate object behavior, the laws of motion in the context of animation; animation; cause and effect thrown objects, rotating, force, oscillating movement, friction, resistance. Studying the tendency of weight to move in a particular manner.

## Module-III

Experimental Animation, Flip Books, Cut-out animation (cardboard sets, houses, layouts designing), clay animation, stop motion shooting technique, animation set designing (table top), Clay character modeling, table-top model lighting Clay Modeling Clay Animation, Experimental Animation work with different media, Water Colors, Poster Colors, Water proof Colors, Oil pastel Colours, Pencil Colours, Charcoal, Pen and Ink using Dry brush.

## Module-IV

Tangents, Dope Sheet, Present and Future Work, Introduction to subject, theme, plot. Definition and explanation of story writing, Presentation of the plot for animation, Characterization, Case studies with successful writers (Animation Movie) Reference Sheets Computer Generated Animation Workflow, nonlinear animation.

## Module-V

Digital Creativity, The high-tech role of computer animation, A guide to advanced computer animation techniques, Performance animation, inverse-kinematics, dynamic equations of motion, morphing technique, Facial animation, Cloth animation, task-level animation system, Passive dynamics, Active dynamics. Motion capture animation, motion capture animation technology, motion capture animation, software. Key-frame animation.

## References

1. Ken. A. Prieb, "The Advanced Art of Stop-Motion Animation".
2. Richard Williams, "The Animator's Survival Kit".



## **CS 601**

### **Programming in Java**

#### **Course Objective**

To impart the basic concepts of Java Programming and to develop understanding about Basic object Oriented design using UML and Applet

#### **Course outcome**

- Understands fundamental constructs of OOP.
- Gets the knowledge of different forms of OO Implementation.
- Apply object oriented programming concepts in problem solving through JAVA.
- Design and implement Applet and event handling mechanisms in programs

#### **Module-I**

C++ Vs JAVA, JAVA and Internet and WWW, JAVA support systems, JAVA environment, JAVA program structure, Tokens, Statements, JAVA virtual machine, Constants & Variables, Data Types, Type Casting, Operators, Expressions & its Evaluation, Decision making and branching, Loops, Jumps in Loops, Labeled Loops.

#### **Module-II**

Defining a class, Adding variables and methods, Creating objects, Accessing class members, Constructors, Method overloading, Static members, Nesting of methods, Inheritance: Extending a class, Overriding methods, Final variables and method~, Final classes, Finalizes methods, Abstract methods and classes, Visibility control.

#### **Module-III**

Arrays, One dimensional & two dimensional, Strings, Vectors, Wrapper classes, Defining interfaces, Extending interfaces, Implementing interfaces, Accessing interface Variables, System packages, Using system packages, Naming conventions, Creating packages, Accessing a package, Using package, Adding a class to a package, Hiding classes.

#### **Module-IV**

Graphics, JFC-JAVA foundation classes, swing, images, java 2d graphics, Applets, Local and remote applets, Applets Vs applications, Writing applets, Applets life cycle, Creating an executable applet, Designing a web page, Applet tag, Adding applet to HTML file, Running the applet, Passing parameters to applets, Aligning the display, HTML tags & applets, Getting input from the user interface.

#### **Module-V**

Internationalization, Communication and Networking, TCP Sockets, UDP Sockets, java.net, java security, Object serialization, Remote method serialization, JDBC: Java Data Base Connectivity, Java beans, Java interface to CORBA, JAVA- COM Integration, Java Media Framework, commerce and java wallet, Data structures and java utilities, JavaScript, Servlets.

#### **TEXTS & REFERENCES BOOKS:**

- “Java: The Complete Reference”,Herbert Schildt.
- Programming JAVA 2nd Edition by E. Balagurusamy, TMH Publications.

## **CS 602**

### **Introduction to Microsoft.Net and C#**

#### **Course Objective**

This course is designed to provide the knowledge of Dot Net Frameworks along with C#

#### **Course Outcome**

After completion of the course the student will be able to use the features of Dot Net Framework along with the features of C#

#### **Module-I**

Visual Studio .Net & .Net languages, .Net Framework, its Layered architecture, The Common language Runtime(CLR), IDE of VB.NET- Menu bar, Toolbar, Solution Explorer, Toolbox, Properties Window,

Form Designer, Output Window, Object Browser. The environment: Editor tab, format tab, general tab, docking tab. Visual development & event driven Programming -Methods and events.

#### **Module-II**

What is C#, Why C# & Evolution of C#, Features of C#, How C# differs from C++ & Java, Arrays, String & Operators in C#: Jagged Arrays, Array & ArrayList class, String class, Boxing & Unboxing variable, Short circuiting operators. Properties, Indexers, Delegates, Multicast Delegates & Events.

#### **Module-III**

Namespace, interface & Exception handling: Creating & using Namespace(DLL library), Creating & using interface, Exception. Multithreading: Understanding System. Threading Namespace, Creating & starting Thread, Threading synchronization & Pooling.

#### **Module-IV**

Windows Based Application Development: Event Driven Programming Model, Important classes used in windows application, TextBox & Label Control, Button, CheckBox, RadioButton & GroupBox Control, ListBox & ComboBox control, Month Calendar Control, Docking Control, Tree View Control, Menu & Toolbar control, Dialog Boxes.

#### **Module-V**

Database programming using ADO.NET: Overview, ADO to ADO.NET, Accessing Data using Server Explorer. Creating Connection, Command, Data Adapter and Data Set with OLEDB and SQLDB. Display Data on data bound controls, display data on data grid. Generate Reports Using, Crystal Report Viewer.

#### **TEXTS & REFERENCES BOOKS:**

- Programming in C# A Primer, by E. Balagurusamy.
- C# Programming Black Book By Matt Telles & Kogenet Solution Inc.
- C#.Net Programming, Wrox Publication

**CS603**  
**Elective III**

- Parallel and Distributed Database
- Cryptography and Information Security
- Grid Computing
- Digital Film Making and Stop motion Animation

**Parallel and Distributed Database**

**Course Objective**

Student will get general idea about parallel and distributed databases, overview of what can be parallelized.

**Course Outcome**

- Student will describe terms related to distributed object database design
- Student will understand transaction management and query processing techniques in parallel and distributed database technology
- Student will relate importance and application of emerging database technology

**Module-I**

Introduction: Distributed Data Processing, Distributed Database System, Promises of DDBSs, Problem areas.

Distributed DBMS Architecture: Architectural Models for Distributed DBMS, DDMBS Architecture. Distributed Database Design: Alternative Design Strategies, Distribution Design issues, Fragmentation, Allocation.

**Module-II**

Distributed query Optimization: Query optimization, centralized query optimization, Distributed query optimization algorithms.

Distributed concurrency control: Serializability, concurrency control Mechanisms & Algorithms, Time stamped & Optimistic concurrency control Algorithms, Deadlock Management.

**Module-III**

Distributed DBMS Reliability: Reliability concepts and Measures, fault-tolerance in Distributed systems, failures in Distributed DBMS, local & Distributed Reliability Protocols, site failures and Network partitioning.

**Module-IV**

Distributed object Database Management Systems: Fundamental object concepts and Models, Object Distributed Design, Architectural Issues, Object Management, Distributed Object storage, Object query Processing.

**Module-V**

**Parallel Systems:** Speedup and Scaleup, Interconnection Networks, Parallel Database Architectures.

**Parallel Databases:** Introduction, I/O Parallelism, Interquery Parallelism, Intraquery Parallelism, Interoperation Parallelism, Intraoperation Parallelism, Design of Parallel Systems.

Parallel DBMS Techniques, Parallel exception problems, Parallel Execution for Hierarchical architecture.

**References**

1. M.Tamer OZSU and Pauck Valduriez, "Principles of Distributed Database Systems", Pearson Edn. Asia, 2001.
2. Stefano Ceri and Willipse Pelagatti, "Distributed Databases", McGraw Hill.
3. Henry F Korth, A Silberchatz and Sudershan, "Database System Concepts", McGraw Hill.
4. Raghuramakrishnan and Johhanes Gehrke, "Database Management Systems", McGraw Hill.

**Cryptography and Information Security**

**Course Objective**

This is aimed to provide information about security and various techniques to secure information.

**Course Outcome**

- Student have firm understanding on terminology and concept related to cryptography
- Student also exposed to basic security management and network security.
- Identify the major types of threats to information security and the associated attacks
- Understand the authentication protocol and processes

**Module-I**

Security Trends, Security Attacks, Security services, Security Mechanisms, A Model for Network Security.

Introduction: Cryptography and modern cryptography, the setting of private-key encryption, historical ciphers and their cryptanalysis, basic principles of modern cryptography.

**Module-II**

Symmetric Techniques: Definition, Substitution ciphers, Transposition ciphers, Shift Cipher, Affine

Cipher, Vigenere Cipher, Permutation Cipher, Hill Cipher, Stream and block ciphers, A5, RC4, Characteristics of good ciphers, Shannon's Theory, Perfect Secrecy, Entropy.  
Data Encryption Standard (DES), International Data Encryption Algorithm, Advanced Encryption Standard, Block cipher modes of operation, Confidentiality using symmetric encryption.

#### **Module-III**

Asymmetric Techniques: Principles of Public Key Cryptosystems, The RSA Algorithm, Key Management, Diffie-Hellman Key Exchange, Elliptic Curve Cryptography, over reals, prime fields and binary fields, Applications, Practical considerations. Cryptography in Embedded Hardware.

#### **Module-IV**

Message Authentication: Authentication requirements, Authentication functions, Authentication Protocols, Message Authentication Codes (MAC), MD5 Message Digest Algorithm, Hash functions – Security of hash functions and MACs, Secure Hash Algorithm (SHA), Digital Signatures, Digital Signature Standard (DSS). Introduction to signature scheme, security requirement for signature scheme, digital signature etc., provably secure signature schemes, undeniable signatures.

#### **Module-V**

Introduction to information security, security models, physical and logical security, security requirements, reliability and integrity, sensitive data/information, inference, access control- mandatory and discretionary, security architecture, issues.

#### **References**

1. Douglas R. Stinson, "Cryptography Theory and Practice", Third Edition, Chapman & Hall/CRC, 2006.
2. William Stallings, "Cryptography and Network Security: Principles and Practices", Third Edition, Pearson Education, 2006.
3. Wenbo Mao, "Modern Cryptography – Theory and Practice", Pearson Education, First Edition, 2006.
4. Bernard Menezes, "Network Security and Cryptography", Cengage Learning, New Delhi, 2010.

### **Grid Computing**

#### **Course Objective**

Student become familiar with the fundamental components of grid environment such as context processor, authentication, resource access and security.

#### **Course Outcome**

- Able to appreciate the necessity of grid computing and thus its evaluation
- Able to understand where the grid computing could be effectively utilized by illustrations of applications of grid computing
- Able to select a proper technology and toolkit for using grid computing

#### **Module-I**

Introduction: Parallel and Distributed Computing, Cluster Computing, Grid Computing, Anatomy and Physiology of Grid, Web and Grid Services, Grid Standards, OGSAWSRF, Trends, Challenges and applications.

#### **Module-II**

Grid Monitoring Architecture (GMA): An Overview of Grid Monitoring Systems, R-GMA, GridICE, MDS, Service Level Agreements (SLAs), Other Monitoring Systems, Ganglia, GridMon, Hawkeye and Network Weather Service.

#### **Module-III**

Grid Security, A Brief Security Primer, PKI-X509 Certificates, Grid Security, Grid Scheduling and Resource Management, Gridway and Gridbus Broker-principles of Local Schedulers, Overview of Condor, SGE, PBS, LSF-Grid Scheduling with QoS.

#### **Module-IV**

Data Management, Categories and Origins of Structured Data, Data Management Challenges, Architectural Approaches, Collective Data Management Services, Federation Services, Grid Portals, Generations of Grid Portals.

#### **Module-V**

List of globally available Middlewares, Case Studies, Recent version of Globus Toolkit and gLite, Architecture, Components and Features. Features of Next generation grid.

#### **References**

1. Maozhen Li, Mark Baker, "The Grid: Core Technologies", Wiley, 2005.
2. Fran Berman, Geoffrey Fox, Anthony J.G. Hey, "Grid Computing: Making The Global Infrastructure a Reality", Wiley, 2003.
3. Joshy Joseph, Craig Fellenstein, "Grid Computing", IBM Press, 2004.
4. Ian Foster, Carl Kesselman, "The Grid 2: Blueprint for a New Computing Infrastructure", Elsevier Series, 2004.

## Digital Film Making and Stop Motion Animation

### Course Objective

Student will know animation technique for traditional and computer animation.

### Course Outcome

- Student get skill to make animation
- Student get information about camera features and use.
- Student will understand visual effects in animation
- Student get know about production design for traditional cut out animation

### Module-I

Introduction history of stop-motion feature films. Building Puppets, Plug-In Wire and Sockets, Hands and Feet, Puppet Anatomy, Silicone, Casting a Silicone Puppet, Making a Silicone Mold, Plastic Casting, Face Armatures, Replacement Faces and Rapid Prototyping, Replacement Animation Puppets.

### Module-II

Digital Cinematography, Advance Digital Camera Basics, Aperture and Shutter Speed, Depth of Field, White Balance, Camera Effects, Rack Focus, Blurring Effects, Camera Moves, Stereoscopic Photography. Character Animation, Performance, Two-Character Dialogue, Lip Sync.

### Module-III

Advance Visual Effects for Stop Motion Movie, Compositing, Digital Compositing, Split-Screen and Masks, Blue/Green Screen, Front Light/Back Light, Advanced Compositing for *Ava*, Effects, Rig and Shadow Removal, Motion Blur, Eye Compositing Effects for *Madame Tutli-Putli* (case study of stop motion animation films.), Case study stop motion movies.

### Module-IV

The fantastical imaginings of Tim Burton, Introducing Tim Burton, Surviving Burbank, Surviving Burbank, Discussion points, Mise-en-scene and German Expressionism, Formal elements of German Expressionist films, Key aspects of mise-en-scene, View Tim Burton's short *Vincent*, Discussion points: *Vincent*, *Frankenweenie*, Discussion points: *Frankenweenie*, Task: *Frankenweenie* + photographing mise-en-scène, Further research, The writer and the 'Burtonesque' outsider, Discussion points, Artistic collaborations in film, The director and the actor: Johnny Depp, The director and the composer: Danny Elfman, Discussion points, Exploring Tim Burton's Artistic practice, Artistic explorations: analysis of Burton's visual art works.

### Module-V

Production design for traditional cut-out animation: Introduction, History of cut-out animation, What Is Advance Cut-Out Animation? Hegemonic forms of animation, Cut-out as experimental animation form, Production issues, Remediation, Immediacy, Hypermediacy, The problem of digital transition, Methodology/Design of the Study, Video Puppetry.

### References

1. Ken. A. Prieb, "The Advanced Art of Stop-Motion Animation".
2. Richard Williams, "The *Animator's Survival Kit*".

**CS604**  
**Elective IV**

- Database Designs
- Real time Security Systems
- Introduction to Robotics
- Audio Video Composing and Editing: Tools and Techniques

**Database Designs**

**Course Objective**

Students will understand advance concept of database management, query processing and transaction processing.

**Course outcome**

- Student get ability draw ER Diagram for any given problem
- Student get ability to create database using defined step
- Student get ability to handle deadlock in transaction.
- Student get understanding of data security and threat related with database
- Student get some commonly used database software used for data storage

**Module-I**

Introduction, Brief History, Data models, Database Defined, Database Design Objective, Advantages and Limitations, Stages in Creating a Database, Important database designing rules, component of management system – DDL, DML, database languages, SQL standard, database users and administrators, Identifying Entities, Identifying Relationships, Identifying Attributes, Presenting Entities and Relationships: Entity Relationship Diagram (ERD), Assigning Keys, Defining the Attribute's Data Type, Normalization.

**Module-II**

Relational DBMS: structure of relational databases, Relational Database Design Process, Design issues - basic normal forms and additional normal forms, Transforming E-R diagram to relations, Integrity constraints, Query processing and optimization.

**Module-III**

Transaction Processing: Transaction concept, concurrent execution, isolation, testing for serializability, Concurrency control, lock based, time-stamp based, validation based protocols, multi-version schemes, deadlock handling.

**Module-IV**

Database Security: Introduction to database security, Security Issues, security models, physical and logical security, security requirements, reliability and integrity, sensitive data, inference, multilevel databases and multilevel security, access control- mandatory and discretionary, security architecture, issues.

**Module-V**

Tools for Database Design, Datasstudio, DbSchema, DeZign for Database, ModelRight, PostgreSQL Maestro, etc. Introduction of these tools and some hands-on.

**References**

1. Abraham Silberschatz, Henry F Korth, Sudarshan S, "Database Systems Concepts", McGraw Hill, 2007.
2. Ron Ben Natan, "Implementing database security and auditing", Elsevier Publications, 2005.
3. "Database design basics (Microsoft Access 2007)", available at <http://office.microsoft.com/en-us/access/HA012242471033.aspx>.
4. Paul Litwin, "Fundamentals of Relational Database Design", available at <http://www.deeptraining.com/litwin/dbdesign/FundamentalsOfRelationalDatabaseDesign.aspx>.
5. Codd E. F., "A Relational Model of Data for Large Shared Data Banks", Communications of the ACM, vol. 13, issue 6, pp. 377–387, June 1970.

**Real Time Security Systems**

**Course Objective**

Student will know about real time processing system and need of security for data transmission.

**Course Outcome**

- Student will understand dynamic threat and networking environments
- Student will know traffic flow pattern and packet scheduling
- Student will understand need of real time protocols
- Student will know about real time security device and tools.

**Module-I**

Today's dynamic threat and networking environments: an introduction, standalone Intrusion Detection/Prevention Systems (IDS/IPS): Functions and limitations. Signature-based intrusion detection and prevention systems. Real-time Networks: Real-time channel, Packet scheduling, Real-Time MAC protocols.

**Module-II**

Denial of Service (DoS) attacks, Network Behavior Anomaly Detection (NBAD) techniques and tools, Traffic flow patterns and data, Network Performance Data, Passive Traffic Analysis,

**Module-III**

Real Time Protocols: RTP (Real-time Transport Protocol), Secure Real-time Transport Protocol (or SRTP), MS-Scale Secure Real-time Transport Protocol (SSRTP), RTCP (Real Time Control Protocol), Secure RTCP (or SRTCP), HMAC: Keyed-Hashing for Message Authentication,

**Module-IV**

Real Time Security Devices and Tools, Features and limitations, Comparison.

**Module-V**

Case Study Using Available tools.

**References**

1. Douglas R. Stinson, "Cryptography Theory and Practice", Third Edition, Chapman & Hall/CRC,2006.
2. William Stallings, "Cryptography and Network Security: Principles and Practices", Third Edition, Pearson Education, 2006.
3. Wenbo Mao, "Modern Cryptography – Theory and Practice", Pearson Education, First Edition, 2006.
4. Bernard Menezes, "Network Security and Cryptography", Cengage Learning, New Delhi, 2010.

## Introduction to Robotics

### Course Objective

Objective of the course is to provide basic concept of robotic and link with computer science

### Course Outcome

- Student get ability to know basic concept of the robotics
- Student will understand various factor related with robots
- Student will know the important part of robotic devices

### Module-I

Introduction To Robotics: What is robot?, Classification of Robots, Advantages and Disadvantages of Robots, Robot Components, Degree of Freedom, Joints, Robot Coordinates, Reference Frames, Programming Modes, Robot Characteristics, Robot Workspace, Robot Languages, Application of Robots.

### Module-II

Spatial Descriptions And Transformation: Robot as Mechanisms, Matrix Representation, Description of Position and Orientation, Frames and Displacement mappings, Homogeneous transforms, Transformation of free vectors, examples.

### Module-III

Manipulator Forward Kinematics: Link description, link connection, Denavit – Hartenberg parameters, examples, Manipulator Inverse Kinematics: Solvability, algebraic and geometric approaches, Degeneracy and Dexterity, Examples.

### Module-IV

Velocity analysis, linear and rotational velocity of rigid bodies, velocity propagation, Jacobians, velocity transformation and inverse velocity, force transformation and inverse force, examples, Robot Controller Design: P, PI, PD, PID and AI control in Robotics, Trajectory Generation: Joint space schemes, continuous path motion, examples.

### Module-V

Actuators: Characteristics of Actuating Systems, Comparison of Actuating Systems, Hydraulic and Pneumatics Devices, Electric Motors in Robotics, Sensors: Sensor Characteristics, Position Sensors, Velocity Sensors, Acceleration Sensors, Touch and Tactile Sensors, Proximity Sensors, Range Finder.

### References

1. John J. Craig, "Introduction to Robotics: Mechanics and Control", 3rd Edition, Pearson Education International, 2005.
2. Jorge Angeles, "Fundamentals of Robotic Mechanical Systems: Theory, Methods, and Algorithms", Second Edition, Springer, 2002.
3. Good e-Text Books are available at: <http://www.robotee.com/index.php/download-free-robotic-e-books/>

## Audio & Video Composing and Editing: Tools and Techniques

### Course Objective

Objective of the course is to provide understanding of audio video compositing to the student.

### Course Outcome

- Student will get an ability to understand terminologies of audio and video
- Student will learn benefit of going digital
- Student will learn video principles
- Student will learn practical visual effect and compositing

### Module-I

Introduction to Audio Tools & Techniques, *Fundamentals* of digital audio/Film/Video/Digital Media, Sound and Audio, Principles of Audio Editing, Broadcast/, Narrative Sync Sound Techniques, Understanding the dynamics of sound design and use of sound as a key. Post production techniques for movie. Sound and Vibration, The Decibel, The Analog Signal, Synchronization, A sound source radiating into free space, A musical scale, The Basic Characteristics of Sound, Velocity, Wavelength, Musical Notation and Frequency. MIDI Basic Concept, MIDI Interface Components, MIDI Devices, Synthesizer, Sound.

### Module-II

Introduction to video, Digital Video, Benefits of Going Digital, Definition of video, Characteristics of video streams, rate, Video editing Tools, Basic concepts of video, Introducing digital video, vertical detail and viewing, horizontal, total detail content of the image, perception of depth, luminance and chrominance, temporal aspect of illumination, continuity of motion, flicker, temporal, aspect of video bandwidth, analog video, video camera, video Discs/Laser, video overlay boards, digital, hardware, DVI. Software, Video as data, What is a video signal? Why binary?, Color, Why digital?, Analog video, digital video.

### Module-III



Video principles, The eye, Gamma, Scanning, Synchronizing, Bandwidth and definition, Aperture effect, Color, Color displays, Color difference signals, Motion portrayal and dynamic resolution, Progressive or interlaced scan?, Binary codes, The computer, The processor, Sampling-rate conversion, Sampling and aliasing, Jitter, Introduction to dither, Gamma in the digital domain, Color in the digital domain, Aspect ratio, Color space and bits per pixel, Video compression method (digital only).

#### **Module-IV**

Digital video processing, Keying, masking, Digital video effects, Graphics, Video compression and MPEG, Introduction to compression, What is MPEG?, Spatial and temporal redundancy in MPEG, Types of recording medium, Types of recording medium, Magnetic recording, Azimuth recording and rotary heads, Optical and magneto-optical disks, Disks in digital video, Types of disk, Magnetic disks, Optical disk principles, Structure of a DVD player, Non-linear video editing, The structure of a workstation, Introduction to the digital VTR, History of DVTRs, Color framing.

#### **Module-V**

Practical Introduction to Visual Effects and Compositing, understands compositing, Work With Multiple Comps and Projects, how and why to work with some kind of project template, how to keep a complex, multiple-composition pipeline organized, shortcuts to help maintain orientation within the project as a whole, Precomping and Composition Nesting, Why Precomp? The Project Panel, Create folders, such as Source, Precomps, and Reference, to group specific types of elements. Use numbering to reflect comp and sequence order so that it's easy to see the order in the Project panel. Create a unique Final Output comp video. (Basics of nonlinear editing).

#### **References**

- John Watkinson, "An Introduction to Digital Video"