

**Sri Chandrasekharendra Saraswathi  
Viswa Mahavidyalaya**

SCSVMV University  
Enathur, Kanchipuram - 631 561.



**B.E. COMPUTER SCIENCE  
AND ENGINEERING**

**SYLLABUS - 2015 ONWARDS**

## **CHOICE BASED CREDIT SYSTEM FOR BE (CSE) FULL-TIME PROGRAMME CREDITS**

**Theory courses:** Courses with 4/3 credits will be assigned 3 Lectures and 2/1 Tutorial hours per week.

**Practical courses:** Courses with 2 credits will be assigned 3 hours of lab/practical work per week

Each semester curriculum shall normally have a blend of theory and practical courses. In the first year the total number of credits will be 25 for each Semester. For semester III to VII, the average credits per semester will be 25 and for semester VIII, the credits will be 18. For the award of the degree, a student has to earn a minimum of 195 credits.

### **DURATION OF THE PROGRAMME**

A student is normally expected to complete B.E (CSE) programme in four years and in any case, not more than seven years from the time of admission.

### **REGISTRATION FOR COURSES**

A newly admitted student will automatically be registered for all the courses prescribed for the first year , without any option.

All other students shall submit a completed registration form indicating the list of courses intended to be credited during the next semester. This registration will be done a week before the last working day of the current semester. Late registration, with the approval of the Dean on the recommendation of the Head of the Department, along with a late fee will be done, up to the last working day.

Registration for the project work shall be done only for the final semester.

## **ASSESSMENT**

The break-up of Assessment and Examination marks for Theory subjects are as follows.

Continuous Internal Assessment comprising of tests, assignments, seminars, group discussion and attendance	:	40 Marks
End semester Examination	:	60 Marks

The break-up of the Assessment and Examination marks for Practical are as follows.

Continuous Internal Assessment comprising of tests, Observation, Record work and attendance	:	40 Marks
End semester Examination	:	60 Marks

The project work will be assessed for 40 marks by a Committee consisting of the Guide and the Head of the Department. The Head of the Department said be the Chairman. 60 marks are allotted for the project viva voce examination at the end of the semester.

## **WITHDRAWAL FROM A COURSE**

A student can withdraw from the course at any time before a date fixed by the Head of the Department prior to the second assessment, with the approval of the Dean on the recommendation of the Head of the Department.

## **TEMPORARY BREAK OF STUDY**

A student can take a one-time temporary break of study covering the current year/semester and/or the next semester with the approval of the Dean on the recommendation of the Head of the Department, not later than seven days after the completion of the mid-semester test. However, the student must complete the entire program within the maximum period of seven years.

## **SUBSTITUTE ASSESMENT**

A student who has missed, for genuine reasons accepted by the Head of the Department, one or more of the assessments of a course other than the end semester examination, may take a substitute assessment for any one of the missed assessments. The substitute assessment must be completed before the comment of the end semester before examination.

A student who wishes to have a substitute assessment for a missed assessment must apply to the Head of the Department within a week from the date of the missed assessment.

## **ATTENDANCE REQUIREMENTS**

To be eligible to appear for the examination in a particular course, a student must put in a minimum of 80% of attendance in the course. However, if the attendance is 70% or above but less than 80% in any course, the authorities can permit the student to appear for the examination in the course on payment of the prescribed condonation fee.

A student who withdraws from or does not meet the minimum attendance requirement in the course must re-register for and repeat the course.

### PASSING AND DECLARATION OF EXAMINATION RESULTS

All assessments of all the courses on the absolute mark basis will be considered and passed by the results passing board in accordance with the rules of the University. Thereafter, the Controller of Examinations shall convert the marks for each course to the corresponding letter grade as follows, compute the grade point average & cumulative grade point average and prepare the grade cards.

90 to 100 marks	-	Grade 'S'
80 to 89 marks	-	Grade 'A'
70 to 79 marks	-	Grade 'B'
60 to 69 marks	-	Grade 'C'
55 to 59 marks	-	Grade 'D'
50 to 54 marks	-	Grade 'E'
less than 50 marks	-	Grade 'F'
Insufficient attendance	-	Grade 'I'
Withdrawn from the course	-	Grade 'W'

A student who obtains less than 50 marks out of 100 in the subject or less than 24 out of 60 in External exam or is absent for the examination will be awarded Grade 'F'.

A student who earns a grade of S,A,B,C,D or E for a course is declared to have successfully completed that course and earned the credits for that course. Such a course cannot be repeated by the student.

A student who obtains letter grade F in a course has to reappear for the examination in that course.

The following grade points are associated with each letter grade for calculating the grade point average.

S – 10; A-9; B-8; C-7; D-6; E-5; F-0

A student can apply for revaluation of one or more of his /her examination answer papers within a week from the date of issue of Grade sheet to the student on payment of the prescribed fee per paper. The application must be made to the Controller of Examinations with the recommendation of the Head of the Department.

After results are declared, Grade cards will be issued to the students. The Grade card will contain the list of courses registered during the year/semester , the grades scored and the grade point average(GPA) for the year/semester.

GPA is the sum of the products of the number of credits of a course with the grade point scored in that course, taken over all the courses for the Year/Semester , divided by the sum of the number of credits for all courses taken in that year/semester. CGPA is similarly calculated considering all the courses taken from the time of admission.

After successful completion of the program, the Degree will be awarded with the following classification based on CGPA:

For First Class with Distinction, the student must earn a minimum of 195 credits within four years from the time of admission, pass all the courses in the first attempt and obtain a CGPA of 8.25 or above.

For First Class, the student must earn a minimum of 195 credits within five years from the time of admission and obtain a CGPA of 6.5 or above.

For Second Class, the student must earn a minimum of 195 credits within seven years from the time of admission.

#### **ELECTIVES**

Apart from the various Core courses offered in the curriculum of the branch of specialization, a student can choose a electives from a list of electives offered by the Department and from other Departments with the approval of the Head of the Department and the Head of the Department offering the course.

#### **Examination Pattern for Sanskrit & Indian Culture paper**

There will not be any External examination for Sanskrit and Indian Culture paper. Performance of students will be assessed through tests and assignments conducted by the same Department. The internal assessment pattern is as follows.

First test	30 Marks
Second test	30 Marks
Assignment (G.D + Seminar + Attendance + Class test)	40 Marks
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Total	100 Marks
Total Marks	100Marks
Passing Minimum marks	50%

In the last semester (B.E. - VI) marks are allotted for test (50) and project work (50). A Candidate shall be declared to have passed the examination, if he/she has secured a minimum mark of 50%.

**COURSE CONTENT  
&  
SCHEME OF EXAMINATION**

**SCSVMV University**  
**B.E (Computer Science and Engg., Choice Based Credit System)**

**SEMESTER - III**

SUBJECT CODE	Subject	Ins. /Week in Hours			C (Units)
		L	T	P	
	Applied Mathematics for Computers - I	3	1	0	3
	Applied Discrete Mathematics	3	1	0	3
	Analog and Digital Electronics	3	1	0	3
	Computer Organization	3	1	0	3
	Data Structures	3	2	0	4
	Sanskrit & Indian Culture-III	1	0	0	1
	HR Skills - I	1	1	0	1*
	Analog and Digital Electronics Lab	0	0	3	2
	Data Structures Lab	0	0	3	2
	Computer Organization Lab	0	0	3	2
	Advanced C++ Lab	0	0	3	2
	<b>Total</b>				<b>25</b>

**L – Lecture**

**T- Tutorial**

**P- Practical**

**C- Credits**

**SEMESTER - IV**

Subject Code	Subject	Ins. /Week in Hours			C (Units)
		L	T	P	
	Mathematical Logic and Combinatorics	3	1	0	3
	Analog and Digital Communications	3	1	0	3
	Microprocessor & Micro Controller	3	1	0	3
	Design and Analysis of Algorithm	3	2	0	4
	Computer Graphics and Multimedia	3	1	0	3
	Sanskrit& Indian Culture-IV	1	0	0	1
	HR Skills - II	1	1	0	1*
	Analog and Digital Communications Lab	0	0	3	2
	Microprocessor & Micro Controller Lab	0	0	3	2
	Design and Analysis of Algorithm Lab	0	0	3	2
	Computer Graphics and Multimedia Lab	0	0	3	2
	<b>Total</b>				<b>25</b>

**L – Lecture**

**T- Tutorial**

**P- Practical**

**C- Credits**

**\* - Credit not included**

**SCSVMV University**  
**B.E (Computer Science and Engg., Choice Based Credit System)**

**SEMESTER - V**

Subject Code	Subject	Ins. /Week in Hours			C (Units)
		L	T	P	
	Automata Theory	3	1	0	3
	Database Management Systems	3	2	0	4
	Operating Systems	3	2	0	4
	Java Programming	3	1	0	3
	System Software	3	1	0	3
	Sanskrit & Indian Culture -V	1	0	0	1
	HR Skills – III	1	1	0	1*
	Open Elective	2	0	0	2*
	Database Management Systems Lab	0	0	3	2
	Operating Systems Lab	0	0	3	2
	Java Programming Lab	0	0	3	2
<b>Total</b>					<b>24</b>

L – Lecture

T- Tutorial

P- Practical

C- Credits

**SEMESTER - VI**

Subject code	Subject	Ins. /Week in Hours			C (Units)
		L	T	P	
	Principles of Compiler Design	3	2	0	4
	Computer Networks	3	1	0	3
	.NET Technologies	3	1	0	3
	Data Warehousing and Mining	3	1	0	3
	Elective – I	3	1	0	3
	Sanskrit & Indian Culture-VI	1	0	0	1
	HR Skills – IV	1	1	0	1*
	Compiler Design Lab	0	0	3	2
	Computer Networks Lab	0	0	3	2
	.NET Lab	0	0	3	2
	Data Warehousing and Mining lab	0	0	3	2
<b>Total</b>					<b>25</b>

L – Lecture

T- Tutorial

P- Practical

C- Credits

\* - Credit not included



**SCSVMV University**  
**B.E (Computer Science and Engg., Choice Based Credit System)**

**SEMESTER - VII**

Subject Code	Subject(Semester - VII)	Ins. /Week in Hours			C (Units)
		L	T	P	
	Resource Management Techniques	3	1	0	3
	Software Engineering	3	2	0	4
	Mobile Computing	3	1	0	3
	Elective - II	3	1	0	3
	Elective - III	3	1	0	3
	Software Development Lab using Case Tools	1	0	3	3
	Mobile Computing Lab	0	0	3	2
	Mobile Application Development Lab	0	0	3	2
	Web Technology Lab	0	0	3	2
	<b>Total</b>				<b>25</b>

**L – Lecture**

**T- Tutorial**

**P- Practical**

**C- Credits**

**SEMESTER - VIII**

Subject Code	Subject(Semester - VIII)	Ins. /Week in Hours			C (Units)
		L	T	P	
	Engineering Economics and Management	3	1	0	3
	Cryptography and Network Security	3	2	0	4
	Elective - IV	3	1	0	3
	Elective - V	3	1	0	3
	Project	0	0	16	8
	<b>Total</b>				<b>21</b>

**L – Lecture**

**T- Tutorial**

**P- Practical**

**C- Credits**

**\* - Credit not included**

# III SEMESTER

## APPLIED MATHEMATICS FOR COMPUTERS - I

3 1 0 3

(For students admitted from 2012-13)

### PREREQUISITE:

Any person can learn this Paper but before that the candidate can know the formula's of Differentiation and Integration.

### AIM:

To get knowledge about differential equations, Probability Theory, Distributions and Testing of Hypothesis.

### OBJECTIVES:

1. To introduce the basic concepts of one dimensional and two dimensional Random Variables.
2. To provide information about Estimation theory, Correlation, Regression and Testing of hypothesis.
3. To enable the students to use the concepts of multivariate normal distribution and principle components analysis.

### OUTCOME:

**After completion of the course the students are expected to be able to:**

1. The student will able to acquire the basic concepts of Probability and Statistical techniques for solving mathematical problems which will be useful in solving Engineering Problems.

### UNIT - I

#### (INTERPOLATION AND NUMERICAL INTEGRATION)

Interpalation with equal intervals - Newton's forward interpolation formula - Newton's backward interpolation formula - - Interpolation with unequal intervals: Lagrange's interpolation formula, Newton's divided difference formula - Numerical integration: Trapezoidal rule- Simpson's one-third rule - Simpson's three-eighth rule - Outline of applications of interpolation & Numerical integration in engineering.

### UNIT - II

#### (NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS)

Picard's method - Taylor's series method - Euler's method - Modified Euler's method - Runge's method - Runge-Kutta method - Predictor-corrector method :Milne's method, Adam's Bashforth method - Outline of applications of numerical solution of ordinary differential equations in Engineering.

### **UNIT - III (PROBABILITY THEORY)**

Random experiment – Mathematical, statistical and axiomatic definitions of probability – Conditional probability – Independent events - Theorem of total probability – Theorem of probability of causes: Bayes’s theorem – Bernoulli’s trials – De Moivre-Laplace approximation – Generalization of Bernoulli’s theorem multinomial distribution – Outline of applications of probability theory in engineering.

### **UNIT - IV (THEORETICAL DISTRIBUTIONS)**

Binomial distribution: Properties and constants of Binomial distribution – Fitting a Binomial distribution - The multinomial distribution – Negative Binomial distribution – Poisson distribution: Properties and constants of Poisson distribution – Fitting a Poisson distribution – Hyper-geometric distribution – Normal distribution: Properties and constants of Normal distribution – Fitting a normal curve – Outline of applications of theoretical distributions in engineering

### **UNIT - V (TESTING OF HYPOTHESIS)**

Tests of Hypothesis- Sampling distribution-Estimation and testing of hypothesis-Tests of hypothesis and tests of significance- Critical region and level of significance- Errors in testing of hypothesis- One-tailed and Two-tailed tests-Critical values – procedure of testing of hypothesis- Tests of significance for large samples-Tests of significance for small samples- Student’s t-Distribution-Snedecor’s F-distribution-Chi-square distribution-Chi-square test of Goodness of fit.

#### **TEXT BOOK**

1. Grewal B.S, *Higher Engineering Mathematics*, 41st Edition, Khanna Publishers, New Delhi, 2011.
2. Veerarajan. T., *Probability, Statistics and Random Processes*, Third Edition, Tata McGraw-Hill Publishers, New Delhi 2008.

#### **REFERENCE BOOKS**

1. Erwin Kreyszig, *Advanced Engineering Mathematics* , 10th Edition, John Wiley & Sons, 2010
2. Gerald C.F and Wheatley P.O, *Applied Numerical Analysis*, 7th Edition , Pearson Education India, 2007
3. Gupta S.P, *Statistical Methods*, 28th Edition, Sultan Chand & Sons., New Delhi, 1997.

# APPLIED DISCRETE MATHEMATICS

3 1 0 3

(For Computer Science and Engineering students admitted from 2012-13)

## PRE-REQUISITE:

Understanding of Math (in general Sets, Boolean Algebra, Graphs, State Machines, ideas of Algorithms)

## AIM:

Introduce the students to the foundational aspects of combinatorial mathematics via a selection of topics like graphs, relations, trees, state machine.

## OBJECTIVES:

2. To introduce a number of discrete mathematical structures found to be serving as tools in the development of theoretical computer science.
3. To focus on how discrete structures actually helped computer engineers to solve problems occurred in the development of programming languages.
4. To know about the importance of discrete structures towards simulation of a problem to computer science & engineering.

## OUTCOME:

After completion of the course the students are expected to be able to

1. Have knowledge on various discrete structures.
2. Define the key concepts of graph theory and use graph structures to represent data sets and relations on them.
3. Deal with problems which may arrive in computer science & engineering.
4. Prepare for entrance examinations involving placement opportunities.

## UNIT – I (RELATIONS AND DIGRAPHS)

Product sets and partitions – Relations and digraphs – Paths in relations and digraphs – Properties of relations – Equivalence relations – Computer representation of relations and digraphs – Operations on relations – Transitive closure and Warshall's algorithm – Outline of applications of digraphs in information technology.

## UNIT – II (ORDER RELATIONS AND STRUCTURES)

Partially ordered sets – External elements of partial ordered sets – Lattices – Finite Boolean algebras – Functions of Boolean algebras – Circuit designs – Outline of applications of Boolean algebras in information technology.

## UNIT – III (TREES)

Trees – Labeled trees – Tree searching – Undirected trees – Minimal spanning trees – Outline of applications of trees in information technology.

**UNIT - IV**  
**(TOPICS IN GRAPH THEORY)**

Graphs – Euler paths and circuits – Hamiltonian paths and circuits – Transport networks – Matching problems – Coloring problems – Outline of applications of graph theory in information technology.

**UNIT - V**  
**(LANGUAGES AND FINITE STATE MACHINES)**

Semi groups (Definition only) – Product and quotients and semi groups (Definition only) - Languages – Representations of special grammars and languages – Finite state machines – Semi groups, machines and languages – Machines and regular languages – Simplification of machines – Outline of applications of finite state machines in information technology.

**Note:** Questions are to be set on problem solving and not on the theoretical aspects.

**TEXT BOOK:**

1. Kolman B., Busby R.C. and Ross S., *Discrete Mathematical Structures for Computer Science*, Fifth Edition, Prentice Hall of India, New Delhi, 2006.

**REFERENCE BOOKS:**

1. Kenneth H. Rosen, *Discrete Mathematics and its Applications*, 7<sup>th</sup> Edition, Tata McGraw Hill, 2011
2. Susanna S. Epp, *Discrete Mathematics with Applications*, 4<sup>th</sup> Edition, Brookes/Cole Publishing Company, 2010
3. J.P. Trembley, R. Monahor, *Discrete Mathematical Structures with Applications to Computer Science*, Tata McGraw Hill, New Delhi

# ANALOG AND DIGITAL ELECTRONICS

3 1 0 3

(For Students admitted from 2014 onwards)

## PREREQUISITE:

Basic Electronics

## AIM

The aim of this course is to understand the concepts and to familiarize the student with the principle of operation, capabilities and limitations of various electron devices so that he will be able to use these devices effectively and to have a basic knowledge in digital electronics.

## OBJECTIVES

The course should enable the students to:

1. Study various number systems and to simplify the mathematical expressions using Boolean functions - simple problems.
2. Study implementation of combinational circuits.
3. Understand the Diode operation and switching characteristics.
4. Understand the Operation of BJT, FET, MOSFET metal semiconductor rectifying and ohmic contacts,
5. Study the characteristics and some applications of OPAMP.

## OUTCOME:

At the end of the course the student should be able to:

1. Understand the basic number system and Boolean algebra.
2. Understand the basics of combinational circuits.
3. Develop through basic knowledge on the behavior and the characteristics of semiconductor junction,
4. Acquire knowledge on the applications of BJT, FET, MOSFET.
5. Distinguish clearly between an ideal and actual characteristics of an Op-amp. And to learn different linear applications.

## UNIT- I

### BOOLEAN ALGEBRA AND LOGIC FUNCTIONS

Review of Number systems and their conversions.

**Boolean Algebra:** Introduction to Boolean algebra - The AND, OR and NOT operations. Laws of Boolean algebra. Minimization of Boolean expression. Boolean expressions and logic diagrams. Universal building blocks. Negative logic.

**Logic Simplifications:** Truth tables and maps. Sum-of-products and product-of-sums. Simplification of logic functions using Karnaugh map Minimization and Quine-McCluskey method of minimization.

## UNIT - II

### COMBINATIONAL AND SEQUENTIAL CIRCUITS

Combinational Circuits: Half Adder, Full Adder, Half Subtractor and Full Subtractor, Number complements. Multiplexer - Demultiplexer, Decoder and Encoder code converters – BCD to Excess3, Gray, and Seven Segment Display Conversions – Parity Generator and Checkers  
Sequential Circuits: Basic latch circuits - Flip-flops, truth table and excitation table. Shift Registers.

### **UNIT -III SEMICONDUCTORS & DIODES**

Semiconductor fundamentals –Energy Band diagram – Intrinsic and Extrinsic Semiconductors- Working and description of a PN diode– Varactor Diode –Avalanche and Zener Breakdown – Zener diode –Photo diode – Photo voltaic cell – Light emitting diode – Liquid crystal display – Light dependant resistor - Single –phase, half-wave and full-wave rectifiers – Bridge rectifiers.

### **UNIT- IV TRANSISTORS**

Principle of transistor action – Cut off, Active and saturation regions of a transistor – CE,CB,CC Configurations –Transistor as a switch – Use of a heat sink – Constructional features of a field effect transistor –theory of operation–MOSFET –Working and V-I Characteristics – Depletion and enhancement types –Working and V-I characteristics of UJT – SCR, DIAC,TRIAC.

### **UNIT- V CHARACTERISTICS OF OPAMP**

Ideal OP-AMP characteristics, DC characteristics, AC characteristics, offset voltage and offset current, CMRR, Slew rate, virtual ground concept, Inverting and Non-inverting amplifier, voltage follower, summer, multiplier, differentiator and integrator, comparators, Schmitt trigger, multivibrators (Astable), D/A converter (R-2R ladder), A/D converters(Successive - Approximation).

#### **TEXT BOOKS**

1. Millman and Halkias, '*Electronic devices and Circuits*', Tata McGraw Hill International, Edition, Second Edition 2008.
2. D.Roy Choudhary, Sheil B.Jani, '*Linear Integrated Circuits*', New Age, Fourth Edition, 2010.
3. M.Morris Mano, '*Digital Design*', PHI, Fourth Edition, 2008.

#### **REFERENCE BOOKS**

1. Salivahanan *Electronic devices and Circuits*, second editionTata McGraw Hill International, 2011.
2. David A.Bell, (*Fundamentals of EDC*) *Electron Devices and Circuits*, Prentice Hall Of India, 5e,2009.
3. Jacob Millman, Christos C.Halkias, '*Integrated Electronics - Analog and Digital circuits system*', Tata McGraw Hill, 2e 2011.
4. Anand Kumar: *Switching Theory and Logic Design* – PHI, second Edition 2014..



# COMPUTER ORGANIZATION

3 1 0 3

(For Students admitted from 2014 onwards)

## PREREQUISITE:

Data Structures and Algorithms, and Computer Science I or equivalent course.

## AIM:

To study in detail the organization of the Control unit, the Arithmetic and Logical unit, the Memory unit and the I/O unit.

## OBJECTIVES:

5. To have a thorough understanding of the basic structure and operation of a digital computer.
6. To discuss in detail the operation of the arithmetic unit including the algorithms & implementation of fixed-point and floating-point addition, subtraction, multiplication & division.
7. To study in detail the different types of control and the concept of pipelining.

## LEARNING OUTCOME:

1. An ability to design the arithmetic unit for various data types.
2. An ability to implement different types of control and the concept of pipelining.
3. An ability to select appropriate computer systems for given application domains.
4. Understand what hardware and software problems will require solutions for future generations.

## UNIT I

### BASIC STRUCTURE OF COMPUTERS

Functional units – Basic operational concepts – Bus structures – Performance and metrics – Instructions and instruction sequencing – Instruction set architecture – Addressing modes – Basic I/O Operation.

## UNIT II

### BASIC PROCESSING UNIT

Fundamental concepts – Execution of a complete instruction – Multiple bus organization – Hardwired control – Micro programmed control – computer arithmetic - Addition and Subtraction – Multiplication Algorithm – Division Algorithm – Floating Point Arithmetic operations – Decimal Arithmetic Unit – Decimal Arithmetic Operations.

### **UNIT III PIPELINING**

Basic concepts – Data hazards – Instruction hazards – Influence on instruction sets – Data path and control considerations – Performance considerations – Exception handling.

### **UNIT IV MEMORY SYSTEM**

Basic concepts – Semiconductor RAM – ROM – Speed – Size and cost – Cache memories – Improving cache performance – Virtual memory – Memory management requirements – Associative memories – Secondary storage devices.

### **UNIT V I/O ORGANIZATION**

Accessing I/O devices – Programmed Input/output -Interrupts – Direct Memory Access – Buses – Interface circuits – Standard I/O Interfaces (PCI, SCSI, USB), I/O devices and processors.

#### **TEXT BOOK:**

1. David A. Patterson and John L. Hennessy, “Computer Organization and Design: The Hardware/Software interface”, Third Edition, Elsevier, 2005.
2. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, “Computer Organization”, Fifth Edition, Tata McGraw Hill, 2002.

#### **REFERENCES:**

1. William Stallings, “Computer Organization and Architecture – Designing for Performance”, Ninth Edition, Pearson Education, 2012
2. John P. Hayes, “Computer Architecture and Organization”, Third illustrated Edition, Tata McGraw Hill, 2007.
3. V.P. Heuring, H.F. Jordan, “Computer Systems Design and Architecture”, Second Edition, Pearson Education, 2004.

# DATA STRUCTURES

3 2 0 4

(For Students admitted from 2014 onwards)

## PRE-REQUISITE:

Basic Knowledge on C Programming.

## AIM:

The purpose of this course is to impart knowledge on various data structures concepts to the students.

## OBJECTIVES:

1. Learn linear data structures – list, stack, and queue.
2. Learn Non linear data Structures-Trees and Graphs.
3. Be exposed to sorting, searching and hashing algorithms.

## OUTCOME:

At the end of the course, the student should be able to:

1. Implement application of linear and nonlinear data structures.
2. Apply the different linear data structures to problem solutions.
3. Implement the various algorithms.

## UNIT - I

### INTRODUCTION TO DATA STRUCTURES AND LINKED LIST

Definitions of Data Structure and Algorithm - Arrays - Structures, Unions, Pointers- Abstract Data Type (ADT) – Introduction to Linked list-Single, Double and Circular linked lists.

## UNIT -II

### LINEAR DATA STRUCTURES

Stacks- Array representation, linked list representation- Application - Infix, Postfix and prefix notation, Evaluating Postfix Expression, Converting an infix Expression to Postfix.  
Queue-Array representation, linked list representation- Double ended queue-Circular queue-Priority queue.

## UNIT - III

### NON LINEAR DATA STRUCTURES

Trees- Basic tree concepts-Binary trees-Tree Traversal Techniques- Pre order , Post order , In order-Application of tree-Introduction to Balanced Search trees-AVL trees-B-Trees-Graphs-Operations-DFS-BFS-Implementation-Storage Structures.

## UNIT - IV

### SORTING

Bubble sort-Radix sort-Binary Tree sort- Heap sort- Insertion sort -Shell sort-Bucket sort-selection sort.

## **UNIT - V**

### **SEARCHING**

Searching – Introduction to search-Linear search, Indexed Sequential Search, Binary search, Interpolation search, Hash search. Hashing –Hashing Fundamentals-Hash function-Hashing methods-collision resolution technique.

#### **TEXT BOOKS :**

1. Seymour Lipschutz – “*Theory and Problems of Data Structures*”.(AVL Trees, B-Trees), Edition 2006,Tata mcgraw Hill, 20th Reprint 2011
2. Ellis Horowitz & Sartaj Sahani – “*Fundamentals of Data Structures in C*” – W.H. Freeman and Co., 2nd Edition, 2007

#### **REFERENCE BOOKS :**

1. Mark Allen Weiss – “*Data Structures and Analysis in C*” – 2<sup>nd</sup> Edition, Pearson Education Pubs,1997.
2. Aho, Hopcroft, Ullman – “*Data Structures and Algorithms*” – Pearson Education,1998 .
3. Behrouz A.Forouzan, Richard Gilberg, “*Computer Science – Structured Programming Approach Using C*”, 2<sup>nd</sup> Ed, Thomson Asia, 2001.

## Sanskrit & Indian Culture

1 0 0 1

### Unit - I (Gītā)

1. Introduction to Jñānayoga
2. Introduction to Bhaktiyoga
3. Introduction to Karmayoga

### Unit - II (Upaniṣadic principles )

4. Introduction to Śaṅkara's Phillosophy
5. Introduction to Rāmānuja's Phillosophy
6. Introduction to Mādhva's Phillosophy

### Unit - III

7. Amazing creations in Sanskrit (Varnacitras, Sthānacitras and Svaracitras, Gaticitras, Citrabandanas)
8. Intercity verses in Sanskrit, some intercity discoveries, Sanskrit and artificial intelligence beauty and charm of Sanskrit Poetry.
9. Stotrakāvya and its relevance

### Unit - IV

10. Introduction to Maths
11. Introduction to Physics and Chemistry
12. Introduction to Environmental Science

### Unit - V

13. Introduction to Yoga
14. Introduction to Botany & Zoology
15. Introduction to Agriculture

### Reference Texts

1. *The wonder that was India* by Arthur Llewellyn Basham – 1971
2. *The wonder that is Sanskrit* by Sampadananda Misra – 2002
3. *Vedic Science & Technology* by Sadasiva Biswal and Bidyut Lata Ray – 2009
4. *Vedavijnanasree* by Urmila Srivatsava - 2002

**HR Skills - I**  
**2014 - 2015 ONWARDS**

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English as a subject is being introduced for second year B.E/B.Tech students from 2014-2015. The objective is to impart intensive teaching to enable them to communicate in English both at the spoken and written levels. The expectations of the Campus Recruiters and other agencies are taken into consideration.

1. Words Misused
2. Homonyms and Homophones
3. One word substitution
4. Phrases and Clauses
5. Rearrangement of Sentences
6. Spotting Errors

**BOOKS FOR REFERENCE:**

1. *Objective General English* – Dr. R.S. Aggarwal (S.Chand and Co Pvt Ltd, New Delhi 110 055).
2. *Essential English* – A.P. Bharadwaj (S.Chand and Co Pvt Ltd, New Delhi 110 055).
3. *English Grammar and Composition* - Wren and Martin
4. *English for Engineering Students* – Dr. Sumant (VijayNicholas Publication)  
(Relevant portions in the syllabus will be selected from the books prescribed and given in a consolidated form to students.)

**ASSESSMENT:**

- I. Examination for both the Semesters will be through Internal Assessment only. This will be for 100 marks each. A candidate has to secure 50% for a pass.
- II. Internal Assessment will comprise of both oral and written examinations for 40 Marks.
- III. End Semester Examination is of Practical Mode for 100 marks and this will be converted to 60.

## ANALOG AND DIGITAL ELECTRONICS LAB

0 0 3 2

(For Students admitted from 2014 onwards)

### PRE-REQUISITE:

Comfortable programming in Basic Electronics

### AIM:

This lab aims to help students to be strong in Analog and Digital Electronics.

### OBJECTIVES:

1. Understand the Diode operation and switching characteristics.
2. Understand the Operation of BJT, FET, MOSFET metal semiconductor rectifying and ohmic contacts,
3. Study the characteristics and some applications of OPAMP.
4. Study various number systems and to simplify the mathematical expressions using Boolean functions - simple problems.
5. Study implementation of combinational circuits.

### OUTCOME:

**After successfully completing this course a student should be able to**

1. Develop basic knowledge on the behavior and the characteristics of semiconductor junction,
2. Acquire knowledge on the applications of BJT, FET, MOSFET.
3. Distinguish clearly between an ideal and actual characteristics of an Op-amp. and learn different linear applications.
4. Understand the basic number system and Boolean algebra.
5. Understand the basics of combinational circuits.

### LIST OF EXPERIMENTS

1. Implementation of Boolean functions, Adder / Subtractor Circuits.
2. Implementation of Multiplexer/ Demultiplexer Circuits.
3. Implementation of Code converters (Gray to Binary, Binary to Gray, Excess-3 to BCD and BCD to Excess-3).
4. Study of flip-flops - JK, RS, D & T FF.
5. Shift registers – SISO, PIPO, PISO and SIPO.
6. V-I characteristics of PN & Zener diode.
7. Characteristics BJT (CE mode)
8. Characteristics of JFET
9. Characteristics of SCR/UJT
10. Op-amp characteristics – Slew rate verifications, CMRR, Input-Offset voltage.
11. Applications of Op-amp-I-Inverting, Non-Inverting, Adder & Subtractor.
12. Applications of Op-amp II – Differential Amplifier, Comparator, Integrator & Differentiator.

## COMPUER ORGANISATION LAB

0 0 3 2

(For Students admitted from 2014 onwards)

### **PREREQUISITES:**

Programming Knowledge in C.

### **AIM:**

To design combinational circuits, to design and build digital systems.

### **OBJECTIVES:**

**The students should be made to:**

1. Understand various components of PC.
2. Study and design various Logic Gates
3. Design Multiplexer/Demultiplexer, Encoder/Decoder, Synchronous/Asynchronous Counter.
4. Design Shift register, Code Converters, BCD adder and Comparator

### **OUTCOME:**

**After successfully completing this course a student should be able to**

1. Understand various hardware components on the computer system and Dismantling and assembling of PC.
2. Implement Logical Gates.
3. Implement Multiplexer/Demultiplexer, Encoder/Decoder, Synchronous/Asynchronous Counter
4. Implement Shift register – Right/ Left/Serial/Parallel
5. Implement Shift registers, code converters, BCD adder and comparator

### **SOFTWARE REQUIRED:**

Synthesis tool: Xilinx ISE.

Simulation tool: ModelSim Simulator (with support Verilog code)

### **LIST OF EXPERIMENTS:**

1. Recognize various components of PC.
2. Dismantling and assembling of PC.
3. To Simulate AND, OR, NOT, NAND, NOR Gates.
4. To Simulate Encoder/Decoder.



5. To Simulate Asynchronous Counter/ Synchronous counter.
6. Shift register – Right/ Left/Serial/Parallel
7. To Simulate BCD Adders.
8. To Simulate Comparators.
9. Experiments from virtual Lab(Simulation Not for Evaluation)

**REFERENCES:**

1. “*Verilog HDL A guide to Digital Design and Synthesis*” - Samir Palnitkar , SunSoft Press 1996
2. [http://download.xilinx.com/direct/ise9\\_tutorials/ise9tut.pdf](http://download.xilinx.com/direct/ise9_tutorials/ise9tut.pdf).
3. [http://web.stanford.edu/class/ee183/handouts\\_win2003/Modelsim\\_short\\_tutorial.pdf](http://web.stanford.edu/class/ee183/handouts_win2003/Modelsim_short_tutorial.pdf)
4. [http://bertrand.granado.free.fr/Sysprog/SysProg/Cours\\_files/modelsim\\_tut.pdf](http://bertrand.granado.free.fr/Sysprog/SysProg/Cours_files/modelsim_tut.pdf)

## DATA STRUCTURES LAB

0 0 3 2

(For Students admitted from 2014 onwards)

### PRE-REQUISITE :

Basic Knowledge on C Programming.

### AIM:

To develop programming skills in design and implementation of data structures and their applications

### OBJECTIVES:

**The students should be made to:**

1. Be familiar with c programming.
2. Learn to implement Linear and Nonlinear data structures.
3. Learn to implement sorting and searching algorithms.

### OUTCOME:

**At the end of the course, the student should be able to:**

1. Design and implement C programs for implementing stacks, queues, linked lists.
2. Apply good programming design methods for program development.
3. Apply the different data structures for implementing solutions to practical problems.
4. Develop searching and sorting programs.

### LIST OF PROGRAMS

1. Write simple program to implement Array data structure with all possible manipulation such as insertion, deletion, find & replace, Merging of two sorted lists, accepting array values from command line arguments
2. Write simple programs to implement structures and unions with all possible manipulations such as passing structures to functions, returning from functions, pointer to the structure, members as pointers in the structure and self referential structure.
3. Write simple programs to implement pointers with all manipulations such as pointer to arrays, pointer arithmetic, pointer to pointer, passing pointers to functions, returning from functions and pointers to functions
4. Implementation of Stack
5. Implementation of Queue
6. Convert an Infix expression to postfix.
7. Evaluate the given postfix expression.
8. Implementation of Linked List.
9. Implementation of Doubly linked list.
10. Perform Traversals on a Binary Tree.

11. Sort the Given Numbers using.
  - i) Bubble sort
  - ii) Selection Sort.
12. Sort the given Elements using Heap Sort.
13. Implement linear and Binary Search algorithms
14. Implement BFS and DFS algorithms.

## ADVANCED C++ LAB

0 0 3 2

(For Students admitted from 2014 onwards)

### PRE-REQUISITE :

Knowledge programming in C++.

### AIM :

This lab aims to help students to acquire sound knowledge in object oriented programming.

### OBJECTIVES:

To introduce various programming passion such as game designing, programming at hardware level and GUI application development.

### OUTCOME:

**After successfully completing this course a student should be able to**

1. Increase programming knowledge.
2. Implement real world entities with OOP with ease.

### EXERCISES:

1. Program to implement default arguments in C++.
2. Program to implement exception handling in C++.
3. Program to implement user defined namespace in C++.
4. Program to implement Multithreading in C++.
5. Program to implement Stack in C++.
6. Program to implement Queue in C++.
7. Program to implement Linked lists in C++.
8. Web Programming with C++.
9. Program to implement signal (interrupts) handling in C++.
10. Simple programs using C++ STL.
11. Simple programs using graphics concepts in C++.

### TEXT BOOKS:

1. Herbert schildt , *C++ the Complete Reference*, McGrw-Hll; Osborne Media, 5<sup>th</sup> Edition, 2015.

### REFERENCE

1. Michael Dawson, *Beginning C++ Through Game Programming*, Course Technology PTR 2010 ISBN/ASIN: 1435457420.
2. Nicolai M. Josuttis, *C++ Standard Library, The: A Tutorial and Reference*, 2nd Edition, Addison-Wesley Professional, 2012.

# IV SEMESTER

# MATHEMATICAL LOGIC AND COMBINATORICS

3 1 0 3

(For students admitted from 2015)

## PRE-REQUISITE:

The person who can learn this Subject before that the candidate can know the basic Knowledge of normal forms (Conjunctive & Disjunctive).

## AIM:

To get more Knowledge about Normal forms, Combinations, Permutations, Binomial coefficients and Recurrence Relations.

## OBJECTIVES:

1. To review sets, relations, functions, and other foundations
2. To understand propositional and predicate logics and their applications
3. To understand formal models of computations and Permutations.
4. To review the rules of Conjunctive normal forms and Disjunctive normal form.

## OUTCOME :

**After successfully completing this course a student should be able to**

1. To explain sets, relations, functions.
2. To conduct proofs using normal forms and Duality Law.
3. To apply counting, permutations, combinations, and recurrence relations
4. To explain logic programming and functional programming principles

## UNIT - I

Mathematical logic- Connectives-Negation-Conjunction-Disjunction-Statement formulas and truth tables-Conditional and Biconditional-Well formed formulas-Tautologies-Equivalence of formulas-Duality law-Tautological implications-Formulas with distinct truth tables-Functionally complete set of connectives.

## UNIT - II

Normal forms-Disjunctive normal forms-Conjunctive normal forms- Principle of disjunctive normal forms-Principle of conjunctive normal forms-The theory of inference for statement calculus-validity using truth tables-Rules of inference-Consistency of premises and indirect method of proof.

## UNIT - III

Basics of counting-Sum rule-Product rule-Combinations and Permutations-Enumerating combinations and permutations with repetitions-Enumerating permutations with constrained repetitions.

## UNIT - IV

Binomial coefficients-Problems on multinomial theorem- Principle of inclusion and exclusion-Generating function models-Calculating coefficients of generating functions.

## UNIT - V

Recurrence relations- The Fibonacci relation-properties of Fibonacci numbers-Solving recurrence relations by substitutions and generating functions-Methods of characteristic roots-Solutions of Inhomogenous recurrence relations-methods of undertermined coefficients.

### TEXT BOOKS

1. *Discrete Mathematical Structures with Applications to Computer Science*- J.P.Tremblay and R. Manohar-McGraw-Hill International Editon ,1987(Units-I & Unit-II)
2. *Discrete Mathematics for Computer Scientists & Mathematicians*-JeoL.Mott, Abraham Kandel-Theodore P.Baker-Second Edition,Eastern Economy Edition(PHI),1986( Unit-III, Unit-V and Unit-V)

### REFERENCES

1. *Fundamentals of Discrete Mathematical Structures*, K.R. Chowdhary,Third Edition, PHI Learning,2015

# ANALOG AND DIGITAL COMMUNICATION

3 1 0 3

(For Students admitted from 2014 onwards)

## PREREQUISITE:

Basic Electronics.

## AIM

To study the various analog communication fundamentals viz., Amplitude modulation and demodulation; Angle modulation and demodulation. To introduce the basic concepts of digital modulation techniques.

## OBJECTIVES

The course should enable the students to:

1. Study the need of modulation, Amplitude Modulation and demodulation
2. Study various Angle modulation and demodulation techniques
3. Understand different methods of pulse digital modulation and demodulation schemes.
4. Study some basic information theory with some channel coding theorem. Analyze pass band digital modulation and demodulation schemes and compare its bit error probability.

## OUTCOME

At the end of the course the student should be able to:

1. Understand the need for modulation and amplitude modulation techniques.
2. Understand frequency modulation, demodulation and the comparison of AM and FM.
3. Understand the PAM, PPM and PWM techniques.
4. Understand the different methods of PCM, PAM, DPCM, DM, ADM schemes which are used in digital communication.
5. Understand the analysis of ASK, FSK, PSK, DPSK, DEPSK, QPSK, MSK and GMSK schemes and comparison of bit error probability.

## UNIT- I AMPLITUDE MODULATION

Generation and demodulation of AM, DSB-SC, SSB-SC, VSB Signals, Filtering of sidebands, Comparison of Amplitude modulation systems, Frequency translation, Frequency Division multiplexing, AM transmitters - Super heterodyne receiver, AM receiver.

## UNIT- II ANGLE MODULATION

Angle modulation, frequency modulation, Narrowband and wideband FM, transmission bandwidth of FM signals, Generation of FM signal - Direct FM - indirect FM, Demodulation of FM signals, FM stereo multiplexing, PLL - Nonlinear model and linear model of PLL, Non-linear effects in FM systems, FM Broadcast receivers, FM stereo receives, Pre-emphasis and de-emphasis in FM, Comparison of performance of AM and FM systems.

## UNIT- III PULSE MODULATION

Time Division Multiplexing, Types of Pulse modulation, PAM (Single polarity, double polarity) PWM-Generation & demodulation of PWM, PPM- Generation and demodulation of PPM



**UNIT- IV**  
**PULSE DIGITAL MODULATION**

Elements of digital communication systems, advantages of digital communication systems, Elements of PCM: Sampling, Quantization & Coding, Quantization error. PAM and Other forms of pulse modulations Differential PCM system (DPCM), TDM, Delta modulation, adaptive delta modulation, comparison of PCM and DM systems, noise in PCM and DM systems.

**UNIT - V**  
**MODULATION SCHEMES**

Introduction of digital modulation techniques- Generation, Detection, Signal space diagram, calculation of bit error probability and Power spectra of ASK, FSK, PSK, DPSK, DEPSK, QPSK, MSK and GMSK, similarity of BFSK and BPSK, Comparison of Digital modulation systems using bit error probability.

**TEXT BOOK**

1. Simon Haykin, *Communication Systems*, John Wiley & sons, NY, Fifth Edition, 2010.
2. Simon Haykin, "*Digital communications*", John Wiley, 2013.
3. H. Taub and D. Schilling, "*Principles of Communication Systems*", TMH, Third Edition, 2008.

**REFERENCES**

1. Roddy and Coolen, *Electronic communication*, PHI, New Delhi, Fourth Edition, 2003.
2. Bruce Carlson et al, *Communication systems*, McGraw-Hill Int., Fifth Edition, 2010.
3. Bernard Sklar, "*Digital Communication*", Paerson Education, Second Edition , 2009.
4. Sam Shanmugam, "*Digital and Analog Communication Systems*", John Wiley, 2008.

# MICROPROCESSOR AND MICROCONTROLLER

3 1 0 3

## **PRE-REQUISITE:**

Basic knowledge of Computer, Digital Electronics

## **AIM**

To learn the Architecture of 8086 and 8051 and to develop skill in simple program writing, to study simple applications.

## **OBJECTIVES**

The objective of the course is to impart knowledge on:

1. The Architecture of 8086, ARM & 8051.
2. The addressing modes & instruction set of 8086, ARM & 8051.
3. The need & use of Interrupt structure.
4. Simple program Skills.
5. Commonly used peripheral / interfacing ICs.

## **OUTCOME**

After completion of the course the students are expected to be able to:

1. Understand the functional block diagram, Timing Diagram, Interrupt structure and Multiprocessor configurations of 8086 & ARM processor.
2. Develop the Programming skills using Loop structure with counting & Indexing, Look up table, Subroutine instructions stack.
3. Interface ICs 8255 PPI, 8259 PIC, 8257 DMA, 8251 USART, 8279 Key board display controller and 8253 Timer/ Counter, A/D and D/A converter.
4. Comprehend the Functional block diagram, Instruction format and addressing modes, Interrupt structure, I/O Ports and Serial communication of 8051 Microcontroller.
5. Develop the programming skills in interfacing Microcontroller.

## **UNIT - I**

### **INTRODUCTION TO MICROPROCESSOR- 8086 & ARM**

Intel 8086 microprocessor - Architecture - Instruction Set-Addressing Modes-- Assembly Language Programming-Procedures- Interrupts. ARM Processor-CPU: Programming I/O, Supervisor Mode, Exceptions and Traps.

## **UNIT - II**

### **MULTIPROCESSOR CONFIGURATIONS**

Coprocessor Configuration – Closely Coupled Configuration – Loosely Coupled Configuration – 8087 Numeric Data Processor – Data Types – Architecture – 8089 I/O Processor – Architecture – Communication between CPU and IOP

## **UNIT - III**

### **INTERFACING MICROPROCESSOR**

Memory Interfacing and I/O Interfacing – Parallel Communication Interface- Serial Communication Interface-D/A and A/D Interface-Timer-KeyBoard/Display Controller-Interrupt Controller – DMA Controller – Programming and applications Case studies: Traffic Light Control, LED display, LCD display, Keyboard Display Interface and Alarm Controller.

**UNIT- IV**  
**MICROCONTROLLERS**

Architecture of 8051 Microcontroller – signals – I/O ports – memory – counters and timers – serial data I/O – interrupts- Assembly Language Programming.

**UNIT- V**  
**INTERFACING MICROCONTROLLER**

Programming 8051 timer- Serial Port Programming- Interrupts Programming – LCD & Keyboard Interfacing-ADC, DAC & Sensor Interfacing-External Memory Interfacing- Stepper Motor and Waveform Generation.

**TEXT BOOKS:**

1. Marilyn Wolf “Computer as components-Principles of Embedded Computing System Design”, Third Edition, Morgam Kaufmann Publisher,2012.
2. Yn-cheng Liu,Glenn A.Gibson, “Microcomputer systems: The 8086 / 8088 Family architecture, Programming and Design”, second edition, Prentice Hall of India , 2006 .
3. Kenneth J.Ayala, 'The 8051 microcontroller' Third Edition, 2004.

**REFERENCES:**

1. Douglas V.Hall, “ Microprocessors and Interfacing : Programming and Hardware”, second edition , Tata McGraw Hill ,2006.
2. A.K.Ray & K.M Bhurchandi, “Advanced Microprocessor and Peripherals – Architecture, Programming and Interfacing”, Tata Mc Graw Hill , 2006.
3. Mohamed Ali Mazidi,Janice Gillispie Mazidi,” *The 8051 microcontroller and embedded systems using Assembly and C*”, second edition, Pearson education /Prentice hall of India , 2007.

# DESIGN AND ANALYSIS OF ALGORITHMS

3 2 0 4

(For Students admitted from 2014 onwards)

## PRE-REQUISITE:

Basic knowledge of Computer Programming.

## AIM :

To study various algorithmic techniques and methods of analysis of algorithms

## OBJECTIVES:

1. To develop proficiency in problem solving and programming.
2. To be able to carry out the Analysis of various algorithms for mainly time and space complexity.
3. To develop a base for advanced study in Computer Science

## OUTCOME:

**After completion of the course the students are expected to be able to:**

1. Design algorithms for various computing problems.
2. Analyze the time and space complexity of algorithms.
3. Analyze the different algorithm design techniques for a given problem.
4. Modify existing algorithms to improve efficiency.

## UNIT – I

Introduction – Notion of Algorithm – Fundamentals of Algorithmic Solving – Important Problem types – Fundamentals of the Analysis of Algorithm Efficiency-Analysis Framework – Asymptotic Notations and Basic Efficiency Classes. Mathematical Analysis of Non-recursive Algorithm – Mathematical Analysis of Recursive Algorithm – Example: Fibonacci Numbers , Tower of Hanoi

## UNIT – II

Divide and conquer: General Method, Binary Search ,Finding the maximum and minimum, Merge sort, Quick sort, Strassen’s matrix multiplication

## UNIT – III

The Greedy Method : General method, Fractional Knapsack problem, Job sequencing with deadlines, Minimum spanning trees, Single source shortest paths.

## UNIT – IV

Dynamic programming: General method, Multistage graphs, All pairs shortest paths, Optimal binary search trees, 0/1 Knapsack, Travelling sales person problem.

## UNIT – V

Back Tracking: General method, 8-Queens problem, Sum of subsets, Graph coloring, Hamiltonian cycles – Branch and Bound: General Methods (FIFO & LC) – 0/1 Knapsack problem - NP hard and NP complete Problems-Basic Concepts-Non deterministic Algorithms- The classes NP, NP Hard and NP Complete-definitions and examples.

**Note :** Proofs of algorithms are not included in the syllabus

**TEXT BOOKS**

1. Anany Levitin, *“Introduction to the Design and Analysis of Algorithms”*, Pearson Education Asia, 2nd Edition 2011 (For Unit I).
2. Ellis Horowitz, Sartaj Sahani, Sanguthevar Rajasekaran – *“Computer Algorithms/C++”*, Second Edition, Universities Press, 2007 (For Unit II to V)

**REFERENCE BOOK**

1. Ellis Horowitz, Sartaj Sahani, Sanguthevar Rajasekaran – *“Fundamentals of Computer Algorithms”* – W.H. Freeman and Co, 2002.

# COMPUTER GRAPHICS AND MULTIMEDIA

3 1 0 3

(For Students admitted from 2014 onwards)

## PRE-REQUISITE:

Programming knowledge in C, Data structures, Basics of Algebra and Matrices.

## AIM:

To study about Graphics Concepts and Multimedia.

## OBJECTIVES:

1. To make the students understand graphics concepts and develop, design and implement two and three dimensional graphical structures and understand about various color models.
2. To understand multimedia compression techniques and data file format also some applications of multimedia.

## OUTCOME:

After completion of the course the students are expected to be able to:

1. Understand input and output devices used in graphics systems method to generate line, circle and ellipse, to create 2D object and various transformation techniques.
2. Understand various 3D Transformation techniques and to create various curves how to remove hidden surfaces.
3. Understand about various color models used in graphical system and will gain knowledge in multimedia compression techniques and applications.

## UNIT - I

Overview of Graphics systems: video display device-Raster Scan systems-Graphics workstations and viewing systems—Introduction to OpenGL-- open GL basic Graphics primitives – Output primitives – Line, Circle and Ellipse drawing algorithms – Attributes of output primitives.

## UNIT - II

2D Viewing – Window-Viewport Transformation - Two dimensional Geometric transformations – Line, Polygon, Curve and Text clipping algorithms.

## UNIT - III

Introduction to 3D viewing and Transformations- Projection techniques- Splines representation-Cubic Splines representation- Beizer curves and surfaces- visible surface detection methods-color models.

## UNIT - IV

Introduction and definitions –Architecture- applications – elements – Animations – Compression – Types of Compressions: Lossless – Lossy – Introduction to Video compression , Image Compression, Audio compression– Data and file format standards

## UNIT - V

Creating interactive multimedia – Multimedia Authoring Systems – Multimedia Authoring Software Applications – Video On demand – Virtual Reality – Content based retrieval in digital libraries.

### TEXT BOOKS:

1. Donald D. Hearn, M. Pauline Baker “*Computer Graphics with OpenGL*”, Third Edition, Pearson Education, 2009
2. Ze-Nian Li and Mark S.Drew, “*Fundamentals of Multimedia*”, First Edition, Pearson Education, 2008.

### REFERENCE BOOKS

1. F.S.Hill, “*Computer Graphics using OPENGL*”, Second edition, Pearson Education, 2003.
2. Prabhat K Andleigh, Kiran Thakrar, “*Multimedia Systems Design*”, First Edition, PHI, 2007.

## SANSKRIT& INDIAN CULTURE

1 0 0 1

### (Syllabus for IV Semester)

**Unit I - (1)** Introduction to Sindh Vedic Cultures; significance & how it is different from the other cultures. (2) Why we have to follow? Important features. (3) Chronology of Indian Cultures; origin & spread; general features.

**Unit II - (4)** Literary Heritage of India – significance of Indian Literature; (5 & 6) chronology of Indian literature; (7) Literature in Sanskrit and other languages;

**Unit III - (8)** Early Indian Education – significance & advantages. (9) Gurukulas and Guru-sishya parampara. Learning methods. (10) Evolution of script and languages; important early scripts and writing materials; (11) important early educational centers (*ghattikas*, universities) & their unique features.

**Unit IV - (12 & 13)** Duties & responsibilities of human - *gruhya sutras, smritis & sruties* - significance in day to day life.

**Unit V - (14 & 15)** Scientific thoughts of Early Indian Sages;

### REFERENCE BOOKS

1. Joshi,K. 1992(rp). *The Veda and Indian Culture*. Rastriya Veda Vidya Pratishthana. New Delhi.
2. Majumdar, R.C. 1994 (rp). *Ancient India*. Motilal Banarsidas Publishers. Delhi.
3. Patel, I.S. (ed). 1984. *Science and the Vedas*. Bombay.
4. Sri Chandrasekarendra Sarasvati Swamihi. 1991. *The Guru Tradition*. Bharatiya Vidya Bhavan. Bombay.
5. Sri Jayendra Saraswatiji Maharaj. 1951. *The Vedas and Vedangas*. Prakashan Kendra. Lucknow.
6. Vartak, P.V. 1986. *Scientific Knowledge in the Vedas*. Delhi. Winternize, M. 1996(rp). *History of Indian Literature*. Delhi.



## HR Skills -II

### SYLLABUS FOR II B.E.(CSE) SEMESTER III & IV FROM 2014 - 2015 ONWARDS

1 1 0 1

The objective is to impart intensive teaching to enable them to communicate in English both at the spoken and written levels. The expectations of the campus recruiters and other agencies are taken into consideration.

1. Idioms and Phrasal Verbs (Reference: S. No. 4 Prescribed)
2. Synthesis of Sentences
3. Sentence Completion
4. Paragraph Coherence
5. Same Theme Sentences – Selection of Preferable Sentence
6. Comprehension (True/False, Inference, MCQ)

#### BOOKS FOR REFERENCE:

1. Objective General English – Dr. R.S. Aggarwal (S.Chand and Co Pvt Ltd, New Delhi 110 055).
2. Essential English – A.P. Bharadwaj (S.Chand and Co Pvt Ltd, New Delhi 110 055).
3. English Grammar and Composition - Wren and Martin
4. English for Engineering Students – Dr. Sumant (VijayNicholas Publication)  
(Relevant portions in the syllabus will be selected from the books prescribed and given in a consolidated form to students.)

#### ASSESSMENT:

- I. Examination for both the Semesters will be through Internal Assessment only. This will be for 100 marks each. A candidate has to secure 50% for a pass.
- II. Internal Assessment will comprise of both oral and written examinations for 40 Marks.
- III. End Semester Examination is of Practical Mode for 100 marks and this will be converted to 60.

# ANALOG AND DIGITAL COMMUNICATION LAB

0 0 3 2

(For Students admitted from 2014 onwards)

## **PREREQUISITE:**

Basic Electronics.

## **AIM :**

To study the various analog communication fundamentals viz., Amplitude modulation and demodulation; Angle modulation and demodulation. To introduce the basic concepts of digital modulation techniques.

## **OBJECTIVES :**

1. Study the need of modulation, Amplitude Modulation and demodulation
2. Provide knowledge about various Angle modulation and demodulation techniques.
3. Understand different methods of pulse digital modulation and demodulation schemes.
4. Study some basic information theory with some channel coding theorem, analyze pass band digital modulation and demodulation schemes and compare its bit error probability.

## **OUTCOME:**

**After completion of the course the students are expected to be able to**

1. Understand the need for modulation and amplitude modulation techniques.
2. Understand frequency modulation, demodulation and the comparison of AM and FM.
3. Understand the PAM, PPM and PWM techniques.
4. Understand the different methods of PCM, PAM, DPCM, DM, ADM schemes which are used in digital communication.
5. Understand the analysis of ASK, FSK, PSK, DPSK, DEPSK, QPSK, MSK and GMSK schemes and comparison of bit error probability.

## **LIST OF PROGRAMS**

1. AM Modulator [Class C Amplifier] / AM Demodulator
2. FM modulator/ FM Detector
3. Pre Emphasis, De emphasis Circuits
4. Study of sampling theorem
5. Pulse amplitude modulation and demodulation(PAM)
6. Pulse width modulation and demodulation(PWM)
7. Pulse code modulation and demodulation(PCM)
8. Pulse position modulation and demodulation(PPM)
9. Time division multiplexing and demultiplexing (TDM)
10. Study of amplitude shift keying system (ASK)
11. Study of frequency shift keying system(FSK)
12. Frequency Counters
13. Frequency Synthesizer using PLL

## MICROPROCESSOR AND MICROCONTROLLER LAB

0 0 3 2

(For Students admitted from 2014 onwards)

### PRE-REQUISITE :

Basic knowledge of Computers, Digital Electronics

### AIM :

To excel in the Architecture of 8086 & 8051 and to develop skill in simple program writing, to study simple applications.

### OBJECTIVES :

1. The Architecture of 8086 & 8051 and ARM.
2. The addressing modes & instruction set of 8086 & 8051.
3. The need & use of Interrupt structure.
4. Simple programming Skills.
5. Commonly used peripheral / interfacing ICs.

### OUTCOME:

After completion of the course the students are expected to be able to:

1. Understand the functional block diagram, Timing Diagram, Interrupt structure and Multiprocessor configurations of 8086 Microprocessor.
2. Develop the Programming skills using Loop structure with counting & Indexing, Look up table, Subroutine instructions stack.
3. Interface ICs 8255 PPI, 8259 PIC, 8257 DMA, 8251 USART, 8279 Key board display controller and 8253 Timer/ Counter, A/D and D/A converter.
4. Comprehend the Functional block diagram ,Instruction format and addressing modes, Interrupt structure ,I/O Ports and Serial communication of 8051 Microcontroller.
5. Develop the programming skills in PID control algorithm, square, triangular and sine wave form generation, closed loop control of servo motor and stepper motor control.

### LIST OF EXPERIMENTS

#### EXPERIMENTS IN MICRPROCESSOR 8086:

- 1) Write a ALP to perform basic arithmetic operation on two 16 bit Numbers.
- 2) Write a ALP to study the addressing modes in 8086.
- 3) Write a ALP to interface various modes of 8255with 8086 microprocessor.
- 4) Generation of Square, Triangular and Saw tooth waveform using DAC interfaced with 8086 microprocessor.
- 5) Write a ALP to control the speed and direction of Stepper motor.

#### EXPERIMENTS IN ARM PROCESSOR:

- 1) Study of ARM evaluation system.
- 2) Study and analyze the Interfacing ADC and DAC.
- 3) Study and analyze the Interfacing Keyboard and LCD.
- 4) Study and analyze the Interfacing Stepper motor and Temperature Sensor.

**EXPERIMENTS IN MICROCONTROLLER 8051:**

- 1) Write a microcontroller program to perform basic arithmetic operation on two 8 bit numbers.
- 2) Write a ALP to interface Seven Segment Display.
- 3) Write a ALP to interface Keyboard.
- 4) Write a ALP to interface Traffic Light Control.
- 5) Write a ALP to interface 16 x 2 LCD Display with Microcontroller 8051 using Keil  $\mu$ Vision.

## DESIGN AND ANALYSIS OF ALGORITHMS LAB

0 0 3 2

(For Students admitted from 2014 onwards)

### **PRE-REQUISITE:**

Basic knowledge of Computer Programming.

### **AIM:**

To implement various algorithms based on different techniques.

### **OBJECTIVES:**

1. To implement various problems related to different algorithmic techniques
2. To study the space and time complexity of the implemented algorithms

### **OUTCOME:**

**After completion of the course the students are expected to be able to:**

1. Implement various algorithms and gain the knowledge of problem solving
2. Learn the different techniques used in development of algorithm with examples.

### **LIST OF PROGRAMS**

1. Write a program that implements Tower of Hanoi.
2. Write a program to find  $n^{\text{th}}$  Fibonacci term using recursion & iteration.
3. Write a program that implements Merge sort
4. Write a program that implements Quick sort
5. Write a program that implements knapsack using greedy method
6. Write a program that implement Single source Shortest path using Dijkstra's algorithm
7. Write a program that implements travelling sales person problem.
8. Write a program that implements All pair Shortest path
9. Write a program that implements N-Queen Problem
10. Write a program that implements graph coloring algorithm

# COMPUTER GRAPHICS AND MULTIMEDIA LAB

0 0 3 2

(For Students admitted from 2014 onwards)

## PRE-REQUISITE:

Programming knowledge in C, Data structures, Basics of Algebra and Matrices.

## AIM:

To develop programming skills in Graphics concepts and Multimedia.

## OBJECTIVES:

1. To make the students understand graphics concepts and develop, design and implement two and three dimensional graphical structures using OpenGL.
2. To understand multimedia compression techniques and applications of multimedia.

## OUTCOME:

**After completion of the course the students are expected to be able to:**

1. Understand how to generate line, circle and ellipse also how to create 2D object and various transformation techniques.
2. Understand various 3D Transformation techniques using OpenGL.
3. Understand multimedia compression techniques and applications.

## LIST OF EXPERIMENTS

### Implement The Exercises From 1 To 4 Using C

1. Implementation of Algorithms for drawing 2D Primitives – Line (DDA, Bresenham) – and Circle (Midpoint)
2. Implementation of 2D Geometric transformations: Translation, Rotation, Scaling, Reflection, Shear.
3. Implementation of Composite 2D Transformations.
4. Implementation of Liang - Barsky Line Clipping.

### Implement the exercises from 5 to 7 using OpenGL

5. Implementation of 3D Transformations - Translation, Rotation, Scaling
6. Implementation of 3D Projections – Parallel, Perspective
7. Creating 3D Scenes
8. Compression Algorithms - To implement text and image compression algorithms.
9. Image Editing and Manipulation - Basic Operations on image using any image editing software, Creating gif animated images, Image optimization
10. 2D Animation – To create Interactive animation using any authoring tool

# V SEMESTER

# AUTOMATA THEORY

3 1 0 3

(For students admitted from 2012-13)

## PRE-REQUISITE:

Basic knowledge of Mathematics, Set theory, Mathematical induction principles.

## AIM:

To develop mathematical foundation to help in courses on compiler designer, digital circuits and software programming

## OBJECTIVES:

**The objective of the course is to impart knowledge on Automata Theory**

## OUTCOME:

**After completion of the subject the students are expected to be able to**

1. Design of digital circuits.
2. Design of Lexical analyzer
3. Designing software for identifying the words, phrases and other patterns in large bodies of text.
4. To write software for processing the natural language.
5. To apply in Artificial Intelligence and knowledge engineering, in game theory and games, computer graphics, linguistics etc.,

## UNIT – I FINITE AUTOMATA

An informal picture of finite automata - Deterministic finite automata – Non-deterministic finite automata – An application: Text search – Finite automata with epsilon transitions

## UNIT II REGULAR EXPRESSIONS AND LANGUAGES

Regular expressions – Finite automata and regular expressions – Applications of regular expressions: Regular expressions in UNIX, Lexical analysis, Finding patterns in a text – Algebraic laws for regular expressions

## UNIT III CONTEXT FREE GRAMMARS AND LANGUAGES

Context free grammars – Parse trees – Applications of context free grammars: Parsers, The YACC parser generator, Markup languages, XML and document type definitions – Ambiguity in grammars and languages.

## UNIT IV PUSHDOWN AUTOMATA

Pushdown automaton – The languages of a Pushdown automaton – Equivalence of Pushdown automaton and Context free grammars – Deterministic pushdown automata.



## UNIT V INTRODUCTION TO TURING MACHINES

Problems that computers cannot solve – The Turing machine – Programming techniques for Turing machines – Extensions to the basic Turing machine – Restricted Turing machines – Turing machines and computers

Note: The second edition of the prescribed text book differs drastically in treatment (Application oriented) from the first edition (Theory oriented). Hence the treatment of the second edition is to be followed. Questions are to be set on problem solving and not on the theoretical aspects.

### TEXT BOOK

1. Hopcroft E. John, Motwani Rajeev, Ullman D. Jeffrey, *Introduction to Automata theory, Languages and Computation*, Second Edition, Pearson Education 2001

### REFERENCE BOOKS

1. Anderson, A. James, *Automata theory with Modern Applications*, Cambridge University Press, 2006
2. Carlos Martín-Vide, Victor Mitraná, *Grammars and Automata for String Processing*, Taylor & Francis, CRC Press, 2004
3. Linz Peter, *An Introduction To Formal Languages And Automata*, Jones & Bartlett Publishers, 2011

# DATABASE MANAGEMENT SYSTEM

3 2 0 4

(For Students admitted from 2014 onwards)

## PRE-REQUISITE:

Fundamentals of Computer programming

## AIM :

Most of the organizations depend on databases for storing the data and to share the data among different kinds of users for their business operations. Persistent storage required and several users must be able to safely access the same data concurrently. Hence this course discusses about the problems with the file processing system and how it can be handled effectively in Database Systems through various design tools, design techniques and algorithms.

## OBJECTIVES :

1. To understand the different database models and language queries to access databases.
2. To understand the normalization forms in building an effective database tables
3. To protect the data and the database from unauthorized access and manipulation

## OUTCOMES:

**After completion of the course the students are expected to be able to:**

1. Define, manipulate, and control a relational database management system
2. Design SQL based Client-Server applications
3. Build a database management system that satisfies relational theory

## UNIT – I

Databases - Need - Concepts - Architecture - Data independence - Data modeling: Entity relationship model - Weak entity sets - Mapping ER model to Relational model.

## UNIT – II

Concepts - Integrity constraints - Relational algebra - Relational calculus - Tuple relational calculus - Domain relational calculus - Overview of QBE.

## UNIT – III

SQL Queries - Nested queries - Aggregate operators - Null values - Embedded SQL – Database security - Views - Queries on views.

## UNIT – IV

Schema Refinement - Functional dependencies - Normalization - Decomposition - Armstrong's axioms - 3NF, BCNF, 4NF - Multi-valued dependencies.

## UNIT – V

Object-oriented data model - Object identity and pointers - Object definition and manipulation language - Object-oriented databases - Object relational databases - Recent trends-Mobile databases-XML Databases.

**TEXT BOOK**

1. Silberchatz, F. Korth, and S. Sudarshan, "*Database System Concepts*", 6<sup>th</sup> illustrated Edition, McGraw Hill 2011

**REFERENCE BOOKS**

1. R. Elmasri and S. B. Navathe, "*Fundamentals of Database Systems*", 6<sup>th</sup> illustrated Edition, Pearson Education, 2013
2. Raghu Ramakrishnan, Johannes Gehrke "*Database Management Systems*", 3<sup>rd</sup> illustrated Edition, WCB, McGraw Hill, 2003
3. C.J. Date, "*An introduction to Database Systems*", 8<sup>th</sup> Edition, Pearson Education, 2006

# OPERATING SYSTEMS

3 2 0 4

(For Students admitted from 2014 onwards)

## PRE-REQUISITE:

Basic Knowledge about Processors, Synchronization, Memory Management

## AIM:

To learn about various aspects of operating systems such as process management, memory management and I/O management

## OBJECTIVE:

The objective of this subject is to help the students to get detailed Knowledge of the various functions which are being performed by the Operating System.

## OUTCOME:

After completion of the course the students are expected to be able to:

1. Learn about various techniques and algorithms
2. Learn more about operating systems and its functional performance
3. Know about the process of segmentation

## UNIT - I

Introduction - Mainframe systems – Desktop Systems – Multiprocessor Systems Distributed Systems – Clustered Systems – Real Time Systems – Handheld Systems - Hardware Protection – System Components – Operating System Services – System Calls – System Programs - Process Concept – Process Scheduling – Operations on Processes – Cooperating Processes – Inter-process Communication.

## UNIT - II

Threads – Overview – Threading issues - CPU Scheduling – Basic Concepts – Scheduling Criteria – Scheduling Algorithms – Multiple-Processor Scheduling – Real Time Scheduling - The Critical-Section Problem – Synchronization Hardware– Semaphores – Classic problems of Synchronization – Critical regions – Monitors.

## UNIT - III

System Model – Deadlock Characterization – Methods for handling Deadlocks-Deadlock Prevention – Deadlock avoidance – Deadlock detection – Recovery from Deadlocks - Storage Management – Swapping – Contiguous Memory allocation – Paging – Segmentation – Segmentation with Paging.

## UNIT - IV

Virtual Memory – Demand Paging – Process creation – Page Replacement – Allocation of frames – Thrashing - File Concept – Access Methods – Directory Structure – File System Mounting – File Sharing – Protection

## UNIT - V

File System Structure – File System Implementation – Directory Implementation – Allocation Methods – Free-space Management. Kernel I/O Subsystems - Disk Structure – Disk Scheduling – Disk Management – Swap-Space Management. Case Study: The Linux System, Windows

### TEXT BOOK

1. Abraham Silberschatz, Peter Baer Galvin and GregGagne, “*Operating System Concepts*”, 9<sup>th</sup> Edition, John Wiley & Sons (ASIA) Pvt. Ltd,2013.

### REFERENCE BOOKS

1. Harvey M. Deitel, “*Operating Systems*”, 3<sup>rd</sup> Edition, Pearson Education Pvt. Ltd , 2004
2. Andrew S. Tanenbaum, Herbert Bos ,“*Modern Operating Systems*”, 4<sup>rd</sup> Edition , Pearson Education, 2014
3. William Stallings, “*Operating System*”, 4<sup>th</sup>Edition, Pearson Education India, 2006,
4. Pramod Chandra P. Bhatt – “*An Introduction to Operating Systems, Concepts and Practice*”, 3<sup>rd</sup> Edition , PHI Learning Pvt. Ltd., 2010

# JAVA PROGRAMMING

3 1 0 3

(For Students admitted from 2014 onwards)

## PRE-REQUISITE:

Basic knowledge of C++ programming.

## AIM:

The aims of the course are to develop experience in the *Java* language and its object-oriented features by the use of hands-on exercises to create both applications and applets. It will enable the students to understand the core principles of the Java Language.

## OBJECTIVES:

1. To understand the concept of OOP as well as the purpose and usage principles of inheritance, polymorphism, encapsulation and method overloading.
2. To identify classes, objects, members of a class and the relationships among them needed for a specific problem.
3. To create Java application programs using sound OOP practices (e.g., interfaces and APIs) and proper program structuring (e.g., by using access control identifies, automatic documentation through comments, error exception handling)
4. To use testing and debugging tools to automatically discover errors of Java programs as well as use versioning tools for collaborative programming/editing.
5. To develop programs using the Java Collection API as well as the Java standard class library.

## OUTCOMES:

**After completion of the course the students are expected to be able to:**

1. Design, implement, test, debug, and document programs that use basic data types and computation, simple I/O, conditional and iterative structures, and functions.
2. Describe and use the mechanics of parameter passing.
3. Discuss and use primitive data types and User defined data types.
4. Build applications using Java's object-oriented features.
5. Create applications and applets using Java class libraries
6. Develop applications in Java.

## UNIT - I

Introduction to Java: Fundamentals of OOPS-Java Evolution, Java Vs C++-JVM-Java Tokens-Constants, Data Types & Variables, Operators and Expressions-String Handling: String Basics, String Operations, Character Extraction, String Buffer, Arrays, Classes, objects and Methods, Final, Static- Exception Handling. : Types of Errors, Exceptions, Exception Handling Mechanisms, Advantages, Throwing User defined Exceptions-Exploring java.io: Buffered InputStream & Buffered OutputStream-Modifiers-Inheritance.

## UNIT - II

Interfaces: Defining Interfaces, Extending Interfaces, Implementing Interfaces, Accessing Interfaces-Packages: Creating and Accessing Packages, Mechanisms of Using Packages, Hiding Classes, Import command.

### UNIT - III

Multithread Programming: Fundamental Concepts, Thread Creations, Thread Life Cycle, Thread Priorities and Thread Scheduling, Thread Synchronization, InterThread Communication- Managing I/O Files: Concepts of I/O Streams, Stream classes, character Streams, Byte Streams, File Streams, random Access Files, and Serializations-Exploring java.net: InetAddress, Server Socket, socket, Datagram Packet, Datagram Socket, and Multicast Socket.

### UNIT - IV

Exploring java.Util: collections, Enumerations, iterations, String Tokenizer, Bitset, Date, Calendar, Gregorian Calendar, Time Zone, Currency-Applet Programming: Applet Fundamentals-Java Application Vs Java Applets, Applet life Cycle, Building the Applet code, Running the Applet-Passing Parameters to Applet, Applet tag, Java Applet Package.

### UNIT - V

Exploring javax.swing: JComponent, containers, panes, Layout Managers, Basic Components, Advanced Components-Handling Events: Listener, Interfaces and Adapter classed for various components-JDBC principles: Exploring java.sql-connection, DriverManager, Statement, Resultset, Callable statement, prepared Statement, Resultset Metadata & Database Meta Data.

#### TEXT BOOKS:

1. Herbert Schildt, "*Java The Complete Reference*", 8th Edition, Tata McGraw Hill,2011.
2. James Jaworski, "*Java Unleashed*", 4th revised edition, SAMS Techmedia Publications, Digitized-2010.

#### REFERENCE BOOKS:

1. Kogent Solution Inc ,*Java 6 Programming Black Book*, New Ed, Dreamtech Press, 2007
2. Campione, Walrath and Huml, "*The Java Tutorial*", Addison Wesley,2001.
3. Elliotte Rusty Harold ,*Java Network Programming*, Second Edition, O'Reilly Media, Inc.", 2013, (for Java.net package in Unit -III)
4. *Java Database Programming Bible*, John O' Donahue, illustrated Edition, Wiley, 2002 (for Unit -V)

# SYSTEM SOFTWARE

3 1 0 3

(For Students admitted from 2014 onwards)

## PRE-REQUISITE:

Fundamental Knowledge of Operating Systems.

## AIM :

To provide the detailed knowledge of Unix Operating System and Shell programming.

## OBJECTIVES:

The main objective of this course is to

1. Familiarize students with the Linux environment
2. Learn the fundamentals of shell scripting/programming
3. Familiarize students with basic Linux administration

## OUTCOME:

After completion of the course the students are expected to be able to:

1. Understand the architecture and concept of Unix operating system
2. Use System calls and memory management.
3. Use UNIX commands and editors.
4. Work on File systems, directories, and File operations
5. Carry out Unix File management and shell programming in Unix.

## UNIT - I BASICS OF UNIX

File and common commands-Directories-The Shell-File System-Basics of Files-Directories and Filenames-Permissions-Inodes-The directory hierarchy.

## UNIT - II USING THE SHELL

Command line structure, Metacharacters, Creating new commands, Command arguments and parameters, Program output as arguments, Shell variables, More on I/O redirection, Looping in shell programs, Filters-The grep family, Other filters, The stream editor sed, The awk pattern scanning and processing language, Good files and good filters

## UNIT - III SHELL PROGRAMMING

Customizing the cal command, while and until loops, catching interrupts, Replacing a file, killing processes by name, The pick command: blank vs. arguments, The news command: community service messages, get and put: tracking file changes.

## UNIT - IV PROGRAMMING WITH STANDARD I/O

Standard input and output, arguments, File access, A screen-at-a-time printer, An interactive file comparison program, Accessing the environment.



## **UNIT - V**

### **UNIX SYSTEM CALLS**

Low-level I/O, File system: directories, File system: inodes, Processes, Signals and interrupts – Program development.

#### **TEXT BOOK**

1. *“The UNIX Programming Environment”*, Brian Kernighan & Pike, PHI 2009.

#### **REFERENCE BOOKS**

1. *“Classic Shell Scripting:”* by Arnold Robbins, First Edition, O'Reilly Media; 2005.
2. *“UNIX and Linux System Administration”* Handbook by Evi Nemeth, Garth Snyder, Trent R. Hein, Ben Whaley (4th Edition), 2010.
3. *“Unix Shell Programming”* by Yashwant Kanetkar, BPB Publications, 2002.

## INDIAN CULTURE

1 0 0 1

### (Syllabus for V Semester)

**Unit I – (2)** Samskaras or Sacraments – Important occasions & significance; Sixteen important Samskaras in due course of human life.

**Unit II – (1)** Responsibilities of Human - four Ashrama Dharmas .

**Unit III – (2)** significance of social gatherings & celebrations of different occasions. – Worship – personal and public rituals & their significance; (2) socio-cultural significance of festivals and impact on culture. (1) Significance of sound science – *Gandharvaveda* (Music) & Dance.

**Unit IV – (2)** Significance of Yoga in daily life.

**Unit V – (2)** Scientific heritage - importance and significance of Upavedas. (3) Special reference to Ayurveda and Arthashastra.

### REFERENCE BOOKS

1. Acharya, D. 1999. *Dharmaveda* (sub-Veda of Yajurveda). Hindi. Vijaya Kumar Govindram Harsanand. Delhi.
2. Kangle, R.P. 1992 (rp). *The Kautilya Arthashastra*. Delhi.
3. Rao, S.K.R. 1994. *Nityarchana*. Agama-kosha (Agam Encyclopaedia). Kalpatharu Research Academy Publications. Vol X. Bangalore.
4. Ray, P. (tr). 1997. *Vasistha's Dhanurveda Samhita*. J.J. Publishing House. Delhi.
5. Shalini, K. 1997. *Vedic Leguminous Plants* (Medical and Microbiological Study). Classical Publishing Company. New Delhi.
6. Swami Satyananda Saraswati. 1997 (rp). *Asanas Pranayama Mudra Bandha*. Bihar Yoga Bharati. Bihar.

## HR Skills – III

1 1 0 1

(For Students admitted from 2014 onwards)

### PRE-REQUISITE :

Basic knowledge in Mathematics and Reasoning.

### AIM:

To enhance the logical reasoning skill and problem solving skills .

### OBJECTIVES:

1. To improve numerical skills and diagrammatic reasoning skills.
2. To cater to the needs to attend competitive examinations in a successful manner.

### OUTCOMES:

After completion of the course the students are expected to be able to:

1. Solve the problems with verbal understanding
2. Acquire the skill of doing numerical skills and diagrammatic reasoning problems.
3. Acquire the ability to determine the correct sequence of a set of sentences.
4. Do the problems within the time-frame.
5. Attend competitive examinations in a successful manner.

### UNIT - I

#### (NUMBERS AND NUMBER SYSTEMS, EQUATIONS, RATIO-PROPORTION-VARIATION)

Addition-Subtraction-Multiplication-Division-Prime Numbers and Composite Numbers-LCM,HCF-Equations-Variation.

### UNIT - II

#### (PERCENTAGES-PROFIT AND LOSS-PARTNERSHIP,AVERAGES-MIXTURES-ALLIGATIONS AND SIMPLE INTEREST-COMPOUND INTEREST)

Percentage-Partnerships-Average , Mixtures-Alligation, Interest.

### UNIT - III

#### (QUADRATIC EQUATIONS AND PROGRESSIONS,TIME AND WORK-PIPES AND CISTERNS,TIME AND DISTANCE)

Quadratic Equations-Arithmetic progression-Geometric Progression- Time and Work-Pipes and cisterns. Speed.

### UNIT - IV

#### (GEOMETRY-MENSURATION,PERMUTATIONS&COMBINATIONS)

Angles and lines, Arcs and sectors, Mensuration, Permutations, Combinations.

**UNIT-V**  
**(PROBABILITY,DATA INTERPRETATION,DATA SUFFICIENCY)**

Compound events, Independent events, Methods of Presenting data, Three –dimensional graph, Flow chart.

**REFERENCES:**

1. *Quantitative Aptitude*, R.S.Aggarwal, S.Chand&Company Pvt.Ltd.,New Delhi.
2. *Quantitative Aptitude for competitive examinations*, Abhijit Guha, Tata McGraw-Hill Education Pvt.Ltd., New Delhi.

# DATABASE MANAGEMENT SYSTEMS LABORATORY

0 0 3 2

(For Students admitted from 2014 onwards)

## PRE-REQUISITE:

Basic knowledge about database concepts.

## AIM :

To develop hands on most of the organizations depend on databases for storing the data and to share the data among different kinds of users for their business operations. Persistent storage required and several users must be able to safely access the same data concurrently. Hence this course discusses about the problems with the file processing system and how it can be handled effectively in Database Systems through various design tools, design techniques and algorithms.

## OBJECTIVES:

1. Learn to create and use a database
2. Be familiarized with a query language
3. Have hands on experience on DDL Commands
4. Have a good understanding of DML Commands and DCL commands
5. Familiarize advanced SQL queries.
6. Be Exposed to different applications

## OUTCOMES:

**After completion of the course the students are expected to be able to:**

1. Design and implement a database schema for a given problem-domain
2. Populate and query a database
3. Create and maintain tables using PL/SQL.
4. Prepare reports.

## LIST OF EXPERIMENTS

1. Creation of a database and writing SQL queries to retrieve information from the database.
2. Performing Insertion, Deletion, Modifying, Altering, Updating and Viewing records based on conditions.
3. Creation of Views, Synonyms, Sequence, Indexes, Save point.
4. Creating an Employee database to set various constraints.
5. Creating relationship between the databases.
6. Study of PL/SQL block.
7. Write a PL/SQL block to satisfy some conditions by accepting input from the user.
8. Write a PL/SQL block that handles all types of exceptions.
9. Creation of Procedures.
10. Creation of database triggers and functions
11. Normalization in Oracle (1NF, 2NF, 3NF, 4NF, 5NF) using Functional Dependencies.

12. Database design using Oracle/ Mysql /SQL Forms/MS Access only backend process for the following

- a. Inventory Control System.
- b. Material Requirement Processing.
- c. Hospital Management System.
- d. Railway Reservation System.
- e. Personal Information System.
- f. Web Based User Identification System.
- g. Timetable Management System.
- h. Hotel Management System

## OPERATING SYSTEMS LAB

0 0 3 2

(For Students admitted from 2014 onwards)

### PREREQUISITE:

Basic Knowledge about Unix and Linux Commands, CPU Scheduling, Process Management and Deadlocks.

### AIM:

To learn about various aspects of operating system functionalities with various system calls related to file system and process management.

### OBJECTIVES:

The objective of this lab is to teach students about various operating systems including Unix and Linux, Shell Programming Process Communication and System Calls.

### OUTCOME:

**After completion of the course the students are expected to be able to:**

1. Learn various scheduling algorithmic techniques
2. Process Synchronization used by operating systems to perform its functionalities

### LIST OF EXPERIMENTS

1. Basic UNIX and LINUX networking commands.
2. Shell Programming.
3. Illustration of Grep, sed, awk .
4. File system related system calls.
5. Process management – Access, Chmod, Create, Exec, Fork, Getpid, Getuid, kill, lseek, mount, pipe
6. Implement CPU Scheduling using
  - (i) FIFOs.
  - (ii) Round Robin.
7. Implement semaphore locking
8. Implement sharing memory between processes
9. Implement Server Process in the UNIX System Domain

### REFERENCES:

1. Abraham Silberschatz, Peter Baer Galvin and GregGagne, “*Operating System Concepts*”, Ninth Edition, John Wiley & Sons (ASIA) Pvt. Ltd, 2013.
2. Maurice J. Bach, “*The Design of the UNIX Operating System*”, Prentice/Hall International, Inc.

# JAVA PROGRAMMING LAB

0 0 3 2

(For Students admitted from 2014 onwards)

## PRE-REQUISITE :

Basic knowledge of C++ programming.

## AIM :

To enable the students to understand the core principles of the Java Language and to produce well designed, effective applications and applets.

## OBJECTIVES :

1. To introduce the students to some concepts of advanced programming and practice on reusing components.
2. To focuses on Graphical User Interface (GUI), multithreading, networking, and database manipulation.
3. To develop applet programs and swing concepts.
4. To design packages, interfaces and implement the concepts of inheritance.
5. To create back end connectivity with java programs.

## OUTCOME:

**After completion of the course the students are expected to be able to:**

1. Develop applications in Java.
2. Use java libraries.
3. Create packages and develop interfaces.
4. Develop Applets and swing concepts of programs.

## LIST OF PROGRAMS

1. Simple Java Applications
  - a. For understanding reference to an instance of a Class(object), methods
  - b. Handling Arrays, Control statements and operators.
  - c. Handling Strings in java.
2. Package Creation
  - a. Developing User defined packages in java
3. Interface
  - a. Developing user-defined interfaces and implementation.
  - b. Use of predefined Interfaces.
4. Inheritance
  - a. Handling inheritance in java
5. Threading
  - a. Creation of thread in java applications.
  - b. Multithreading
6. Exception Handling Mechanisms
  - a. Handling pre-defined exceptions
  - b. Handling user-defined exceptions
7. File operations in java



8. Applets
  - a. Handling simple applet programs.
  - b. Creation of color Palette.
9. Swings
  - a. Handling Layouts in java
  - b. Handling Events in javax.swing
  - c. Handling swing controls.
10. Database connectivity
  - a. Handling backend connectivity for data retrieval

# VI SEMESTER

# PRINCIPLES OF COMPILER DESIGN

3 2 0 4

(For Students admitted from 2014 onwards)

## PRE-REQUISITES:

An undergraduate course in automata theory, design and analysis of algorithms and data structures.

## AIM :

At the end of the course, the student will be able to design and implement a simple compiler.

## OBJECTIVES:

1. To introduce the major concept areas of language translation and compiler design.
2. To enrich the knowledge in various phases of compiler and its use, code optimization techniques, machine code generation, and use of symbol table.
3. To extend the knowledge of parser by parsing LL parser and LR parser.

## OUTCOME :

After completion of the course the students are expected to able to

1. Acquire the knowledge of modern compiler & its features.
2. Learn & use the new tools and technologies used for designing a compiler

## UNIT – I INTRODUCTION TO COMPILING

Compilers Analysis of the source program –Phases of a compiler – Cousins of the Compiler – Grouping of Phases – Compiler construction tools – Lexical Analysis –Role of Lexical Analyzer – Input Buffering –Specification of Tokens-Finite Automata-Regular expression to finite Automata- Minimization of NFA to DFA.

## UNIT – II SYNTAX ANALYSIS

Role of the parser –Writing Grammars –Context Free Grammars – Top Down parsing – Recursive Descent Parsing – Predictive Parsing – Bottom up parsing – Shift Reduce Parsing – Operator Precedent Parsing – LR Parsers – SLR Parser –Canonical LR Parser – LALR Parser

## UNIT – III INTERMEDIATE CODE GENERATION

Syntax directed translation -Intermediate code generation- Postfix notation, Three address codes-quadruples, triples and indirect triples –Syntax trees-Declarations –Assignment Statements –Boolean Expressions –Flow of control statements– Case Statements – Back patching – Procedure calls.

## UNIT – IV CODE GENERATION

Issues in the design of code generator – The target machine – Runtime Storage management – Basic Blocks and Flow Graphs – Next use Information – A simple Code generator – DAG representation of Basic Blocks – Peephole Optimization.

**UNIT – V**  
**CODE OPTIMIZATION AND RUN TIME ENVIRONMENTS**

Introduction – Principal Sources of Optimization – Loop optimization- Optimization of basic Blocks – Runtime Environments – Source Language issues – Storage Organization – Storage Allocation strategies – Access to non-local names – Parameter Passing.

**TEXT BOOKS**

1. Alfred Aho, Ravi Sethi, Jeffrey D Ullman, “*Compilers Principles, Techniques and Tools*”, Second Edition, Pearson Education Asia, 2006.

**REFERENCE BOOKS**

1. Allen I. Holub “*Compiler Design in C*”, Prentice Hall of India, 2006.
2. C. N. Fischer and R. J. LeBlanc, “*Crafting a compiler with C*”, Second Edition Benjamin Cummings , 2008.
3. J.P. Bennet, “*Introduction to Compiler Techniques*”, Second Edition, Tata McGraw-Hill, 2003
4. Raghavan V, “*Principles of Compiler Design*”, Tata Mc-Graw Hill Education Pvt. Ltd., New Delhi, 2010.

# COMPUTER NETWORKS

3 1 0 3

(For students admitted from 2014 onwards)

## PRE-REQUISITE :

Linux in C- Programming Knowledge to understand the protocol implementations of OSI and TCP/IP Network Models

## AIM :

To gain basic and core knowledge in Networking Hardware and Software and OSI and TCP/IP models with their corresponding Layers, Issues , Functionalities and Protocol Design.

## OBJECTIVES :

**The Objective of this Course is to impart knowledge on :**

1. Networking fundamentals
2. How Data communication happens in different networks.
3. Working principle of Internet.
4. OSI and TCP/IP Layers and protocols Design
5. Application software Development to implement various protocols.

## OUTCOME :

**After completion of the course the students are expected to be able to:**

1. Understand the basic network concepts, topologies and models.
2. Appreciate the Design and functioning of OSI and TCP/IP Models.
3. Understand the issues and solutions offered in each Layer of above-said models.
4. Understand the working principle of Internet and Domain Name System(Internet Addressing )

## UNIT -I.

### COMPUTER NETWORKS AND THE INTERNET

Internet Description and Protocol, The Network Edge, The Network Core, Delay, Loss, and Throughput in Packet Switched Networks , Protocol Layers and Their Service Models , Networks Under Attack , History of Computer Networking and the Internet.

## UNIT -II

### APPLICATION LAYER

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

## UNIT - III

### TRANSPORT LAYER

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

**UNIT - 4**  
**THE NETWORK LAYER**

Introduction :- Forwarding and Routing - Network Service Models , Virtual Circuit and Datagram Networks , Forwarding and Switching by Router , The Internet Protocol (IP): Forwarding and Addressing in the Internet , Routing Algorithms , Routing in the Internet , Broadcast and Multicast Routing .

**UNIT - 5**  
**THE LINK LAYER: LINKS, ACCESS NETWORKS, AND LANS**

Introduction to the Link Layer , Error-Detection and -Correction Techniques , Multiple Access Links and Protocols , Switched Local Area Networks , Link Virtualization : A Network as a Link Layer , Retrospective : A Day in the Life of a Web Page Request .

Introduction to Wireless Networks :- CDMA , WiFi : 802.11 Wireless LANs, Introduction to SDN and Wireless Sensor Networks.

**Text Book:**

1. **James F. Kurose & Keith W. Ross** , Computer Networking : A Top-Down Approach, Sixth Edition, Pearson.

**REFERENCE BOOKS:**

1. Andrew S. Tanenbaum. **Computer Networks**, Fourth Edition, Prentice Hall, Pearson Education.
2. Behrouz A Forouzan, **Data Communications and Networking**, Fifth Edition, Tata McGraw-Hill
3. **Introduction to SDN :**

**REF:**<https://www.opennetworking.org/images/stories/downloads/sdn-esources/white-papers/wp-sdn-newnorm.pdf>

4. **Introduction to Wireless Sensor Networks :**

**REF :** [http://www.science.smith.edu/~jcardell/Courses/EGR328/Readings/WSN% 20Intro %20WorldSciPub.pdf](http://www.science.smith.edu/~jcardell/Courses/EGR328/Readings/WSN%20Intro%20WorldSciPub.pdf)

# DOT NET TECHNOLOGIES

3 1 0 3

## PREREQUISITES:

Knowledge of C and C++.

## AIM:

To gain basic knowledge in .Net IDE.

## OBJECTIVES:

This course will help students to achieve the following objectives:

1. Introduce to .Net IDE Component Framework.
2. Learn creating Web pages using ASP.Net.
3. Performing Database operations.

## OUTCOMES:

At the end of this course students will be able to:

1. Create Web pages of their own using ASP.Net.
2. Create simple data binding applications using ADO.Net connectivity.

## UNIT - I

Programming Models – Introduction to .NET Framework – Evolution of .NET technologies - CTS, CLS, CLR, MSIL, JIT, Assemblies, .NET Security Model – Introduction to Base Class Library - Introduction to VB.NET - Working with Visual Studio IDE – IDE Components –Environment Options -VB.NET Fundamentals – Variables – Data Types – Arrays – Control Flow Statements – Modular Coding – Subroutines – Functions – Argument Passing

## UNIT - II

Classes – Instance Fields – Constructors – Properties – Methods – Object – Inheritance – Static Classes – Interfaces -Exception Handling- Need – Models – Statements – Creating Exception Classes - Collections – Arrays – ArrayList Collection – HashTable Collection – SortedList Class – IEnumerator and IComparer Interfaces Handling Strings, Characters and Dates – File Class - Directory Class – Accessing Files – FileStream– StreamWriter– StreamReader– BinaryWriter– Binary Reader

## UNIT - III

Windows Forms – Form Properties – Form Events – Building Dynamic Forms at Runtime - Introduction to Components and controls – Adding Components and controls to forms – Layout and Grouping – Responding to User Inputs – Mouse and Keyboard Events – Designing Menus – Building MDI Applications- Reading Input through Controls – Presentation and Information Controls – Common Dialog Controls – RichTextBox Control

## UNIT - IV

ADO.NET Architecture – DataSet – DataGrid Control- Data Binding – DataAdapter – Command Objects – DataReader – Performing Updates-Introduction to Web Programming – Building Web Applications – Web Controls - Interacting with Web Applications – Maintaining State – ASP.NET Objects – Page Object – Response Object – Request Object – Server Object – Deploying ASP.NET Applications

## UNIT- V

Data-Bound Web Controls – Simple Data binding – Binding to DataSets – Customizing DataGrid Control -Building and Consuming Web Services – ASP.NET Web Service Projects -Theoretical Introduction to C# and Comparison with VB.

### TEXT BOOKS:

1. Jeffrey R. Shapiro, *VB.NET Complete Reference*, Tata McGrawHill, (Units I - III)
2. Evangelos Petroustos , *Mastering Visual Basic. NET*, BPB Publications Reprinted 2005 (Units I -III)
3. Michael Otey , Denielle Otey, *ADO.NET Complete Reference*, Tata McGrawHill, 4<sup>th</sup> reprint 2005 (Unit -IV)
4. Pro C# with .NET 3.0 – *Andrew Troelsen* – Special Edition 2007 (Unit -V)

### REFERENCE BOOK

1. Evangelos Petroustos , Ali Bilgin, *Mastering Visual Basic. NET Database Programming* BPB Publications – 2002



# DATA WAREHOUSING AND MINING

3 1 0 3

## **PREREQUISITES:**

Knowledge of data base management systems.

## **AIM:**

To gain basic knowledge on warehousing and handling of large volume of data.

## **OBJECTIVES:**

This course will help students to achieve the following objectives:

1. Design of data warehouse
2. Methods to interpret knowledge from data warehouse.

## **OUTCOMES:**

At the end of this course students will be able to:

1. Develop the data warehouse with suitable schema.
2. Create simple data mining applications using various functionalities of data mining.

## **UNIT- I DATA WAREHOUSE**

Evolution of Data base Technology - Definition: Data Warehouse - Differences between Operational Data base systems and Data Warehouses - Multidimensional Data Model - OLAP Operations - Warehouse Schema - Data Warehousing Architecture - Warehouse Server - Metadata - OLAP engine - The tasks in Building a Data Warehouse - Data warehouse backend Process - Data warehouse applications

## **UNIT- II INTRODUCTION TO DATA MINING & PREPROCESSING**

Data mining: Definition - Knowledge discovery in database (KDD) vs. Data mining - DBMS vs DM- Stages of the Data Mining Process-task primitives, Data Mining Techniques -Data mining knowledge representation – Data mining query languages, Integration of a Data Mining System with a Data Warehouse – Issues, Data preprocessing – Data cleaning, Data transformation, Feature selection, Dimensionality reduction, Discretization and generating concept hierarchies.

## **UNIT - III ASSOCIATION & CLUSTERING**

Mining frequent patterns- Market Basket Analysis –Frequent Itemset Mining Methods, Pattern Evaluation Methods, Advanced Pattern Mining - Multilevel, Multidimensional space, Constraint-based Pattern Mining, Mining High Dimensional Data and Colossal Patterns.  
Cluster Analysis, Partitioning Methods, Hierarchical Methods, Density-Based and Grid-Based Methods, Evaluation of Clustering

## **UNIT- IV CLASSIFICATION**

Decision Tree Induction - Bayesian Classification – Rule Based Classification – Model Evaluation, Enhancing Model Accuracy, Classification: Advanced Methods – Bayesian Belief

Networks, Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners , Genetic Algorithms, Rough Set Approaches, Fuzzy Set Approaches

## **UNIT - V**

### **MINING COMPLEX TYPES, DATA MINING APPLICATIONS AND CASE STUDIES**

Introduction to Mining Data Streams – Mining Time-Series Data – Graph Mining – Social Network Analysis. Data warehousing and mining Applications - Products - Case studies - The Future of Data Mining - Privacy and Security of Data Mining

#### **TEXT BOOK**

1. *Data Mining: Concepts and Techniques: Concepts and Techniques* By Jiawei Han, Micheline Kamber, Jian Pe , 3rd Edition, Elsevier, 2011

#### **REFERENCE BOOKS**

1. Arun K Pujari , "*Data mining*" , Third Edition, Universities Press (India) Private Limited, 2013
2. C.S.R. Prabhu , "*Data Ware housing: Concepts, Techniques, Products and Applications*", Third Edition , Prentice Hall of India, 2008.
3. Morgrat A. Dunham, " *Data Mining: Introductory And Advanced Topics*", Third Edition , Pearson Education, 2008.

## SANSKRIT & INDIAN CULTURE

1 0 0 1

### (Syllabus for VI Semester)

**Unit I – (2)** Social significance of religion - evolution of religious thoughts and ritual practices; (1) different philosophical Schools.

**Unit II – (1)** structural evolution for ritual practices; significance of temples & other constructions. (2) Civil engineering skill & construction technologies; scientific aspects in *Vastusastra*

**Unit III – (1)** Important personalities and their Contribution – Devarishies, Maharishies, Rishies, Seers and contribution of their institutions to protect the cultural heritage.

**Unit IV – (3)** Vedic Mathematics, Astrology & Astronomy, etc. early Indian works and its importance in day to day life.

**Unit V – (5)** project work - ancient Indian technological thoughts with modern applications in different fields.

### REFERENCE BOOKS

1. Datta, B. & A.N. Singh. 1962(rp). *History of Hindu Mathematics*. 2 Vols. Asian Publishing House. Bombay.
2. Jagadguru Swami Sri Bharati Krishna Tirthaji Maharaj. 1994 *Vedic Mathematics*. Motilal Banarasidas. New Delhi.
3. Kulkarni, R.P. 1983. *Geometry according to Sulba Sutra*. Samsodhana Mandal. Pune.
4. Radhakrishna, S. 1993(rp). *Indian Philosophy*. Vol I & II. Oxford University Press. Delhi.
5. Rao, J. 1960. *Principles and Practices of Medical Astrology*. Raman Publications. Banglore.

## HR Skills – IV

1 1 0 1

### APTITUDE SKILLS-II

(For Students admitted from 2014 onwards)

#### PRE-REQUISITE :

Basic knowledge in Mathematics and Reasoning.

#### AIM :

To succeed in campus recruitment and other career development examinations.

#### OBJECTIVES :

1. To improve candidate does abilities and verbal understand.
2. To improve numerical skills and diagrammatic reasoning skills.
3. To help to determine the correct sequence of a set of sentences.
4. Totrain the students to identify from a number of pieces of information, those that are needed to solve a problem.
5. To cater to the needs to attend competitive examinations in a successful manner.

#### OUTCOMES:

**After completion of the course the students are expected to be able to:**

1. Solve the problems with verbal understanding
2. Acquire the skill of doing numerical skills and diagrammatic reasoning problems.
3. Acquire the ability to determine the correct sequence of a set of sentences.
4. Do the problems within the time-frame.
5. Attend competitive examinations in a successful manner.

#### UNIT-I

#### (NUMBERS AND LETTER SERIES - ANALOGIES)

Number series –Difference series – Product series – Squares/ cube series – combination series – General approach to number series. Letter series – Number and Letter analogies.

#### UNIT-II

#### (CODING AND DECODING – BLOOD RELATION)

Coding and Decoding – Odd man out – Alphabet classification – Word classification – Number classification. Blood Relation.

#### UNIT -III

#### (DIRECTIONAL SENSE – SYMBOLS AND NOTATION - DEDUCTION)

Directional sense - Symbols and Notation – Blood relation – Mathematical operations – Deduction – Rules of deduction – Example ( I to X )

**UNIT-IV**  
**(CONNECTIVITY'S – CLOCK AND CALENDARS – ANALYTICAL REASON)**

Connectivity's – Logical Connectivity's – OR, NOT, AND, IF-THEN. Clock – Points to note. Calendars – Leap & non Leap year – Counting number of odd days - Analytical reason – Linear sequencing – Circular arrangements – Order sequence.

**UNIT-V**  
**(DISTRIBUTION – BINARY LOGIC & PUZZLES – CUBES & VENN DIAGRAMS – NON-VERBAL REASONING)**

Distribution – Double line distribution – Binary logic - Puzzle. Cubes – Venn diagram Type I, II, III – Non-Verbal reasoning – Patterns of behavior elements – Types of questions

**REFERENCES :**

1. *Quantitative Aptitude*, R.S. Aggarwal, S. Chand & Company Pvt. Ltd., New Delhi.
2. *Quantitative Aptitude for competitive examinations*, Abhijit Guha, Tata McGraw-Hill Education Pvt. Ltd., New Delhi.

## COMPILER DESIGN LAB

0 0 3 2

(For students admitted from 2014 onwards)

### PRE-REQUISITE :

An undergraduate course in automata theory and good knowledge in programming.

### AIM:

At the end of the course, the student will be able to design and implement code for each phase to understand compiler software working and its coding in detail.

### OBJECTIVES:

1. To provide an Understanding of the language translation peculiarities by designing complete translator for mini language.
2. To provide practical programming skills necessary for constructing a compiler.

### OUTCOME :

**After completion of the course the students are expected to be able to:**

1. Design, develop and implement a compiler for any language.
2. Apply the knowledge of lex tool & yacc tool to develop a scanner & parser.
3. Design & conduct experiments for Intermediate Code Generation in compiler.
4. Design & implement a software system for backend of the compiler.
5. Learn the new code optimization techniques to improve the performance of a program in terms of speed & space.

### LIST OF EXPERIMENTS

1. Generation of tokens for given lexeme
2. Implementation of symbol table
3. Check whether the given string is successfully parsed or not for CFG
4. Computation of FIRST and FOLLOW sets
5. Computation of LEADING and TRAILING sets
6. Implementation of shift reduce parser
7. Implementation of Quadruples and triples
8. To implement the lexical analyzer using LEX tool for a subset of C language.
9. To write LEX and YACC program for implementing calculator using LEX and YACC tool.
10. To write LEX and YACC program for implementation of syntax analyzer using LEX and YACC tool.

## COMPUTER NETWORKS LAB

0 0 3 2

(For students admitted from 2014 onwards)

### PRE-REQUISITE :

Basic Linux & Networking Linux Commands and Linux in C & C++ /Java- Programming Skills.

### AIM :

To gain basic and core knowledge in Networking Software Development for OSI and TCP/IP models with their corresponding Layers, Issues , Functionalities and Protocol Design.

### OBJECTIVES:

**The Objective of this Course is to impart knowledge on :**

1. Introduction to Socket Programming
2. To develop TCP/UDP Socket connection application to realize Client- Server Model
3. Application software Development to implement various Application Layer and network Layer routing Algorithms.
4. Remote Command Execution and Remote Method Invocation.
5. Use of LAN Trainer Kit to understand Network topologies and Operations

### OUTCOME:

**After completion of the course the students are expected to be able to:**

1. Understand the basic network concepts, topologies and OSI and TCP/IP models.
2. Appreciate the Design and functioning of OSI and TCP/IP Models.
3. Understand the issues and solutions offered in terms of protocol implementation in each Layer of above-said models.
4. Understand the working principle of Internet.

### LIST OF EXPERIMENTS

1. Study of Network Topologies, Devices
2. Campus Network – Design and Implementation
3. Write a program to know your IP Address and to check whether it is Broadcasting address or not.
4. Study and Implementation of Experiments using LAN Trainer Kit
  - a. Aloha
  - b. CSMA
  - c. CSMA/CD
  - d. Token Bus
  - e. Token Ring
  - f. Stop and Wait

- g. Stop and Wait with BER
  - h. Sliding Window Go Back N
  - i. Sliding Window Go Back N with BER
  - j. Packet Transmission
  - k. File Transfer
5. Implement the following executing protocols of Internet in action using Wireshark Lab .
- a. Packet Capture and Observations using Packet Sniffer.
  - b. Explore various aspects of HTTP Protocol.
  - c. Tracing DNS with Wireshark.
  - d. Analysis and Obtain various parameters-Values for TCP Protocol in action
  - e. Analysis and Obtain various parameters-Values for UDP Protocol in action
  - f. Analysis and Obtain various parameters-Values for IP Protocol in action
  - g. Analysis and Obtain various parameters-Values for NAT Protocol in action
  - h. Analysis and Obtain various parameters-Values for ICMP Protocol in action
  - i. Analysis and Obtain various parameters-Values for Ethernet and ARP Protocols in action
  - j. Analysis and Obtain various parameters-Values for DHCP Protocol in action  
Analysis and Obtain various parameters-Values for 802.11 Wireless Network Protocol in action
  - k. Analysis and Obtain various parameters-Values for SSL Protocol in action
6. Getting the MAC Address.
7. Implement the following Routing Algorithms
- a. Distance vector
  - b. Link State
  - c. Shortest Path
8. Remote Method Invocation.
9. Remote Command Execution
10. Network tool Introduction – Packet Tracer, NS2, RF Planner **(Not for Evaluation)**

**References:**

- 1. BenchMark LAN Trainer User Manual by Prof. Timothy A. Gonsalves, Department of Computer Science & Engineering, IIT-Madras.
- 2. Solutions of BenchMark LAN Trainer Problems at :  
[http://csivc.csi.cuny.edu/engsci/files/ens466/Ens466\\_Experiments.pdf](http://csivc.csi.cuny.edu/engsci/files/ens466/Ens466_Experiments.pdf).
- 3. The Wireshark Problems with solution are available as Supplements: Wireshark Labs at :  
<http://www-net.cs.umass.edu/wireshark-labs/>
- 4. Companion Manual for the text book Computer Networking : A Top-Down Approach at :  
[http://wps.pearsoned.com/ecs\\_kurose\\_compnetw\\_6/216/55463/14198700.cw/](http://wps.pearsoned.com/ecs_kurose_compnetw_6/216/55463/14198700.cw/)



## DOT NET LAB

0 0 3 2

(For students admitted from 2014 onwards)

### PREREQUISITES:

Knowledge of C and C++.

### AIM:

To gain programming knowledge in .Net Framework.

### OBJECTIVES:

This Lab course will help students to achieve the following objectives:

- 1.Introduce to .Net IDE Component Framework.
- 2.Programming concepts in .Net Framework.
- 3.Creating website using ASP.Net Controls.

### OUTCOMES:

At the end of this Lab course students will be able to:

- 1.Create user interactive web pages using ASP.Net.
- 2.Create simple data binding applications using ADO.Net connectivity.
3. Performing Database operations for Windows Form and web applications.

## LIST OF EXPERIMENTS

1. Create a windows form with the following controls Textbox, Radio button, Check box, Command Button
2. Write a program for Menu option.
3. Create a program to connect with database and manipulate the records in the database using ADO .NET
4. Create a program to implement the concepts of OOPS for creating class, inheritance
5. Create a program to perform input validation using procedure.
6. Write a program to open a file and using I/O operations write contents into a file and read the contents from the file.
7. Create a window form using HTML controls.
8. Create a program to perform validation using validation controls.
9. Create a program in ASP .NET to connect with the database using ADODB connectivity and manipulate the records.
10. Write a program to store the employee details using class and methods in C# .NET
11. Write a program to Handle Exceptions
12. Write a program to create a form with Basic controls. In c#. NET.

## DATA WAREHOUSING AND DATA MINING – LAB

0 0 3 2

(For students admitted from 2014 onwards)

### PRE-REQUISITE:

Knowledge on any query language

### AIM:

At the end of the course, the student will be able to design and implement data mining application software to suit to the real world problem.

### OBJECTIVES:

3. To practice data warehouse design with suitable schema.
4. To apply various preprocessing techniques.
5. To provide practical programming skills necessary for data analyzing and interpretation of data.

### OUTCOME :

**After completion of the course the students are expected to be able to:**

6. Design, develop and implement an application in data warehousing and mining domain.

### LIST OF EXERCISES

1. Design and implement a data warehouse for analysis
2. Star, snowflake & Galaxy schema to be implemented
3. Run OLAP queries on an implemented datawarehouse
4. Data Pre-processing using Weka
5. Naïve bayes and decision tree classification
6. Attribute selection & regression
7. Svm classification and evaluation
8. K-means clustering, pca and evaluation
9. Hierarchical Clustering
10. Mining Frequent Itemsets
11. Introduction to writing custom programs to perform data mining

### REFERENCES:

1. Ian H. Witten & Eibe Frank, *Data Mining: Practical Machine Learning Tools and Techniques*, The Morgan Kaufmann Series in Data Management Systems , Third Edition
2. WEKA Documentation-<http://www.cs.waikato.ac.nz/ml/weka/documentation.html>

# VII SEMESTER

## **EBU7FT091– RESOURCE MANAGEMENT TECHNIQUES**

3 1 0 3

(For computer science engineering students admitted from 2012-13)

### **PRE-REQUISITE :**

Understanding of Programming, Sequencing, Graphs, State Machines, Algorithms

### **AIM:**

Introduce the students to the foundational aspects of Mathematical Programming in Resource management techniques.

### **OBJECTIVES:**

1. To introduce the Mathematical formulation of the problem to be serving as tools in the development of theoretical computer science.
2. To focus on Transportation and assignment model in computer engineers to solve problems occurred in the development of programming languages.
3. To know about the importance of Game theory in computer science & engineering.
4. To know the methods to solve replacement and sequencing problems in computer engineers.
5. To Solve problems in Resource allocation Scheduling.

### **OUTCOME:**

**After completion of the course the students are expected to be able to,**

1. Have the knowledge of the Mathematical formulation of the problem which is a tools in the development of theoretical computer science.
2. Solve the problems on Transportation and assignment model in computer engineers.
3. Have the knowledge of Game theory in computer science & engineering.
4. Solve replacement and sequencing problems in computer engineers.
5. Solve problems in Resource allocation Scheduling.

### **UNIT - I**

#### **LINEAR PROGRAMMING AND SIMPLEX METHOD**

Mathematical formulation of the problem - Graphical solution method - Exceptional cases - General linear programming problem - Canonical and standard forms of linear programming problem - The simplex method - Computational procedure : The simplex algorithm - Artificial variable techniques : Big M method - problem of degeneracy.

### **UNIT - II**

#### **TRANSPORTATION, ASSIGNMENT AND ROUTING PROBLEMS**

Mathematical formulation of the transportation problem - Triangular basis - Loops in a transportation table - Finding initial basic feasible solution (NWC, LCM and VAM methods) - Moving towards optimality - Degeneracy in transportation problems- Transportation algorithm (MODI method) - Unbalanced transportation problems - Assignment algorithm : Hungarian assignment method - Routing problems : Travelling salesman problem.

### **UNIT – III GAME THEORY**

Two person zero sum games - Maxim in Minimax principle - Games without saddle points (Mixed strategies) - Solution of 2 X 2 rectangular games - Graphical method - Dominance property - Algebraic method for m x n games - Matrix oddments method for m x n games.

### **UNIT – IV REPLACEMENT AND SEQUENCING PROBLEMS**

Replacement of equipment or asset that deteriorates gradually - Replacement of equipment that fails suddenly - Recruitment and promotion problem - Problem of sequencing - Problems with n jobs and 2 machines - Problems with n jobs and k machines - Problems 2 jobs and k machines.

### **UNIT – V NETWORK MODELS**

Network and basic components - Rules of network construction - Time calculations in networks - Critical path method (CPM) - PERT - PERT calculations - Negative float and negative Slack - Advantages of network (PERT/CPM) - Project Cost - Time Cost Optimization Algorithm - Linear Programming formulation - Precedence planning - Updating - Resource allocation Scheduling.

**Remark:** Each Unit has to be covered in 12 hours (each of 50 minutes duration). Questions may be set to test the problem solving ability of the students in the above topics.

#### **PRESCRIBED BOOK**

1. Kanti Swarup, P.K.Gupta and Man Mohan, *Operations Research*, Eighth Edition, Sultan Chand & Sons, New Delhi, 1999.

#### **REFERENCE BOOKS**

1. H.A.Taha, *Operations Research*, Eighth Edition, Pearson Education India, 2008
2. Richard Bronson, *Operations Research*, (Schaum's Outline Series), Second Edition McGraw Hill Company, 2003.
3. S.Hillier and J.Liebermann, *Operations Research*, Sixth Edition, Mc Graw Hill Company, 1995.
4. J.K.Sharma, *Operation Research* (Theory and Applications), First Edition, Mac Millen Ltd., 1997.
5. Barry Render, Ralph M. Stair, Allynan Bacon, *Quantitative Analysis for Management*, Fifth Edition, Boston, 1994.

# SOFTWARE ENGINEERING

3 2 0 4

(For Students admitted from 2014 onwards)

## PRE-REQUISITE :

Basic Knowledge of systematic and operational language

## AIM :

The systematic Approach to the design, development, operation, and maintenance of a software system.

## OBJECTIVES :

1. Apply software engineering theory, principles, tools and processes, as well as the theory and principles of computer science.
2. Design and experiment with software prototypes
3. Demonstrate professionalism including continued learning and professional activities
4. Build solutions using different technologies, architectures and life-cycle approaches in the context of different organizational structures
5. Insist the development, adoption and sustained use of standards of excellence for software engineering practices
6. Communicate effectively through software development
7. Contribute to society by behaving ethically and responsibly in software development

## OUTCOME :

**After completion of the course the students are expected to be able to:**

1. Demonstrate basic knowledge in software engineering.
2. Plan, design, develop and validate the software project
3. Identify, formulates, and solves software engineering problems
4. Develop skills that will enable them to construct software of high quality
5. Understand the impact of sound engineering principles

## UNIT - I

**Introduction** –Definition-S/W Engineering Paradigm – System engineering –Software characteristics -verification – validation- Software Cost Estimation Techniques-COCOMO-life cycle models-Water fall, Prototype, spiral, WINWIN Spiral, Agile, Evolutionary, Incremental, and Object oriented.

## UNIT - II

**System Analysis**-Requirements analysis-Functional-Non-Functional-Analysis principles-Prototyping-Software Requirement Specification – data dictionary-data modeling, functional modeling and behavioral Modeling

## UNIT - III

**Design Process and Principles** – Software design and types- Design concepts: Abstraction, Refinement, Modularity and software architecture control hierarchy, structural partitioning and

information hiding. Effective modular design: functional independence cohesion and coupling – design documentation.

#### **UNIT – IV**

**Design Standards:** -User interface design, Transform mapping and Transaction mapping. Design for Real-time Systems: System Considerations -analysis and simulation of real time Systems, Software Configuration System.

#### **UNIT – V**

**Software Testing Techniques:** Software testing fundamentals-White Box Testing-Black box testing- Software Testing Strategies: A strategic approach to software testing- Unit testing-integration testing validation testing-system testing, Software Maintenance, Reverse Engineering and Re-Engineering.

#### **TEXT BOOKS:**

1. Roger Pressman.S., " *Software Engineering : A Practitioner's Approach*",McGraw Hill 4th edition 2011
2. I Sommerville, " *Software Engineering* 7<sup>th</sup> edition: ", Addison Wesley, 2007

#### **REFERENCE BOOKS:**

1. P fleeger, " *Software Engineering* ",3<sup>rd</sup> Edition, Pearson Education India, 2008.
2. Carlo Ghezzi, Mehdi Jazayari, Dino Mandrioli " *Fundamental of Software Engineering* ", 2nd illustrated Edition, Prentice Hall of India,2003.
3. Watts S.Humphrey,"*A Discipline for Software Engineering*", Pearson Education, 2007.

# MOBILE COMPUTING

3 1 0 3

(For students admitted from 2014 onwards)

## PRE-REQUISITE:

A background in computer networks is required. Familiarity with network simulation tools would be an advantage

## AIM

To gain basic and core knowledge in Mobile communication and Software application.

## OBJECTIVES:

1. To learn about the concepts and principles of mobile computing
2. To explore both theoretical and practical issues of mobile computing
3. To develop skills of finding solutions, developing and simulating various mobile applications

## OUTCOME:

After completion of the course, the students are expected to be able to:

1. Understand the concepts of wireless communication and transmission
2. Recognize the various multiple access mechanisms
3. Understand the different types of routing protocols that support wireless environment
4. Adapt with multidisciplinary activities mobile database, mobile cloud and sensor networks

## UNIT – I

### WIRELESS COMMUNICATION FUNDAMENTALS

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

## UNIT – II

### TELECOMMUNICATION NETWORKS

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

## UNIT – III

### WIRELESS LAN

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



**UNIT – IV**  
**MOBILE NETWORK LAYER & TRANSPORT AND APPLICATION LAYERS**

Mobile IP – Dynamic Host Configuration Protocol - Routing – DSDV – DSR – Alternative Metrics,  
Traditional TCP – Classical TCP improvements.

**UNIT – V**  
**MOBILE APPLICATION LAYER & CASE STUDIES**

WAP, WAP 2.0, Mobile Database, Mobile Cloud and Sensor Networks.

**TEXT BOOKS**

1. Jochen Schiller, “Mobile Communications”, PHI/Pearson Education, Second Edition, Pearson Education India, 2008 . (Unit I Chap 1,2 &3- Unit II chap 4,5 &6-Unit III Chap 7.Unit IV Chap 8- Unit V Chap 9&10.)
2. William Stallings, “Wireless Communications and Networks”, PHI/Pearson Education, 1st Indian reprint 2002. (Unit I Chapter – 7&10-Unit II Chap 9)

**REFERENCE BOOKS**

1. Kaveh Pahlavan, P Prasanth Krishnamoorthy, “*Principles of Wireless Networks*”, First illustrated Edition, PHI/Pearson Education, 2003.
2. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, “*Principles of Mobile Computing*”, Second Edition, Dreamtech Press, 2006.
3. Hazysztof Wesolowshi, “*Mobile Communication Systems*”, John Wiley and Sons Ltd, 2002.
4. Vijay Kumar, “*Mobile Database Systems*”, First illustrated Edition, John Wiley & Sons, 2006
5. <https://cloud.google.com/solutions/mobile>
6. [www.sensor-networks.org/](http://www.sensor-networks.org/)

## SOFTWARE DEVELOPMENT LAB USING CASE TOOLS

1 0 3 3

(For Students admitted from 2014 onwards)

### PRE-REQUISITE:

Need Basic Knowledge of Sound Engineering Principles

### AIM:

The main objective is to learn and to gain practical experience with software engineering methodologies and UML techniques.

### OBJECTIVES:

1. objective of this lab is to enable the student to practice the software engineering techniques and object-oriented analysis and design through UML of software application
2. The UML is to import state of the art knowledge on practical Applications

### OUTCOME:

1. Students will demonstrate basic knowledge in software engineering and UML Practical Applications.
2. Students will be able to plan, design, develop and validate the software project
3. Identify ambiguities, inconsistencies and incompleteness from a requirements specification
4. Identify and state functional requirements and non-functional requirements
5. Identify and state students will be apply advance software methodology to create high quality of software development process.

### SOFTWARE ENGINEERING LAB EXERCISE

1. Software Project Planning and Scheduling using PERT and GANTT chart
2. Requirement gathering, Analysis and SRS specification(Discussion among Client and Developer to personnel)
3. Introduction to UML and Use case, Class diagrams
4. System modeling (DFD,CFD and ER)
5. Flow of events and activity diagram
6. Interaction diagrams: sequence and collaboration diagrams
7. State Transition Diagram and Deployment Diagram
8. Coding Development
9. Software Testing
10. The Extreme Programming process(Agile Model)

**NOTE:** Emerging Topics if any....

**EXERCISES:** Form groups of 3 students (with one of them as a leader).

## MOBILE COMPUTING LAB

0 0 3 2

(For Students admitted from 2014 onwards)

### PRE-REQUISITE:

A background in computer networks is required. Acquaintance with network simulation and sun java toolkit would be an advantage

### OBJECTIVES:

1. To explore the practical issues of mobile computing using network simulation tools
2. To develop skills of developing and simulating various mobile applications
3. To develop various routing protocols using Simulation environment

### OUTCOME:

After completion of the course the students are expected to be able to:

1. Understand the modeling environment of wireless communication and transmission
2. Understand the different types of routing protocols that support wireless environment

Simulate the following programs using Sun java toolkit

1. Write program to simulate HelloWorld midlet
2. Write program to simulate multiple midlets
3. Write program to simulate command class
4. Write program to implement check color
5. Simulate AODV Protocol using NS-2
6. Simulate DSR Protocol using NS-2
7. Build a wireless network topology using NS-2
8. Build a bus network topology using NS-3
9. Build a wireless network topology using NS-3

### REFERENCES:

1. [http://www.isi.edu/nsnam/ns/doc/ns\\_doc.pdf](http://www.isi.edu/nsnam/ns/doc/ns_doc.pdf)
2. <http://www.oracle.com/technetwork/java/download-135801.html>
3. <https://www.nsnam.org/docs/release/3.22/tutorial/ns-3-tutorial.pdf>

## MOBILE APPLICATION DEVELOPMENT LAB

0 0 3 2

(For Students admitted from 2014 onwards)

### PREREQUISITES:

Knowledge of OOP Concepts.

### AIM:

To gain basic knowledge in Android Applications.

### OBJECTIVES:

1. Introduce to the android architecture and creating simple applications.
2. Present different views to create user interface.
3. Introduce creating android applications with any simple database.
4. Present different ways of sharing data through the use of content providers.
5. Introduce how to take the android application to the market.

### OUTCOMES:

**At the end of this Lab students will be able to:**

1. Know the basics of Android Application Programming.
2. Develop Simple Android Applications

### TOOLS:

Develop Applications using any of the following tools:  
Eclipse, Android studio.

### LIST OF EXERCISES

1. Design a Simple Scientific Calculator.
2. Creating Menus in Android.
3. Application explaining the Basic UI Design with all the relevant Fields.
4. A Simple application illustrating styles and themes.
5. Call Log Notification Menu.
6. A GUI Application.
7. Creating live Folders with search options.
8. A simple database application.
9. Playing a audio, video file using Android..
10. A simple offline search Engine.

### REFERENCES:

1. *"Android Apps with Eclipse"*, Onur Cinar, Apress-2012.
2. <http://developer.android.com/tools/studio/index.html>.

## WEB TECHNOLOGY LAB

0 0 3 2

(For Students admitted from 2014 onwards)

### PRE-REQUISITE:

Needs basic computer knowledge and working with Microsoft Office

### AIM:

To create a fully functional website with MVC Architecture

### OBJECTIVE:

1. The objective of this web technology lab is to develop an ability with students to design and implement static and dynamic website.
2. Study about Basic HTML Tags with help of CSS Styling and client side Event handling using VB Script & java Script
3. Web Technology Lab is a part of Server side programming like ASP, Servlet, JSP and PHP Technologies.
4. Finally study about Cookies, Sessions and Database Handling with ASP, Servlet, JSP and PHP Technologies

### OUTCOME:

**After completion of the course, the students are expected to be able to:**

Have good web designing and web programming ability. Model-view-controller has been widely adopted as architecture for World Wide Web applications in major programming languages. Several commercial and noncommercial web application frameworks have been created that enforce the pattern. These frameworks vary in their interpretations, mainly in the way that the MVC responsibilities are divided between the client and server.

### LIST OF EXERCISES

**Using Web Designing IDE's Like Dreamweaver, Front page, Expression Web, Share point to design following excise 1 to excise 5**

1. Create a simple webpage using HTML.
2. Use frames to Include Images and Videos.
3. Add a Cascading Style sheet for designing the web page.
4. Design a dynamic web page with validation using JavaScript.
5. Course registration using ASP & Sql server (use cookies, sessions to be part of excises)

**Using Eclipse (PHP & J2EE ) IDE to implement following excise 6 to excise 8**

6. Any Online Application using Servlet & Sql server (use cookies, sessions to be part of excises)
7. Any Online Application using JSP & Sql server (use cookies, sessions to be part of excises)
8. Library Automation using PHP & Sql server (use cookies, sessions to be part of excises)

# VIII SEMESTER

# ENGINEERING ECONOMICS AND MANAGEMENT

3 1 0 3

(For Students admitted from 2014 onwards)

**PRE-REQUISITE: NA**

## **AIM:**

The aim of this subject is to make students understand and appreciate the importance of Managerial functions and Engineering economic analysis.

## **OBJECTIVES:**

1. Apply managerial functions, as well as theory and principles of planning, organizing, leading, and controlling resources to accomplish organizational goals.
2. Special emphasis will be placed on skills necessary for a manager to be effective.
3. The subject will involve an overview approach to covering the various concepts required for an overall understanding of management's role in the contemporary organization.
4. Apply Economic concepts, as well as theory and principles of Understand economic factor
5. Contribute to society by behaving ethically and technical responsibilities to take correct decision making

## **OUTCOMES:**

**After completion of the course the students are expected to be able to:**

1. Know, comprehend, apply, analyze, synthesize and evaluate the basic principles of the fundamentals of managing organizations and Economic concepts.
2. Identify and apply appropriate management techniques for managing contemporary organizations
3. Understand the concepts of time value of money and cost analysis
4. Understand the skills, abilities, and tools needed to obtain a job on a management track in an organization of their choice.
5. Complete specific activities, as identified in the syllabus, related to managerial functions and economic concepts. At the close of the semester, students will be prepared for further study in the area of management.

## **UNIT – I**

Nature of management and its process – Contribution of Taylor and Fayol to management – Functions and principles of management – Industrial ownership – Types, formation, merits and demerits – Management by objective, Management by exception.

## **UNIT – II**

Planning – Nature & purpose, Kinds of plans – Decision making process and kinds of decision – Organization process – organization structure, Staffing - Selection and Recruitment - Career Development - Career stages – Training - Performance Appraisal

### **UNIT - III**

Direction and Control: Motivation process and theory – Leadership – Leadership style. Communication – process and methods – barriers, coordination – features and Techniques, Control process and methods.

### **UNIT - IV**

Basic economic concept – Importance of economic in engineering – Economic and technical decisions – Demand and supply – Factors influencing demand – Elasticity of demand – demand forecasting – Competition.

### **UNIT - V**

Actual cost and opportunity cost – Marginal cost – Incremental cost and sunk cost, Fixed and variable cost – Short-run long-run cost – Cost output relationship – Price fixation – Pricing policies – Pricing methods. Break even analysis.

#### **TEXT BOOKS:**

1. L.M..Prasad *Principles & Practice of Management*, 7<sup>th</sup> Edition, Sultan Chand & Sons, 2007
2. Varshney and Maheswari, *Managerial Economics, Third Edition*, Sultan Chand & Sons, 2011

#### **REFERENCE BOOKS:**

1. Harold Knoontz, Heinz Weihrich – *Essentials of Management*, First Reprint, Tata Mcgraw Hill, 2010.
2. Engineering Economics and Costing by Mishra Sasmita, Second Edition, PHI Learning Pvt. Ltd., 2010.



# CRYPTOGRAPHY AND NETWORK SECURITY

3 2 0 3

## **PRE-REQUISITE :**

Basic knowledge of discrete mathematics (algebra), information theory and Analysis of Algorithms

## **AIM:**

The aim of the course is to provide necessary foundations to apply cryptography techniques in new, security challenges in emerging systems and wireless networks.

## **OBJECTIVES:**

**The Objective of this Course is to impart knowledge on :**

- Extensive, detailed and critical understanding of the concepts, issues, principles and theories of computer network security
- Detailed and practical understanding of formalisms for specifying security related properties and validating them using model checking
- Critical theoretical and detailed practical knowledge of a range of computer network security technologies as well as network security tools and services
- Practical experience of analyzing, designing, implementing and validating solutions to computer network security challenges using common network security tools and formal methods.

## **OUTCOME:**

**After completion of the course the students are expected to be able to:**

- The different security goals and how they can be achieved by means of cryptography
- Cryptographic mechanisms: encryption, data authentications, entity authentication, digital signatures
- Understand the concepts and foundations of computer security, and identify vulnerabilities of IT systems.
- Use basic security tools to enhance system security.
- Develop basic security enhancements in stand-alone applications.

## **UNIT - I INTRODUCTION**

Introduction to Network Security - Attacks- Services- Mechanism – Conventional Encryption Principle – Cipher Principles – Data Encryption Standard – Block Cipher Design Principles and Modes of Operation - Triple DES – Placement of Encryption Function – Traffic Confidentiality – Key Distribution.

## **UNIT - II PUBLIC KEY CRYPTOGRAPHY**

Introduction to Public Key Cryptography – RSA - Diffie-Hellman key Exchange - Key Management-Session and Interchange keys, Key exchange and generation-PKI

**UNIT - III**  
**AUTHENTICATION AND HASH FUNCTION**

Authentication requirements – Authentication functions – Message Authentication Codes – Hash Functions – Security of Hash Functions and MACs – MD5 message Digest algorithm - Secure Hash Algorithm – HMAC - Digital Signatures – Authentication Protocols – Digital Signature Standard

**UNIT- IV**  
**NETWORK SECURITY**

Authentication Applications: Kerberos – X.509 Authentication Service – Electronic Mail Security – PGP – S/MIME - IP Security – Web Security.

**UNIT- V**  
**SYSTEM LEVEL SECURITY**

Intrusion detection – password management – Viruses and related Threats – Virus Counter measures – Firewall Design Principles – Trusted Systems.

**TEXT BOOK:**

William Stallings, “Cryptography and Network Security – Principles and Practices”, Prentice Hall of India, Fourth Edition 2006.

**REFERENCES:**

1. Atul Kahate, “*Cryptography and Network Security*”, Third Edition, Tata McGraw-Hill, 2013.
2. Bruce Schneier, “*Applied Cryptography*”, Second Edition, John Wiley & Sons Inc, 2007.
3. Charles B. Pfleeger, Shari Lawrence Pfleeger, “*Security in Computing*”, Third Edition, Pearson Education, 2003

# ELECTIVES

## LIST OF ELECTIVES

<b>CODE</b>	<b>SUBJECT NAME</b>
A	Computer Architecture
B	Distributed Operating System
C	Artificial Intelligence
D	E Commerce
E	Advanced Databases
F	Management Information System
G	Software Quality Assurance
H	Soft Computing
I	Big Data Analytics
J	Professional Ethics and Cyber Laws
K	Virtual Reality
L	Parallel Programming with Cuda C
M	Enterprise Resource Planning
N	Social Network Analysis and Mining
O	Cloud Computing
P	Parallel Programming
Q	Software Defined Networks

## A - COMPUTER ARCHITECTURE

3 1 0 3

### **PREREQUISITES:**

Data Structures and Algorithms, and Computer Science- I or Comparable Programming experience.

### **AIM:**

To study the major components of computer systems and how those components fit together.

### **OBJECTIVES:**

1. To understand the details of representation of data and instructions, how instructions are translated from human-understandable form into machine-understandable form, and how they are fetched, decoded, and executed.
2. To learn basics of Parallel Computer Architecture.
3. To learn the memory technology and optimization.
4. To learn the disk storage and I/O Performance

### **LEARNING OUTCOME:**

After successfully completing this course, they will be able to:

1. Understand and appreciate a computer system's functional components, their characteristics, performance, and interactions.
2. Identify trade-offs among various components such as CPU clock speed, cycles per instruction, memory size, etc.
3. Recognize the challenge of harnessing parallelism and concurrency in both software and in hardware.
4. Understand the design of the various functional units of digital computers.

### **UNIT - I**

#### **FUNDAMENTALS OF COMPUTER DESIGN**

Introduction-Classes of Computers-Defining Architecture-Quantitative Principles of Computer Design- Classifying Instruction set Architectures-memory addressing-Types and size of Operands-Operations in the instruction set-Instruction for control flow-encoding an instruction set.

### **UNIT - II**

#### **INSTRUCTION LEVEL PARALLELISM**

Instruction level parallelism -Data dependencies and hazards-Control Hazards-Compiler Approach-Branch Prediction-Dynamic Scheduling-Hardware based Speculation.

### **UNIT - III**

#### **MULTIPROCESSORS AND THREAD LEVEL PARALLELISM**

A Taxonomy of Parallel Architectures-Symmetric shared memory Architecture-cache coherence protocol-distributed shared memory Architecture-Directory-Based Cache Coherence Protocols-synchronization-model of memory consistency.

**UNIT - IV**  
**MEMORY HIERARCHY DESIGN**

Memory technology and optimization- virtual memory –protection and examples of virtual memory-cache performance and optimization-issues in designing memory hierarchies.

**UNIT-V**  
**STORAGE SYSTEM AND I/O**

Advanced Topics in Disk Storage-Definition and Examples of Faults and Failures-I/O Performance, Reliability Measures and Benchmarks –Designing and Evaluating the I/O System

**TEXTBOOK:**

1. John L. Hennessey and David A. Patterson, “Computer Architecture – A Quantitative Approach”, Fifth Edition, Morgan Kaufmann / Elsevier Publishers, , 2012.

**REFERENCES:**

1. Nickolas carte, “computer architecture” schaum's outline series. Fourth Reprint, Tata McGraw Hill, 2008.
2. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, “Computer Organization”, Fifth Edition, Tata McGraw Hill,2005.
3. William Stallings, “Computer Organization and Architecture – Designing for Performance”, Eighth Edition, Pearson Education,2010.
4. John P. Hayes, “Computer Architecture and Organization”, Third illustrated Edition, Tata McGraw Hill 2007.

## **B - DISTRIBUTED OPERATING SYSTEM**

3 2 0 3

(For Students admitted from 2014 onwards)

### **PREREQUISITES:**

Students are expected to know and understand the fundamentals of operating system. Students are also expected to be able to program in Unix environment.

### **AIM:**

On completing this course the students should have acquired the following capabilities:

- An appreciation of the role of an operating system.
- Become aware of the issues in the communication in distributed system

### **OBJECTIVES:**

**The objective of the course is to impart knowledge on:**

Software issues in the design and implementation of modern computer systems, particularly the operating systems and distributed algorithms that are essential in supporting networking and distributed processing.

- Fundamental concepts (transparency, service, coordination)
- Distributed processes (synchronization, communication and scheduling)
  - Concurrent processes and programming
  - Process interaction
  - Process scheduling
- Distributed resources (files and memory)
  - Distributed file systems
  - Distributed shared memory
  - Security issues in network and distributed environments

### **OUTCOMES:**

**After completion of the course the students are expected to be able to:**

- Understand the concept of distributed operating system
- Organization ,advantages and limitation of distributed operating system

### **UNIT - I**

#### **INTRODUCTION TO DISTRIBUTED SYSTEMS**

What is a Distributed system-Goals-Hardware concepts-Software concepts-Design issues

### **UNIT - II**

#### **COMMUNICATION IN DISTRIBUTED SYSTEMS**

Layered Protocols-Asynchronous Transfer Mode Networks-The Client Server Model-Remote Procedure Call-Group Communication

### **UNIT - III**

#### **SYNCHRONIZATION IN DISTRIBUTED SYSTEMS**

Clock synchronization-Mutual Exclusion-Election Algorithms-Atomic Transactions-Deadlock in Distributed Systems

**UNIT – IV**  
**PROCESSES AND PROCESSORS IN DISTRIBUTED SYSTEMS**

Threads-System models-Processor allocation-Scheduling in Distributed systems-Fault tolerance-Real time distributed systems

**UNIT – V**  
**DISTRIBUTED FILE SYSTEMS**

Distributed File System design-Distributed file system implementation-Trends in Distributed file systems

CASE STUDY: AMOEBA, MACH

**TEXT BOOKS:**

1. Andrew S.Tanenbaum,"*Distributed Operating Systems*",Pearson Education ,2007

**REFERENCE BOOKS:**

1. Abraham Silberschatz, Peter B. Galvin, G. Gagne,"*Operating System Concepts*", Sixth Edition, Addison Wesley Publishing Co., 2003.
2. Andrew S. Tanenbaum, "*Modern Operating Systems*" , Fourth Edition, Pearson Education, 2014.



## C - ARTIFICIAL INTELLIGENCE

3 1 0 3

**Prerequisite: NA**

**AIM:**

The course aims to provide some fundamentals of AI and algorithms required to produce AI systems able to exhibit limited human-like abilities, particularly in the form of problem solving by search, representing and reasoning with knowledge and planning.

**OUTCOMES:**

At the end of the course students should:

- Appreciate the distinction between the popular view of the field and the actual research results;
- Appreciate the fact that the computational complexity of most AI problems requires us regularly to deal with approximate techniques;
- Appreciate different perspectives on what the problems of artificial intelligence are and how different approaches are justified;
- Be able to design basic problem solving methods based on AI-based search, knowledge representation, reasoning with knowledge and planning.

### UNIT - I

Introduction – Foundations of AI, the History of AI – Intelligent Agent – Agent and Environment, Good Behavior: The Concept of Rationality, Nature of Environments, Structure of Agents- Problem Solving Agents -Example Problems.

### UNIT - II

Uninformed Searching strategies-Breadth First Search, Depth First search, Depth limited search, Iterative deepening search, Bidirectional Search - Avoiding repeated States - Searching with Partial information –Informed search strategies – Greedy Best First Search-A\* Search-Heuristic Functions-Local Search Algorithms for Optimization Problems-Local search in Continuous Spaces.

### UNIT - III

Online Search Agents and Unknown Environments-Online Search Problems, Online Search Agents- Online Local search, learning in Online Search – Constraint Satisfaction Problems-Backtracking CSP, The Structure of Problems-Adversarial Search-Games, Optimal Decisions in Games, Alpha-Beta Pruning.

### UNIT - IV

Logical agents – Knowledge Based Agents, The Wumpus World, Propositional Logic-A very simple Logic –First Order logic– inferences in first order logic – forward chaining – backward chaining – Unification – Resolution.

## UNIT- V

Planning with state space search – Partial-order planning – Planning graphs – Planning and acting in the real world.

### TEXT BOOK:

S. Russel and P. Norvig, "*Artificial Intelligence –A Modern Approach*", Second Edition, Pearson Education 2003.

### REFERENCES:

1. David Poole, Alan Mackworth, Randy Goebel, "*Computational Intelligence : a Logical Approach*", Oxford University Press, 2004.
2. G. Luger, "*Artificial Intelligence: Structures and Strategies for Complex Problem Solving*", Fourth Edition, Pearson Education, 2002.

## D – E - COMMERCE

3 1 0 3

### **PRE-REQUISITE:**

Basic Knowledge of Internet of Things

### **AIM:**

1. To provide valued online customers with quick delivery of high quality electronic products.
2. To employ the latest in internet e-business technology in transacting online business.

### **OBJECTIVES:**

1. To convey electronic products to customers within 24 hours.
2. Increase the life span of electronic products that the company offers.
3. To continually upgrade the company with up-to-date e-business applications

### **OUTCOME :**

**After completion of the course the students are expected to be able to:**

1. Comprehend the underlying economic mechanisms and driving forces of E-Commerce
2. Understand the critical building blocks of E-Commerce and different types of prevailing business models employed by leading industrial leaders
3. Appraise the opportunities and potential to apply and synthesize a variety of E-Commerce concepts and solutions to create business value for organizations, customers, and business partners
4. Formulate E-Commerce strategies that lever firms' core competencies, facilitate organizational transformation, and foster innovation
5. Undertake planning, organizing, and implementing of E-Commerce initiatives to effectively respond to of dynamic market environments.

### **UNIT - I**

Introduction – Electronic Commerce Framework – The Anatomy of E-Commerce Applications. The Network Infrastructure for E-Commerce, The Internet as a Network Infrastructure.

### **UNIT - II**

Electronic Payment Systems, Interorganizational Commerce and EDI, EDI Implementation, MIME and Value – added Networks.

### **UNIT - III**

Advertising and Marketing on the Internet, Computer Based Education and Training, Technological Components of Education on-Demand, Digital Copy rights and Electronic Commerce, Software Agent.

### **UNIT - IV**

The Corporate Digital Library – Dimensions of Internal Electronics Commerce Systems, Making a Business case for a document Library, Types of Digital documents, Issues behind document Infrastructure, Corporate data warehouses, Documents Active / Compound document architecture.

### **UNIT - V**

Multimedia and Digital Video – Broad band Telecommunications – Mobile and Wireless Computing Fundamentals.

**TEXT BOOK**

1. Kalakota & Whinston, "*Frontiers of Electronic Commerce*", Pearson Education, 2002.

**REFERENCES**

1. Kamalesh K. Bajaj, "*E-Commerce: The Cutting Edge & Business*", Second Edition ,Tata McGraw- Hill,2005.
2. Brenda Kennan, "*Managing your E-Commerce Business*", PHI, 2001.
3. "*Electronic Commerce from Vision to Fulfillment*", PHI, Elias M. Awad, Feb-2003.
4. "*Electronic Commerce – Framework, Technology and Application*", TMH, Bharat Bhaskar,2003.

## E - ADVANCED DATABASES

3 1 0 3

### **PREREQUISITE:**

Basic Knowledge on Database Systems.

### **AIM:**

This course will study more advanced features of databases in design and applications.

### **OBJECTIVES:**

1. To learn the design of databases.
2. To acquire knowledge on parallel and distributed databases and its applications.
3. To study the usage and applications of Object Based database
4. To understand the usage of advanced databases
5. To learn emerging databases such as XML,Spatial,Temporal and Multimedia.
6. To acquire knowledge towards research topics in databases.

### **UNIT- I DISTRIBUTED DATABASES**

Distributed Databases: Homogeneous and Heterogeneous Databases-- Distributed Data Storage – Distributed Transactions – Commit Protocols – Concurrency Control – Distributed Query Processing-Heterogeneous Distributed Databases.

### **UNIT - II PARALLEL DATABASES**

Parallel Databases: I/O Parallelism – Inter and Intra Query Parallelism – Inter and Intra operation Parallelism -- Design of Parallel Systems-Case Studies.

### **UNIT - III OBJECT-BASED DATABASES**

Object-Based Databases: Complex Data Types- Structured Types and Inheritance in SQL- Table Inheritance- Array and Multiset Types in SQL- Object-Identity and Reference Types in SQL.

### **UNIT IV XML DATABASES**

XML Databases: Structure of XML data- DTD - XML Schema - Querying and Transformation: XPath - XQuery - XML Applications.

### **UNIT V SPATIAL, TEMPORAL DATA AND MOBILITY**

Temporal Databases- Spatial Databases- Multimedia Databases- Mobility and Personal Databases.

### **TEXT BOOKS:**

1. Henry F Korth, Abraham Silberschatz, S. Sudharshan, “*Database System Concepts*”, Sixth Edition, McGraw Hill, 2011

**REFERENCES:**

1. R. Elmasri, S.B. Navathe, "*Fundamentals of Database Systems*", Fifth Edition, Pearson Education/Addison Wesley, 2007.
2. Thomas Cannolly and Carolyn Begg, "*Database Systems, A Practical Approach to Design, Implementation and Management*", Third Edition, Pearson Education, 2007

## F - MANAGEMENT INFORMATION SYSTEMS

3 1 0 3

### PRE-REQUISITES:

Students should have a basic idea of computers, Understanding the significance of broadband internet access.

### AIM:

The management information systems minor can open new career options for students, increase their market value, and improve their chances for advancement.

1. To understand MIS in both the wider managerial context and in the narrower.
2. Confines of the selection, support, design and development of computer.
3. Applications to focus on the concepts a developer needs to understand, in order to make effective use of, computerized information systems.

### OBJECTIVES:

1. Understand types of MIS applications in organizations.
2. Discuss the development of management information systems in organizations.
3. Select and design MIS systems appropriate to meet management requirements.
4. Critically evaluate MIS contributions to the strategic management of organizations

### LEARNING OUTCOMES

Upon successful completion of this subject, students will be able to:

1. Describe the use and function of management information systems.
2. Describe and evaluate information systems development processes and techniques.
3. Identify and evaluate hardware and software requirements for information systems.
4. Evaluate data management technologies.
5. Explain the security risks associated with management information systems.

### UNIT- I INTRODUCTION

Definition of MIS- Data Processing- Information Resources Management- Computing Techniques, evolution, types based on functions and hierarchy, System Analyst – Role, Functions, OR Management theory-, Subsystems of MIS, DBQL, Tools , Systems Strategies- Communication ,On line, Distributed systems With FEP, LAN , WAN Features.

### UNIT- II LOGICAL DATA CONCEPTS & SYSTEMS ANALYSIS AND DESIGN

Introduction and importance of Logical Data Concepts-,Comparison between Sequencing of data and Logical data -Types of Files and File Organization-Database Organization Transaction Processing-Control and retrieval techniques, Processing tools in Multimedia-Message Systems-,Scope of Systems analysis and design – Similarities of MIS Tools With DBMS, RDBMS, OODBMS.

**UNIT - III**  
**DECISION MAKING PROCESS & INFORMATION SYSTEMS**

Definition and Criteria for DMP, Various types of decision Making models- Incremental Decision Making – Optimization Techniques under Certainty – Pay off Matrices – Tree based Decision – Games Theory – Support for Decision Making Phases- Financial, Marketing and International Information Systems – KMS.

**UNIT IV**  
**MEASUREMENT OF INFORMATION SYSTEM DESIGN WITH SUB SYSTEMS CONCEPTS**

Definition of Information – Redundancy – Sending and Receiving efficiency – Metrics of Information Systems, Types of Sub systems and its Usage – Decoupling Of information Systems- Pervasive Computing.

**UNIT V**  
**PLANNING MODELS AND NEW IT INITIATIVES**

Hierarchy of Planning- Models- Computational Support for Planning – Choice, Design and Intelligence phases, Planning Software Systems, e- business, e-governance, ERP, e-CRM, Business Intelligence, Pervasive Computing- CMM.

**TEXT BOOKS**

Gordon B. Davis And Maggrethe H.Olson , *Management Information Systems*, 21<sup>st</sup> Reprint, Mc Graw Hill Edition ,2008

**REFERENCES**

1. Robert Schultheis and Mary Summer, *Management Information Systems – The Managers View*, Tata McGraw Hill, 2008.
2. Kenneth C. Laudon and Jane Price Laudon, *Management Information Systems*, 12, illustrated Edition, Prentice Hall PTR, 2011.



## **G - SOFTWARE QUALITY ASSURANCE**

**3 1 0 3**

### **PRE-REQUISITE:**

Basic Knowledge of sound engineering principles

### **AIM:**

The systematic Approach to the understand of software quality assurance

### **OBJECTIVES:**

1. To present the concepts, techniques and metrics for quality assurance in software development
2. To develop a good understanding of issues, techniques and tools for software quality assurance metrics
3. To enable students to gain a working knowledge of techniques for software quality standardization

### **OUTCOMES:**

1. Understand quality management processes
2. Distinguish between the various activities of quality assurance, quality planning and quality control.
3. Understand the importance of standards in the quality management process and their impact on the final product. students to develop skills that will enable them to evaluate software of high quality

### **UNIT - I**

#### **FUNDAMENTALS OF SOFTWARE QUALITY ASSURANCE**

The Role of SQA – SQA Plan – SQA considerations – SQA people – Quality Management – Software Configuration Management

### **UNIT - II**

#### **MANAGING SOFTWARE QUALITY**

Managing Software Organizations – Managing Software Quality – Defect Prevention – Software Quality Assurance Management

### **UNIT - III**

#### **SOFTWARE QUALITY ASSURANCE METRICS**

Software Quality – Total Quality Management (TQM) – Quality Metrics – Software Quality Metrics Analysis

### **UNIT - IV**

#### **SOFTWARE QUALITY PROGRAM**

Software Quality Program Concepts – Establishment of a Software Quality Program – Software Quality Assurance Planning – An Overview – Purpose & Scope.

**UNIT- V**  
**SOFTWARE QUALITY ASSURANCE STANDARDIZATION**

Software Standards–,ISO 9000 Quality System Standards - Capability Maturity Model and the Role of SQA in Software Development Maturity – SEI CMM level 5-review of current software quality trend- IEEE 730-2014.

**TEXT BOOKS:**

1. Mordechai Ben-Menachem / Garry S Marliss, "*Software Quality*", Vikas Publishing House, Pvt, Ltd., New Delhi.1998.(UNIT III to V)
2. Watts S Humphrey, "*Managing the Software Process*", Pearson Education Inc.1999. (UNIT I and II)

**REFERENCES:**

1. Gordon G Schulmeyer, "*Handbook of Software Quality Assurance*", Fourth Edition, Artech House Publishers,2008.
2. Nina S Godbole, "*Software Quality Assurance: Principles and Practice*", Alpha Science International, Ltd, 2004.

## H - SOFT COMPUTING

3 1 0 3

### PRE-REQUISITE :

Basic knowledge In Set Theory .

### AIM :

To impart knowledge of Soft Computing Paradigms.

### OBJECTIVE :

1. To introduce Soft Computing Techniques.
2. To gain knowledge in Fuzzy Inference Systems and Models
3. To study the characteristics of various types of neural networks.
4. To gain insight in Hybrid Learning Models .

### OUTCOME :

Appreciate and adopt various soft computing paradigms for the solution of several Real World Problems.

### UNIT- I SOFT COMPUTING TECHNIQUES

Introduction to Neuro – Fuzzy and Soft Computing – Fuzzy Sets – Basic Definition and Terminology – Set-theoretic Operations – Member Function Formulation and Parameterization – Genetic Algorithms – Simulated Annealing – Random Search – Downhill Simplex Search.

### UNIT- II FUZZY INFERENCE SYSTEMS AND MODELS

Fuzzy Rules and Fuzzy Reasoning – Extension Principle and Fuzzy Relations – Fuzzy If-Then Rules - Fuzzy Reasoning – Fuzzy Inference Systems – Mamdani Fuzzy Models – Sugeno Fuzzy Models – Tsukamoto Fuzzy Models – Input Space Partitioning and Fuzzy Modeling.

### UNIT- III NEURAL NETWORKS

Supervised Learning Neural Networks – Perceptrons - Adaline – Backpropagation Mutilayer Perceptrons – Radial Basis Function Networks – Unsupervised Learning Neural Networks – Competitive Learning Networks – Kohonen Self-Organizing Networks – Learning Vector Quantization – Hebbian Learning.

### UNIT - IV NEURO FUZZY MODELING

Adaptive Neuro-Fuzzy Inference Systems – Architecture – Hybrid Learning Algorithm – Learning Methods that Cross-fertilize ANFIS and RBFN – Coactive Neuro Fuzzy Modeling – Framework Neuron Functions for Adaptive Networks – Neuro Fuzzy Spectrum.

### UNIT - V APPLICATIONS OF COMPUTATIONAL INTELLIGENCE

Printed Character Recognition – Inverse Kinematics Problems – Automobile Fuel Efficiency Prediction – Soft Computing for Color Recipe Prediction.

**TEXT BOOK**

J.S.R.Jang, C.T.Sun and E.Mizutani, "*Neuro-Fuzzy and Soft Computing*", Pearson Education 2004.

**REFERENCES**

1. Timothy J.Ross, "*Fuzzy Logic with Engineering Applications*", Third Edition, Wiley India Pvt. Limited, 2011.
2. Davis E.Goldberg, "*Genetic Algorithms: Search, Optimization and Machine Learning*", Fourth Edition, Pearson Education India, 2006
3. S. Rajasekaran and G.A.V.Pai, "*Neural Networks, Fuzzy Logic and Genetic Algorithms*", Fifteenth Reprint, PHI, 2003.
4. R.Eberhart, P.Simpson and R.Dobbins, "*Computational Intelligence - PC Tools*", AP Professional 1996.

## I -BIG DATA ANALYTICS

3 1 0 3

### PRE-REQUISITE

Basic Knowledge on Data bases, Data mining and Data Structures

### AIM

To Understand Advanced Data Analytics Techniques and Tools by experimenting on Real Time Data Analytic Applications.

### OBJECTIVES:

The main objective of this course

1. To understand Big Data models and structure
2. Introduction to Analytic Tool –R
3. Mining Data streams for Analytics
4. Understanding Map Reduce Framework
5. Advanced Analytic Tools and Techniques

### OUTCOMES :

After Completion of the Course Students expected to be able to:

1. Strong Foundations on Data Analytics Models and structure
2. Understanding the Role of Big Data and its importance
3. Data modeling and Link stream Analysis
4. Able to setup Analytical Environment using R-Studio
5. Able to perform simple analysis application and programs using R –Scripts.

### UNIT - I

#### INTRODUCTION TO ANALYTIC TOOL -R

Using R for Initial Analysis of the Data -Introduction to R programming, initial exploration - analysis of the data using R - basic visualization using R –Basic Scripting-Data Set Analysis

### UNIT-II

#### OVERVIEW OF DATA ANALYTICS

Introduction to Big Data Analytics -definition -overview of big data - Characteristics-Importance of Big Data - data preparation -model planning,-Use-cases-critical activities in each phase of the lifecycle.

### UNIT -III

#### MINING DATA STREAMS

The Stream Data Model .-Sampling Data in a Stream -Filtering Streams - Counting Distinct Elements in a Stream -Estimating Moments .- Counting Ones in a Window

**Link Analysis** : PageRank -Topic-Sensitive PageRank -Link Spam -Hubs and Authorities

**UNIT -IV**  
**MAPREDUCE AND THE NEW SOFTWARE STACK**

Distributed File Systems-MapReduce . Algorithms Using MapReduce-Extensions to MapReduce-The Communication Cost Model-Complexity Theory for MapReduce.

**UNIT -V**  
**BIG DATA FROM THE TECHNOLOGY PERSPECTIVE**

Introduction to Hadoop –Components of Hadoop –Application Development in Hadoop –Pig-Hive-Jaql. Getting Data in Hadoop-copy Data-Flume,Other Hadoop Components-ZooKeeper-HBase-Oozie.

**TEXT BOOK**

1. Jure Leskovec ,Anand Rajaraman, Jeffrey D.Ullman, “Mining of Massive Datasets” ,Second Edition, Cambridge University Press, 2014.
2. Paul Zikopoulos, “Understanding Big Data”, First Edition, McGraw Hill Corporations-2012.

**REFERENCES**

1. Garrett Golemund,” Introduction to Data Science with R “,O'Reilly media,2014.
2. Garrett Golemund,”Hands-On Programming with R: Write Your Own Functions and Simulations Paperback”, O'Reilly media,2014.

## J - PROFESSIONAL ETHICS AND CYBER LAWS

3 1 0 3

**PREREQUISITES:** NA

**AIM:**

To gain knowledge in Cyber and Professional Ethics.

**OBJECTIVES:**

**The main objective of this course**

1. Describe Professional & Philosophical Ethics
2. Describe the process of Securing Intellectual Property
3. Enable Students on how to Recover the Evidence and Investigation
4. Demonstrate on how to secure own presence online
5. Describe Cyber Law provision related to all type cyber crimes

**OUTCOMES:**

**At the end of the course the student will be able to**

1. Make defensible decision making based on Professional & Philosophical Ethics
2. Develop process to File an IPR Application
3. Investigate and Recover Cyber Evidence
4. Implement Cyber Security
5. Suggest legal action to be taken against the cyber crimes

### **UNIT-I COMPUTER AND PHILOSOPHICAL ETHICS**

Moral v/s Ethics, Why Computer Ethics, Philosophical Ethics: Distinguishing Descriptive and Normative Claims, Ethical Relativism, Utilitarianism, Deontological Theories, Rights, Virtue Ethics- Introduction to intellectual property Protections via Trade Secrets, Trademarks, Patents, Etc. Contracting to protect intellectual property, Protection options - Encryption / PGP, copyright on web-content, Copyright on software, digital contracts, digital signatures.

### **UNIT-II INTERNET ETHICS**

Three Morally Significant Characteristics, Hacking & Hacker Ethics, Netiquette Intellectual property issues in cyberspace - Introduction to Deleted File Recovery, Formatted Partition Recovery, Data Recovery Tools, Data Recovery Procedures and Ethics, Preserve and safely handle original media, Document a "Chain of Custody", Complete time line analysis of computer files based on file creation, file modification and file access, Recover Internet Usage Data, Recover Swap Files/Temporary Files/Cache Files

### **UNIT-III EVIDENCE RECOVERY**

Introduction to Encase Forensic Edition, Forensic Tool Kit (FTK) etc, Use computer forensics software tools to cross validate findings in computer evidence-related cases- Introduction to

Cyber Forensic Investigation, Investigation Tools, eDiscovery, Digital Evidence Collection, Evidence Preservation, E-Mail Investigation, E-Mail Tracking, IP Tracking, E-Mail Recovery, Encryption and Decryption methods, Search and Seizure of Computers, Recovering deleted evidences, Password Cracking.

#### **UNIT-IV CYBER SECURITY**

Introduction to Cyber Security, Implementing Hardware Based Security, Software Based Firewalls, Security Standards, Assessing Threat Levels, Types of incidents, Stages of incident response Threats in cyberspace, Blended attacks, , incident prevention and detection, Forming an Incident Response Team, Reporting Cyber crime, Operating System Attacks, Application Attacks, Reverse Engineering & Cracking Techniques and Financial Frauds.

#### **UNIT-V INFORMATION TECHNOLOGY ACT 2000**

Scope, jurisdiction, offense and contraventions, powers of police, adjudication

#### **TEXT BOOKS**

1. *Computers, Ethics, And Social Values*, Johnson and Nissenbaum, Prentice Hall-2011.
2. *Cyber security operations Handbook*, John Rittinghouse, William Hancock-2012.

#### **REFERENCE BOOK**

1. *Computer ethics*, Deborah G. Johnson, third edition, Pearson education-2011.



## **K - VIRTUAL REALITY**

**3 1 0 3**

**(For Students admitted from 2014 onwards)**

### **UNIT- I**

#### **INTRODUCTION TO VIRTUAL REALITY**

Virtual Reality & Virtual Environment : Introduction – Computer graphics – Real time computer graphics –Virtual environments –requirement – benefits of virtual reality- Historical development of VR : Introduction – Scientific Landmark -3D Computer Graphics :Introduction – The Virtual world space – positioning the virtual observer – the perspective projection – human vision – stereo perspective projection – 3D clipping – Colour theory – Simple 3D modeling – Illumination models – Reflection models – Shading algorithms

### **UNIT - II**

#### **GEOMETRIC MODELLING**

Geometric Modeling: Introduction – From 2D to 3D – 3D space curves – 3D boundary representation - Geometrical Transformations: Introduction – Frames of reference – Modeling transformations – Instances –Picking – Flying – Scaling the VE – Collision detection - A Generic VR system: Introduction – The virtual environment – the Computer environment – VR Technology – Model of interaction – VR Systems.

### **UNIT- III**

#### **VIRTUAL ENVIRONMENT**

Animating the Virtual Environment: Introduction – The dynamics of numbers – Linear and Non-linear interpolation - The animation of objects – linear and nonlinear translation - shape & object inbetweening – free from deformation – particle system- Physical Simulation : Introduction – Objects falling in a gravitational field – Rotating wheels – Elastic collisions – projectiles – simple pendulum

### **UNIT- IV**

#### **VR HARDWARES & SOFTWARES**

VR Hardware : Introduction – sensor hardware – Head-coupled displays –Acoustic hardware – Integrated VR systems-VR Software: Introduction –Modeling virtual world - VR toolkits – Introduction to VRML. Creating Shapes –Geometric transformation.

### **UNIT- V**

#### **VR APPLICATION**

Virtual Reality Applications: Introduction – Engineering – Entertainment-Education- The Future: Introduction – Virtual environments – modes of interaction. Case study on Oculus Rift- Head mounted display .

#### **TEXT BOOK**

1. John Vince, “*Virtual Reality Systems*“, First Edition, Pearson Education Asia, 2007.

## REFERENCES

1. Adams, "*Visualizations of Virtual Reality*", Tata McGraw Hill, 2000.
2. Grigore C. Burdea, Philippe Coiffet , "*Virtual Reality Technology*", Wiley Interscience, 2nd Edition, 2006.
3. William R. Sherman, Alan B. Craig, "*Understanding Virtual Reality: Interface, Application, and Design*", Morgan Kaufmann, 2008.
4. [www.vresources.org](http://www.vresources.org).
5. [www.vrac.iastate.edu](http://www.vrac.iastate.edu).
6. [www.w3.org/MarkUp/VRML](http://www.w3.org/MarkUp/VRML).

## L - PARALLEL PROGRAMMING WITH CUDA C

3 1 0 3

(For Students admitted from 2014 onwards)

### PRE-REQUISITE:

Comfortable programming in C, knowledge of data structures & algorithms and computer architecture.

### AIM:

This subject aims to help students to understand the power and limitations of parallel and systems and to understand the beneficial and challenging aspects of parallelism.

### OBJECTIVES:

With the growing number of cores on a chip, programming them efficiently has become an indispensable knowledge for the future. Parallel Programming is a hands-on course involving significant parallel programming on compute-clusters, multi-core CPUs and massive-core GPUs

### OUTCOME:

**After successfully completing this course a student should be able to**

1. Design, implement, test and debug a parallel application program using CUDA C
2. Parallelize an existing application using an appropriate parallel programming paradigm

### UNIT - I HISTORY OF GPU COMPUTING

Introduction -GPUs as Parallel Computers-Architecture of a Modern GPU -Parallel Programming Languages and Models -Evolution of Graphics Pipelines -Evolution of Programmable Real-Time Graphics -Unified Graphics and Computing Processors -GPGPU: An Intermediate Step -GPU Computing -Scalable GPUs -Recent Developments. -Future Trends.

### UNIT - II INTRODUCTION TO CUDA & CUDA THREADS

Data Parallelism -CUDA Program Structure -Device Memories and Data – Transfer Kernel Functions and Threading -CUDA Thread Organization -Using blockIdx and threadIdx - Synchronization and Transparent Scalability -Thread Assignment -Thread Scheduling and Latency Tolerance.

### UNIT - III CUDA MEMORIES & PERFORMANCE CONSIDERATIONS

Importance of Memory Access Efficiency-CUDA Device Memory Types -A Strategy for Reducing Global Memory Traffic -Memory as a Limiting Factor to Parallelism -More on Thread Execution - Global Memory Bandwidth -Dynamic Partitioning of SM Resources-Data Prefetching - Instruction Mix -Thread Granularity and Measured Performance.

**UNIT - IV**  
**PARALLEL PROGRAMMING AND COMPUTATIONAL THINKING**

Goals of Parallel Programming -Problem Decomposition -Algorithm Selection Computational Thinking -Floating point considerations -Application CASE studies.

**UNIT - V**  
**INTRODUCTION TO CUDA LIBRARIES**

CUDA API -cuFFT – Fast Fourier Transforms Library, cuBLAS – Complete BLAS Library, cuSPARSE – Sparse Matrix Library, cuRAND – Random Number Generation (RNG) Library , NPP – Performance Primitives for Image & Video Processing, Thrust – Templated C++ Parallel Algorithms & Data Structures, math.h -C99 floating-point Library.

**TEXT BOOK**

1. David B. Kirk, Wen-mei W. Hwu." Programming Massively Parallel Processors: A Hands-on Approach", first edition Morgan Kaufmann, 2010.
2. <http://docs.nvidia.com/cuda/index.html>

**REFERENCE**

1. <https://developer.nvidia.com/udacity-cs344-intro-parallel-programming>

## M - ENTERPRISE RESOURCE PLANNING

3 1 0 3

(For Students admitted from 2014 onwards)

### PRE-REQUISITE:

Basic Knowledge of Enterprise applications and activities.

### AIM:

Enterprise Resource Planning (ERP) a group of integrated software modules used to run virtually all business processes in an organization. The course explains and demonstrates how business processes such as sales logistics, production/material management, procurement, and human resources are supported in an ERP software package.

### OBJECTIVES:

**This subject provides students with**

1. The basic concepts of ERP systems for manufacturing or service companies, and the differences among MRP, MRP II, and ERP systems;
2. Thinking in ERP systems: the principles of ERP systems, their major components, and the relationships among these components;
3. In-depth knowledge of major ERP components, including material requirements planning, master production scheduling, and capacity requirements planning;
4. Knowledge of typical ERP systems, and the advantages and limitations of implementing such systems.

### OUTCOME:

**Upon completion of the subject, students will be able to**

1. Examine systematically the planning mechanisms in an enterprise, and identify all components in an ERP system and the relationships among the components;
2. Understand production planning in an ERP system, and systematically develop plans for an enterprise;
3. Use methods to determine the correct purchasing quantity and right time to buy an item, and apply these methods to material management;
4. Understand the difficulties of a manufacturing execution system, select a suitable performance measure for different objectives, and apply priority rules to shop floor control.

### UNIT - I

#### ERP AND TECHNOLOGY

Introduction – Related Technologies – Business Intelligence – E-Commerce and E-Business – Business Process Reengineering – Data Warehousing – Data Mining – OLAP – Product life Cycle management – SCM – CRM.

### UNIT - II

#### ERP IMPLEMENTATION

Implementation Challenges – Strategies – Life Cycle – Pre-implementation Tasks – Requirements Definition – Methodologies – Package selection – Project Teams – Process Definitions – Vendors and Consultants – Data Migration – Project management – Post Implementation Activities.

### **UNIT - III**

#### **ERP IN ACTION & BUSINESS MODULES**

Operation and Maintenance – Performance – Maximizing the ERP System – Business Modules – Finance – Manufacturing – Human Resources– Materials Management – Quality management – Marketing – Sales, Distribution and service.

### **UNIT - IV ERP MARKET**

Marketplace – Dynamics – SAP AG – Oracle – PeopleSoft – JD Edwards – QAD Inc – SSA Global – Lawson Software –Intuitive.

### **UNIT-V ERP APPLICATION**

Enterprise Application Integration – ERP and E-Business – Total quality Management – Future Directions – Trends in ERP.

#### **TEXT BOOK:**

*Erp Demystified* by Alexis Leon, Second edition, twelfth reprint – 2012.

#### **REFERENCE BOOK:**

1. Enterprise resource Planning “*A Managerial Perspective*” by D.P Goyal, First edition- 2011.
2. *Enterprise resource planning* by Dr.Milind M.Oka, Latest edition – 2010.

## N - SOCIAL NETWORK ANALYSIS AND MINING

3 2 0 3

(For Students admitted from 2014 onwards)

### PRE-REQUISITE :

Aware about social network

### AIM :

To Get through Knowledge in social network & Mining

### OBJECTIVE :

**The Objective of this Course is to impart knowledge on :**

1. Understand the concept of semantic web and related applications.
2. Learn knowledge representation using ontology.
3. Understand human behavior in social web and related communities
4. Learn visualization of social networks

### OUTCOMES:

**After completion of the course the students are expected to be able to:**

1. Develop semantic web related applications.
2. Represent knowledge using ontology.
3. Predict human behavior in social web and related communities.
4. Visualize social networks

### UNIT- I

Introduction to Semantic Web: Limitations of current Web - Development of Semantic Web - Emergence of the Social Web - Social Network analysis: Development of Social Network Analysis - Key concepts and measures in network analysis - Electronic sources for network analysis: Electronic discussion networks, Blogs and online communities - Web-based networks - Applications of Social Network Analysis.

### UNIT - II

Ontology and their role in the Semantic Web: Ontology-based knowledge Representation - Ontology languages for the Semantic Web: Resource Description Framework - Web Ontology Language - Modeling and aggregating social network data: State-of-the-art in network data representation - Ontological representation of social individuals - Ontological representation of social relationships - Aggregating and reasoning with social network data - Advanced representations.

### UNIT- III

Extracting evolution of Web Community from a Series of Web Archive - Detecting communities in social networks - Definition of community - Evaluating communities - Methods for community detection and mining - Applications of community mining algorithms - Tools for detecting communities social network infrastructures and communities - Decentralized online social networks - Multi-Relational characterization of dynamic social network communities.

#### **UNIT- IV**

Understanding and predicting human behavior for social communities - User data management - Inference and Distribution - Enabling new human experiences - Reality mining - Context - Awareness - Privacy in online social networks - Trust in online environment - Trust models based on subjective logic - Trust network analysis - Trust transitivity analysis - Combining trust and reputation - Trust derivation based on trust comparisons -

#### **UNIT- V**

Graph theory - Centrality - Clustering - Node-Edge Diagrams - Matrix representation - Visualizing online social networks, Visualizing social networks with matrix-based representations - Matrix and Node-Link Diagrams - Hybrid representations - Applications - Cover networks - Community welfare - Collaboration networks - Co-Citation networks.

#### **TEXT BOOKS**

1. Peter Mika, "Social networks and the Semantic Web", Springer, First edition 2007.
2. Borko Furht, "Handbook of Social Network Technologies and Applications", Springer, 1st edition, 2010.

#### **REFERENCE**

1. Guandong Xu , Yanchun Zhang and Lin Li, "Web Mining and Social
2. Networking – Techniques and applications", Springer, First edition, 2011.
3. Dion Goh and Schubert Foo, "Social information retrieval systems: emerging technologies and applications for searching the Web effectively", IGI Global snippet, 2008.
4. Max Chevalier, Christine Julien and Chantal Soulé-Dupuy, "Collaborative and social information retrieval and access: techniques for improved user modelling", IGI Global snippet, 2009.
5. John G. Breslin, Alexandre Passant and Stefan Decker, "The Social Semantic Web", Springer, 2009.



## O - CLOUD COMPUTING

3 1 0 3

### **PRE-REQUISITE:**

Basic Knowledge on Computer, Network and Storage concepts

### **AIM:**

To Understand Advanced Cloud Computing Concepts at infrastructure level and Adoption of Cloud computing to the business needs.

### **OBJECTIVES:**

#### **The main objective of this course**

1. To understand Cloud Computing models and Services
2. Data Center Operations and component analysis
3. Virtualization – Compute, storage and Network
4. Study on Security and Fault Tolerance approaches
5. Migration towards Cloud Computing

### **OUTCOMES :**

#### **After Completion of the Course Students expected to be able to:**

1. Strong Foundations on Cloud Computing Model and services
2. Understanding the Role of Data Center in Cloud environment
3. Virtualization concepts on compute, storage and network
4. Security and Backup solutions for cloud based services
5. Able to take decision in the process of cloud adoption

### **UNIT-I**

#### **CLOUD COMPUTING PRIMER**

Cloud computing characteristics, cloud definition -cloud deployment models – private, public, hybrid and community cloud, cloud services – SaaS, PaaS, and IaaS, Drivers for cloud computing, building cloud infrastructure – a phased approach- virtualization and its benefits- cloud economics and challenges.

### **UNIT-II**

#### **CLASSIC DATA CENTER (CDC)**

Key elements of data center - application, DBMS, compute, storage and network, server clustering, RAID technology, intelligent storage system, DAS, FC-SAN – components, port type, addressing, and zoning, IP-SAN – iSCSI and FCIP, converged network - FCoE, NAS, object based and unified storage, business continuity terminologies, backup-recovery and deduplication, local and remote replication, CDC monitoring and management, Information lifecycle strategy.

### **UNIT-III**

#### **VIRTUALIZED DATA CENTER (VDC)**

**Compute:** Compute virtualization benefits, hypervisor types, virtual machine (VM) -resources, VM resource management, physical to virtual conversion – process, benefits.

**Storage:** Storage virtualization benefits, storage for VMs, block and file level storage virtualization, virtual provisioning – benefits and best practices, storage tiering.

**Networking:** Network virtualization benefits, VDC network infrastructure components, VLANs, and Network traffic management techniques.

#### **UNIT-IV VIRTUALIZED DATA CENTER – DESKTOP AND APPLICATION**

Desktop, application, and user state virtualization – benefits, tools, and deployment methods.

**Business Continuity in VDC:-**Eliminating single points of failure, clustering, fault tolerance, and NIC teaming, backup and replication in VDC, VM templates and VM migration.

**Cloud Security:-**Basic information security concepts, cloud security concerns and threats, security mechanisms in cloud at compute, storage, and network layer, Governance, Risk and compliance in Cloud.

#### **UNIT-V CLOUD INFRASTRUCTURE AND MANAGEMENT**

Cloud infrastructure framework -components, infrastructure management and service creation tools- processes – asset - configuration management, service catalog management, financial management, capacity, performance availability management, incident, problem and compliance management.

**Cloud Migration Considerations:-**Considerations for choosing right application and cloud model, service provider specific considerations, cloud adoption phases, Financial and technical feasibility assessment, migration and optimization considerations.

#### **TEXT BOOK:**

1. Cloud Infrastructure and Services Student Guide - EMC Education Services- 2011.

#### **REFERENCE**

1. EMC IT's Journey to the Private Cloud: A Practitioner's Guide -2011
2. EMC IT'S "ON-RAMP" TO THE JOURNEY TO THE PRIVATE CLOUD Replat form to an Open, Scalable Infrastructure-2011
3. EMC IT's Journey to the Private Cloud: Applications & Cloud Experience.
4. EMC IT's Journey to the Private Cloud: Server virtualization.
5. EMC IT's Journey to the Private Cloud: Backup & Recovery Systems.
6. EMC IT's Journey to the Private Cloud: Virtual Desktop-2011. (Incl.Ref.no: 3,4,5,6)

## **P - PARALLEL PROGRAMMING**

### **PRE-REQUISITES:**

Fundamentals of Computing, Data Structures and Algorithms, Computer Organization, Operating Systems and Compiler Design

### **AIM:**

This subject aims to help students to understand the power and limitations of parallel and systems and to understand the challenging aspects of parallelism.

### **OBJECTIVES:**

It is an introduction to parallel programming, how to parallelize programs, and how to use basic tools like MPI and GPU programming.

### **OUTCOME:**

**After successfully completing this course a student should be able to**

1. Describe generic issues (shared variable programming. Mutual exclusion, condition synchronization Locks, barriers semaphores and monitors) which must be addressed by any parallel programming system.
2. Apply their practical experience with MPI and Pthreads to write clean, adaptable and scalable parallel programs for simple applications.
3. Compare the approaches proposed by a range of more speculative programming mode.

### **UNIT- I INTRODUCTION**

Why parallel computing; Ubiquity of parallel hardware/multi-cores; Processes and threads; Programming models: shared memory and message passing; Speedup and efficiency; Amdahls Law.

### **UNIT-II INTRODUCTION TO PARALLEL HARDWARE**

Multi-cores and multiprocessors; shared memory and message passing architectures; cache hierarchy and coherence; sequential consistency.

### **UNIT-III INTRODUCTION TO PARALLEL SOFTWARE**

Steps involved in developing a parallel program; Dependence analysis; Domain decomposition; Task assignment: static and dynamic; Performance issues: 4C cache misses, inherent and artifactual communication, false sharing, computation-to-communication ratio as a guiding metric for decomposition, hot spots and staggered communication.

**UNIT- IV**  
**SHARED MEMORY PARALLEL PROGRAMMING**

Synchronization: Locks and barriers; Hardware primitives for efficient lock implementation; Lock algorithms; Relaxed consistency models; High-level language memory models (such Java and/or C++); Memory fences. Developing parallel programs with UNIX fork model: IPC with shared memory and message passing; UNIX semaphore and its all-or-none semantic.. Developing parallel programs with POSIX thread library: Thread creation; Thread join; Mutex; Condition variables. Developing parallel programs with OpenMP directives: Parallel for; Parallel section; Static, dynamic, guided, and runtime scheduling; Critical sections and atomic operations; Barriers; Reduction

**UNIT- V**  
**MESSAGE PASSING PROGRAMMING**

Distributed memory model; Introduction to message passing interface (MPI); Synchronization as Send/Recv pair; Synchronous and asynchronous Send/Recv; Collective communication: Reduce, Broadcast, Data distribution, Scatter, Gather; MPI derived data types.; Introduction to GPU programming.

**TEXT BOOK**

1. Peter S Pacheco, *An Introduction to Parallel Programming*, Morgan Kaufmann, 2011.
2. DB Kirk and W-m W Hwu. *Programming Massively Parallel Processors*, Morgan Kaufmann, 2010.

**REFERENCE BOOK**

1. M Herlihy and N Shavit, *The Art of Multiprocessor Programming* Morgan Kaufmann, Revised First edition, Elsevier 2012.
2. JL Hennessy and DA Patterson, *Computer Architecture: A Quantitative Approach*, 4th Ed., Morgan Kaufmann/Els India, 2006.
3. A Grama, A Gupta, G Karypis, and V Kumar, *Introduction to Parallel Computing*. 2nd Ed., Addison-Wesley, 2003.
4. MJ Quinn, *Parallel Computing: Theory and Practice*, Tata McGraw Hill, 2002.

## **Q - SOFTWARE DEFINED NETWORKS**

### **PRE-REQUISITE:**

Computer Networks

### **AIM:**

To introduce the students to the need for Software-Defined Networks and Open Flow, current standards, tools and technologies for implementation

### **OUTCOME:**

Students who complete the course will develop an understanding of

1. Software-Defined Networks – Architecture and Implementation
2. Open Flow – Implementation
3. Developing SDN applications
4. Data Centre requirements and how SDN can be used in the Data Centre.

### **UNIT - I**

#### **INTRODUCTION**

Traditional Switch Architecture, Autonomous and Dynamic Forwarding Tables, Need for SDN, Evolution of Switches and Control Planes, Data Center Needs, Evolution of Networking Technology, Network Virtualization

### **UNIT - II**

#### **SDN & OPEN FLOW**

Characteristics of SDN, SDN Operation, Devices, Controller, Applications, Open Flow – Overview, Basics, Versions and evolution, Alternative definitions of SDN – via APIs , Hypervisor-based overlays, Network Function Virtualization

### **UNIT - III**

#### **SDN IN DATA CENTRE**

Tunneling Technologies, Path Technologies, Ethernet Fabrics in Data Centre, SDN Use Cases in Data Centre, OpenSDN Vs Overlays, Implementations, Introduction to SDN in other environments

### **UNIT - IV**

#### **SDN ENVIRONMENT & APPLICATIONS**

Introduction to SDN Applications, Implementing OpenFlow Switch, Open Flow Controllers, Network Application Development

### **UNIT - IV**

#### **SDN IMPLEMENTATION**

Network Slicing, Open Flow in Cloud Computing , SDN Application Implementation

**TEXT BOOKS**

1. *Software Defined Networks: A Comprehensive Approach*, Paul Goransson and Chuck Black, 2014 [Units 1 -3]
2. *Software Defined Networking with OpenFlow* , Siamak Azodolmolky, 2013 [Units 4-5]

**REFERENCE BOOKS**

1. *SDN: Software Defined Networks* -2013 by Ken Gray
2. *Introduction to Software Defined Networking: Openflow & VxLAN* , 2013 by Vishal Shukla