

**Sri Chandrasekharendra Saraswathi Viswa  
Mahavidyalaya**

[University]

Enathur, Kanchipuram - 631 561.



**B.E. COMPUTER SCIENCE &  
ENGINEERING**

**SYLLABUS - 2012 ONWARDS**



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

Each course is normally assigned one credit per lecture per week and one credit for two periods of tutorials or part thereof for laboratory or practical 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 40. For Semester III to VII the average credits per semester will be 29 and for semester VIII credits will be 28. For the award of the degree a student has to earn a minimum of 212 credits.

### **DURATION OF THE PROGRAMME**

A student is normally expected to complete BE(CS) programme in four years but 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.

Every other student 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 is as follows.

Continuous Internal Assessment comprising of tests, Assignments, Seminars, Group projects and attendance	:	60 Marks
Final Examination	:	40 Marks

The break-up of the assessment and examination marks for practical is as follows.

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

The project work will be assessed for 60 marks by a committee consisting of the guide and a minimum of two members nominated by the head of the department. The head of the department may himself be a member or the chairman. 40 marks are allotted for the project work and viva voce examination at the end of the semester.

## **WITHDRAWAL FROM A COURSE**

A student can withdraw from a 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 of the faculty 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 programme within the maximum period of seven years.

## **MOVEMENT TO HIGHER SEMESTERS**

The following minimum credits must be earned by the student to move to a higher semester

To move to the fifth semester : 45 credits

## **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 examination, may take a substitute assessment for any one of the missed assessments. The substitute assessment must be completed before the date of the fourth meeting of the respective class committees.

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 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 courses to the corresponding letter grade as follows, compute the grade point average and 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.

A student who obtains letter grade I or W in a course has to re-register for and repeat the 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

Course with grades I and W are not considered for calculation of grade point average or cumulative grade point average. F Grade will be considered for computing GPA and CGPA.

A student can apply for retotalling of one or more of his 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 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 programme, the degree will be awarded with the following classification based on CGPA.

For First Class with Distinction the student must earn a minimum of 212 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 212 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 212 credits within seven years from the time of admission.

### **ELECTIVES**

Apart from the various core courses offered in the curriculum of the branch of specialisation, a student can choose a minimum of six 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.

**COURSE CONTENT  
&  
SCHEME  
OF  
EXAMINATION**

**SCSVMV (University)**

**B.E., Computer Science and Engg., Credit Based System**

Subject Code	Subject (III SEMESTER)	Ins./Week in Hours			C (Units)
		L	T	P	
MAUFT1231	Applied Mathematics for Computers I	3	2	0	4
MAUFT1232	Applied Discrete Mathematics	3	2	0	4
EBC3BT123	Digital Electronics	3	2	0	4
EBC3BT124	Analog Electronics	3	2	0	4
EBC3AT125	Data Structures	3	0	0	3
EBC3AT126	Object Oriented Programming using C++	3	2	0	4
EBU3JT057	Sanskrit and Indian Culture – III	2	0	0	1
EBC3AP121	OOPS Lab	0	0	4	2
EBC3AP122	Data Structure Lab	0	0	2	1
EBC3BP123	Digital Electronics Lab	0	0	2	1
EBC3BP124	Analog Electronics Lab	0	0	2	1
	<b>Total</b>				<b>29</b>

**L – Lecture**  
**E – External**

**T – Tutorial**  
**C- Credits**

**P – Practical**

**I - Internal**

**SCSVMV (University)**

**B.E., Computer Science and Engg., Credit Based System**

Subject Code	Subject (IV SEMESTER)	Ins. / Week in Hours			C (Units)
		L	T	P	
MAUFT1241	Applied Mathematics for Computers II	3	2	0	4
EBC4BT122	Analog and digital Communications	3	2	0	4
EBC4AT123	Design and Analysis of Algorithm	3	2	0	4
EBC4AT124	Operating systems	3	0	0	3
EBC4AT125	Computer Architecture	3	2	0	4
EBC4BT126	Microprocessor And Microcontroller	3	2	0	4
EBU4JT057	Sanskrit and Indian Culture IV	2	0	0	1
EBC4AP121	Algorithms Lab	0	0	4	2
EBC4AP122	Operating system Lab	0	0	2	1
EBC4BP123	Microprocessor/ Microcontroller & Assembly Language Programming Lab	0	0	4	2
	<b>Total</b>				<b>29</b>

**L – Lecture**  
**E – External**

**T – Tutorial**  
**C- Credits**

**P – Practical**

**I - Internal**

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

Subject Code	Subject (V SEMESTER)	Ins./week in hours			C (Units)
		L	T	P	
EBC5AT121	System software	3	2	0	4
EBC5AT122	Java Programming	3	2	0	4
EBC5AT123	Database Management System	3	2	0	4
EBC5AT124	Computer Graphics and Multimedia	3	0	0	3
EBC5AT125	Software Engineering	3	2	0	4
EBC5ET126	Elective I	3	2	0	4
EBU5JT057	Sanskrit and Indian Culture V	2	0	0	1
EBC5AP121	Computer Graphics and Multimedia Lab	0	0	2	1
EBC5AP122	Java Programming Lab	0	0	4	2
EBC5AP123	DBMS Lab	0	0	4	2
<b>Total</b>					<b>29</b>

**L – Lecture**  
**E –External**

**T – Tutorial**  
**C- Credits**

**P – Practical**

**I - Internal**

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

Subject Code	Subject (VI SEMESTER)	Ins./ Week in hours			C (Units )
		L	T	P	
MAUFT1261	Automata theory and Applications	3	2	0	4
EBC6AT122	DOT NET Technologies	3	2	0	4
EBC6AT123	Computer Networks	3	2	0	4
EBC6AT124	Data Warehousing & Data Mining	3	0	0	3
EBC6AT125	Mobile Computing	3	2	0	4
EBC6AE126	Elective – II	3	2	0	4
EBU6JT057	Sanskrit and Indian Culture Vi	2	0	0	1
EBC6AP121	Network Lab	0	0	4	2
EBC6AP122	DOT NET Lab	0	0	4	2
EBC6AP123	Data Warehousing and Data Mining Lab	0	0	2	1
<b>Total</b>					<b>29</b>

**L – Lecture**  
**E –External**

**T – Tutorial**  
**C- Credits**

**P – Practical**

**I - Internal**

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

Subject Code	Subject (VII SEMESTER)	Ins./week in hours			C (units)
		L	T	P	
EBC7AT121	Principles of Compiler Design	3	2	0	4
EBC7AT122	Object Oriented System Analysis and Design	3	2	0	4
EBC7AT123	Distributed Computing	3	0	0	3
EBC7AT124	Embedded Systems	3	0	2	4
EBC7AE125	Elective III	3	2	0	4
EBC7AE126	Elective IV	3	2	0	4
EBC7AP121	SDL using CASE Tools	0	0	4	3
EBC7AP122	Web Technology Lab	2	0	4	3
	<b>Total</b>				<b>29</b>

**L – Lecture**  
**E –External**

**T – Tutorial**  
**C- Credits**

**P – Practical**

**I - Internal**

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

Subject Code	Subject (VIII SEMESTER)	Ins./weeks in hours			C (units)
		L	T	P	
EBC8AT121	Principles of Management and Ethics	3	0	0	3
EBC8AE122	Elective – V	3	2	0	4
EBC8AE123	Elective – VI	3	2	0	4
EBC8AP121	Project Work	0	0	32	16
	<b>Total</b>				<b>27</b>

**L – Lecture**  
**E –External**

**T – Tutorial**  
**C- Credits**

**P – Practical**

**I - Internal**

**SYLLABUS FOR SANSKRIT & INDIAN CULTURE**

Year	Semester	Sub.code	Paper	Subject	Period	Credits	
II	Third	C039T027	2	Mahabharata Eloquence (45 Slokas)	15	1 P.W	
		C039T027	2	And Elements of Indian Culture & Science and Technology	15	1 (2P.W)	
	Fourth	C049T027	3	Hitopadesha (Selected Stories)	15	1 P.W	
		C049T027	3	And Elements of Indian Culture & Science and Technology	15	1 (2P.W)	
	III	Fifth	C059T027	4	Raghuvamsa (II Canto 45 Slokas)	15	1 P.W
			C059T027	4	And Elements of Indian Culture & Science and Technology	15	1 (2P.W)
Sixth		C639T027	5	Introduction in to Sanskrit Literature (Selected topics)	15	1 P.W	
		C639T027	5	And Elements of Indian Culture & Science and Technology	15	1 (2P.W)	

## Examination Pattern for Sanskrit & Indian Culture paper

(Students who have admitted during academic year 2002 onwards & common for all branches)

There will not be any external examination for Sanskrit and Indian Culture paper to B.E. courses but performance of students will be assessed through tests and assignments conducted by the same department. The internal assessment pattern is follows.

	Indian Culture	Sanskrit
First Test	20 Marks	20 Marks
Second Test	20 Marks	20 Marks
Assignment	10 Marks	10 Marks
Total	50 Marks	50 Marks

Total marks for Sanskrit and Indian Culture - 100 Marks

Passing Minimum marks - Aggregate 50%

A candidate shall be declared to have passed the examination he/she should have secure a minimum marks of 50% in each part (Sanskrit & Indian Culture) with the aggregate of 50%

# **III SEMESTER**

**UNIT I  
(INTERPOLATION AND NUMERICAL INTEGRATION)**

Interpolation 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: Newton Cotes quadrature formula, Trapezoidal rule - Simpson’s one-third rule - Simpson’s three-eighth rule – Boole’s rule – Weddles rule – Outline of applications of interpolation and numerical integration in engineering.

**UNIT II  
(NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS)**

Picard’s method – Taylor series method - Euler’s method – Modified Euler’s method – Runge’s method – Runge-Kutta method – Predictor-corrector methods: Milne’s method, Adams Bashforth method – Outline of applications of numerical solutions of ordinary differential equations in engineering.

**UNIT III  
(LAPLACE TRANSFORMS AND APPLICATIONS)**

Transforms of elementary functions :  $1, t^n, e^{at}, \sin at, \cos at, \sinh at, \cosh at$  - Properties of Laplace transforms: Linearity Property, First shifting property, Change of scale property – Transforms of periodic functions, Bessel function and error function - Transforms of derivatives - Transforms of integrals - Multiplication by  $t^n$  - Division by  $t$  - Evaluation of integrals by Laplace transform - Inverse transforms: Method of partial fractions – Other methods of finding inverse - Convolution theorem (Without proof) - Simultaneous differential equations with constant coefficients – Unit step function – Unit impulse function - Application to differential equations – Outline of applications of Laplace transforms in engineering.

**UNIT IV  
(FOURIER TRANSFORMS AND APPLICATIONS)**

Fourier integral theorem (without proof) - Fourier Sine and Cosine integrals – Complex form of Fourier integral - Fourier integral representation of a function - Fourier transform – Fourier sine and Cosine transforms – Properties of Fourier Transforms: Linear property, Change of scale property, Shifting property, Modulation theorem - Convolution theorem for Fourier Transforms (without proof) - Parseval’s identity for Fourier transforms (without proof) – Application of transforms to boundary value problems: Heat conduction, Vibrations of a string, Transmission lines,

**UNIT V  
(Z – TRANSFORM AND APPLICATIONS)**

Standard z-transforms of  $1, a^n, n^p$  – Linearity property – Damping rule – Shifting rules – Multiplication by  $n$  - Initial and final value theorems (without proof) – inverse z –transforms – Convolution theorem (without proof) – Convergence of z-transforms – Two sided z-transform – Evaluation of inverse z-transforms: Power series method, Partial fraction method, inversion integral method – Application to difference equations – Outline of applications of z-transform in engineering

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

### **PRESCRIBED TEXT BOOK:**

Grewal B.S, Higher Engineering Mathematics, 41st Edition, Khanna Publishers, New Delhi, 2011.

### **REFERENCES**

1. Alan Jeffrey, Advanced Engineering Mathematics, Academic Press
2. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons
3. Gerald C.F and Wheatley P.O, Applied Numerical Analysis, Addison-Wesley Publishing Company
4. James J.F, A students guide to Fourier Transforms, Cambridge
5. John Bird, Engineering Mathematics Pocket Book, Newness
6. Michael D.Greenberg, Advanced Engineering Mathematics, Prentice Hall
7. Murrey R.Spiegel, Laplace Transforms, Schaum's Outlines, McGraw Hill
8. Peter Lancaster, Salkauskas, Transform methods in applied mathematics, Wiley
9. Peter V.O'Neil, Advanced Engineering Mathematics, Thomson
10. Stroud, K.A, Advanced Engineering Mathematics, Palgrave MacMillen
11. Zarowski, C.J, An introduction to numerical analysis for electrical and computer engineers, Wiley

MAUFT1232 – APPLIED DISCRETE MATHEMATICS  
**(B.E THIRD SEMESTER – COMPUTER SCIENCE ENGINEERING)**  
(For students admitted from 2012-13)

3      2      0      4

**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 – Extremal 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.

**PRESCRIBED TEXT BOOK**

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

**REFERENCES**

1. Kenneth H. Rosen, Discrete Mathematics and its Applications, Tata McGraw Hill
2. Susanna S. Epp, Discrete Mathematics with applications, Brookes/Cole Publishing Company
3. J.P.Trembley, R.Monahor, Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw Hill, New Delhi
4. S. Lipschutz, M. Lipson, Discrete Mathematics, Schaum's Outline Series, Tata Mc Graw Hill  
Stephen A. Wiitala, Discrete mathematics - A Unified Approach, McGraw Hill Company

**UNIT I****NUMBER SYSTEM & BOOLEAN ALGEBRA**

Review of number system: types and conversion codes. Basic theorems and properties of Boolean algebra, Boolean functions, canonical and standard forms. Simplification of Boolean functions using K-maps & tabulation method.

**UNIT II****COMBINATIONAL CIRCUITS**

Digital logic gates-Design procedure – Adders-Subtractor, code converters Parallel adder/Subtractor- Carry look ahead adder-BCD adder,Magnitude Comparator- encoder / decoder-Multiplexer/ Demultiplexer. Boolean function implementation using logic gates and MUX.

**UNIT III****SYNCHRONOUS SEQUENTIAL CIRCUITS**

Flip flops - SR, D, JK and T. Triggering of flip flops; Analysis of synchronous sequential circuits; State reduction and State assignment; Flipflop excitation tables. Design of synchronous sequential circuits- Counters.

**UNIT IV****ASYNCHRONOUS SEQUENTIAL CIRCUIT**

Fundamental and pulse mode asynchronous sequential machines ;Analysis of asynchronous sequential machines; State assignment, Asynchronous design problem.

**UNIT V**

PROGRAMMABLE LOGIC DEVICES, MEMORY AND LOGIC FAMILIES Memories: ROM, PROM & EPROM; Programmable logic devices: PLA, PAL, Xilinx FPGA, digital logic families: TTL, ECL, CMOS.

**TEXT BOOKS**

1. M. Morris Mano, 'Digital Logic and Computer Design', Prentice Hall of India, Eastern Economy edition 2008 (1-3 units)
2. John M. Yarbrough, 'Digital Logic, Application & Design', Thomson, 2002. (4-5 units)

**REFERENCE BOOKS**

1. Charles H. Roth, 'Fundamentals Logic Design', Jaico Publishing, IV edition, 2002.
2. Floyd, 'Digital Fundamentals', 8<sup>th</sup> edition, Pearson Education, 2003.
3. Donald P. Leach and Albert Paul Malvino, 'Digital Principles and Applications', 5 ed., Tata McGraw Hill Publishing Company Limited, New Delhi, 2003.
4. Donald D. Givone, 'Digital Principles and Design', Tata Mc-Graw-Hill Publishing company limited, New Delhi, 2003.

**UNIT – I**

Semi Conductor Diodes: 'p' type and 'n' type semi conductors – Junction Diode, Current – Voltage Characteristics, Diode Applications – Half wave rectifier, Full wave rectifier, Bridge Rectifier, Diode Limiting and clamping circuits, Voltage Doubler, Zener Diode, Characteristics and Application. Varactor Diode.

**UNIT – II**

Bipolar Junction Transistor: Construction, operation, characteristics and parameters of BJT – Cut Off, Active, and Saturation operation Amplifier – CE, CC and CB configurations. DC load line – Biasing Circuits – Base Bias, Emitter Bias, Voltage Divider Bias.

**UNIT – III**

Junction Field Effect Transistors & Thyristors: Construction, characteristics, biasing. JFET MOSFET, Depletion and Enhancement Mode FET Construction. UJT, SCR, TRIAC .

**UNIT – IV**

Operational amplifier and Applications: Basic Op-amp applications, Op-amp circuits using diodes, sample and hold circuits, log and anti log amplifier, multiplier and divider differentiator, integrator, electronic analog computation

**UNIT – V**

Comparators & waveform generators comparator-re generative comparator(Schmitt trigger), square wave generator(Astable multi vibrator), monostable multi vibrator, triangular wave generator, basic principle sine wave oscillators, series op-amp regulators, 723 general purpose regulator

**TEXT BOOK:**

1. G.K Mitthal Electronic Devices and Circuits. Khanna Publications.
2. Floyd , Electronic Devices, Pearson Education.
3. Rai Chowdry and Jain, linear integrated circuits, 1999, Wiley eastern (UNIT IV , V )

**REFERENCE BOOK:**

1. Ben. G. Streetman: Solid state electronic devices, Prentice Hall of India, 1986.
2. Electronic Circuits – Millman Halkias.
3. Electronics Devices and Circuits by BOGART. USB publications.

## EBC3AT125 DATA STRUCTURES

3 0 0 3

### UNIT I

#### Introduction to Data structures and Linked list

Definitions of Data Structure and Algorithm - Arrays - Structures, Unions, Pointers – Introduction to Linked list-Single, Double and Circular linked lists

### UNIT II

#### Linear Data Structure

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 Structure

Trees-Binary trees-Representation -node representation ,array representation –Basic search and Traversal Techniques – BFS,DFS, Pre order , Post order ,In order –Application of tree and Binary Tree – General expression as trees- Introduction to AVL Trees- B-Trees.

### UNIT IV

#### Sorting

Bubble sort-Radix sort-Binary Tree sort- Heap sort- Insertion sort -Shell sort-Bucket sort- Address calculation sort.

### UNIT V

#### Searching

Searching – sequential searching –Efficiency of sequential searching, Searching an ordered table, Indexed Sequential Search, Binary search, Interpolation search. Hashing – Resolving Hash clashes by open addressing, Coalesced Hashing, Separate Chaining, Linear hashing

#### TEXT BOOKS:

1. Seymour Lipschutz – “Theory and Problems of Data Structures”.(AVL Trees,B-Trees), Tata mcgraw Hill, Edition 2006 20<sup>th</sup> Reprint 2011
2. Ellis Horowitz & Sartaj Sahani – “Fundamentals of Data Structures in C ” – W.H. Freeman and Co., 2<sup>nd</sup> Edition, 2007
3. Jean Paul Tremblay & Paul Sorenson – “An Introduction to Data Structures with Applications” – TMH., 2<sup>nd</sup> Edition, 15<sup>th</sup> Reprint 1999 (Address calculation sort)

#### REFERENCE BOOKS

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

## EBC3AT126 OBJECT ORIENTED PROGRAMMING USING C++

3 2 0 4

### UNIT – I

Need for object oriented programming, Characteristics of object oriented language -objects, classes, Inheritance, Reusability, creating new data types, Polymorphism and overloading. C++ programming basics – Data types, Manipulators- Type conversion- Arithmetic operators- Loops and decisions- Class and objects: A simple class, C++ Objects as physical Objects, C++ Objects as Data Types.

### UNIT – II

Constructors, destructors, member functions defined outside the class, The copy constructor, overloaded constructors, Default Constructor ,Parameterized Constructors, Function Overloading, Constructor with Dynamic Allocation , inline functions, Passing objects as function arguments, Returning objects from Functions

### UNIT – III

Arrays : Defining & accessing Array elements, arrays as class member data, array of Objects - Pointers to Objects – Referring to Members, another approach to new, An array of pointers to Objects -Memory management – new and delete operator, a string class using new. Friend Functions – Friend Classes, Static data member and Static Functions ,this pointer.

### UNIT – IV

Operator Overloading : Overloading Unary Operators, Operator Arguments, Return Values, nameless Temporary objects, postfix notations - Overloading Binary Operators - Arithmetic operators, Concatenating Strings, Multiple overloading- Comparison operators, Arithmetic Assignment Operators. Templates- function templates, class template.

### UNIT –V

Inheritance-Derived class and base class, derived class constructors, overriding member functions, Class Hierarchies, Public and private inheritance, Levels of inheritance, Multiple inheritance - Abstract base class, Abstract Classes. Virtual Functions – Pure virtual functions, Virtual base class.

#### TEXT BOOKS:

1. Robert Lafore,Galgotia, Object Oriented Programming (in Microsoft C++) - Publication Pvt Ltd. Reprint 2008
2. Yaswant Kanitkar, Let us C++ - (used for templates) ,BPB Publication, 2<sup>nd</sup> Edition 2002

#### REFERENCE BOOKS :

1. Object Oriented Programming in C++ - E. Balaguruswamy, Tata Mcgraw Hill.
2. Teach yourself C++ - Herbertschildt, OSBORNE/MH
3. B. Stroustrup, “The C++ Programming Language”, Pearson Education.
4. Herbert Schildt, “C++: The Complete Reference”, TMH

## **EBU3JT057 - SANSKRIT & INDIAN CULTURE**

### **UNIT I**

Mahabharata Eloquence 1 to 9 verses

### **UNIT II**

Mahabharata Eloquence 10 to 18 verses

### **UNIT III**

Mahabharata Eloquence 19 to 27 verses

### **UNIT IV**

Mahabharata Eloquence 28 to 36 verses

### **UNIT V**

Mahabharata Eloquence 37 to 45 verses

## **CO39T027-INDIAN CULTURE - II**

### **PART I**

Unit I – importance of smritis & sutras ; significance of Manu's smritis & grihya sutran;  
Unit II – Samskaras or Sacraments – definition & significance; Sixteen important Samskaras in due course of human life special reference to the Hindu. Four Ashrama Dharmas.  
Unit III – Worship & Festivals – Worship – Personal and public worships; sixteen different kinds of poojas; tantra and mudras in pooja; significance and different types of Yajnas, utensils and requirements. important sacred places and cultural centres; significance of festivals and impact on culture.

### **PART II**

Unit IV – Importance and significance of Upavedas.  
Unit V – Special reference to Ayurveda and Arthasastra.

### **REFERENCE BOOKS**

Acharya, D. 1999. Dharnurveda (sub-Veda of Yajurveda). Hindi. Vijaya Kumar Govindram Harsanand. Delhi.  
Kangle, R.P. 1992 (rp). The Kautilya Arthasastra. Delhi.  
Rao, S.K.R. 1994. Nityarchana. Agama-kosha (Agam Encyclopaedia). Kalpatharu Research Academy Publications. Vol X. Bangalore.  
Ray, P. (tr). 1997. Vasistha's Dhanurveda Samhita. J.J. Publishing House. Delhi.  
Shalini, K. 1997. Vedic Leguminous Plants (Medical and Microbiological Study). Classical Publishing Company. New Delhi.

## EBC3AP121 OOPS LAB

0 0 4 2

1. Illustrate class & objects
2. To demonstrate the concept of function overloading applied to the member functions.
3. To demonstrate the use of overloaded constructor and destructor.
4. To demonstrate the use of this pointer and inline functions
5. Implement passing object as function arguments and return object from function
6. Illustrate the use of array of objects
7. Illustrate the memory management operator
8. To enter the records of n number of students and then display them using nested structure.
9. Illustrate the use of friend class and friend function
10. Illustrate the use of static data member and static member function
11. To Implement the use of unary operator overloading
12. To implement the use of Binary operator overloading
13. To implement the assignment and comparison of two strings using binary operator overloading
14. To implement the use of single private and public inheritance
15. To implement the use of multiple inheritance
16. To implement the use of multilevel inheritance
17. To implement the use of Hierarchical inheritance
18. To implement the Pure Virtual Function
19. To implement the use of class template
20. To implement the use of function template

## EBC3AP122 DATA STRUCTURES LAB

0 0 2 1

1. Implementation of Stack
2. Implementation of Queue
3. Convert an Infix expression to postfix.
4. Evaluate the given postfix expression.
5. Implementation of Linked List.
6. Implementation of Doubly linked list.
7. Perform Traversals on a Binary Tree.
8. Sort the Given Numbers using.
  - i) Bubble sort
  - ii) Selection Sort.
9. Sort the given Elements using Heap Sort.
10. Implement BFS and DFS algorithms

## EBC3BP123 DIGITAL ELETRONICS LAB

0 0 2 1

1. Adder/Subtractor
2. Multiplexer/Demultiplexer
3. Encoder/Decoder
4. Study of flip flops – RS/JK/T/D
5. Asynchronous Counter
6. Synchronous counter
7. Shift register – Right/ Left/Serial/Parallel
8. Code Converters – Binary to Gray, BCD to Excess 3
9. Seven segment display systems (with Counters & Decoders)
10. Design of combinational and sequential circuits using PLAs and PALs.

1. Characteristics Of Diodes(Pn Junction Diode And Zener Diode)
2. Input and output Characteristics of BIT.
3. Characteristics of JFET.
4. Characteristics of UJT and SCR.
5. Study of CRO.
6. Diode Applications-Clipper, Clamper And Rectifier.
7. Opamp Applications-Amplifier, Integrator And Differentiator.
8. Comparator /Schmitt Trigger Using Ic 741
9. Zener And Series Opamp Regulator
10. Rc Phase Shift Oscilator /Wein Bridge Oscillator

# **IV SEMESTER**

**MAUFT1241 – APPLIED MATHEMATICS FOR COMPUTERS II**  
**(B.E FOURTH SEMESTER –COMPUTER SCIENCE ENGINEERING)**  
**(For students admitted from 2012-13)**

3      2      0      4

**UNIT I**  
**(FOURIER SERIES)**

Euler's Formulae – Condition for Fourier expansion – Functions having points of discontinuity – Change of interval – Expansions of even and odd functions - Half-Range series – Parseval's formula (without proof) – Root mean square value (without proof) – Typical waveforms: Square wave form, Saw toothed waveform, Modified saw toothed waveform, Triangular waveform, Half wave rectifier, Full wave rectifier – Outline of applications of Fourier series in engineering

**UNIT II**  
**(PARTIAL DIFFERENTIAL EQUATIONS)**

Formation of partial differential equations – Solution of a partial differential equation – Equations solvable by direct integration – Linear equations of first order – Non linear equations of the first order – Charpit's method - Homogeneous linear equations with constant coefficients –Rules for finding complementary functions – Rules for finding particular integral – Solution of homogeneous linear equation of any order – Non-homogeneous linear equations – Non linear equations of the second order: Monge's method.

**UNIT III**  
**(NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS)**

Classification of second order equations – Finite difference approximation to derivatives – Elliptic equations: Laplace Equation, Poisson's equation – Solution of Laplace's equation – Solution of Poisson's equation – Parabolic equations: Heat equation – Solution of heat equation – Hyperbolic equations: Wave equation – Solution of wave equation – Outline of applications of numerical solution of partial differential equations in engineering.

**UNIT IV**  
**(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 – V**  
**(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 – Hypergeometric distribution – Normal distribution: Properties and constants of Normal distribution – Fitting a normal curve – Outline of applications of theoretical distributions in engineering

### **PRESCRIBED TEXT BOOKS:**

1. Grewal B.S, Higher Engineering Mathematics, 41st Edition, Khanna Publishers, New Delhi, 2011.
2. Gupta S.P, Statistical Methods, 28<sup>th</sup> Edition, Sultan Chand and Sons., New Delhi, 1997.

### **REFERENCES**

1. Alan Jeffrey, Advanced Engineering Mathematics, Academic Press
2. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons
3. Gerald C.F and Wheatley P.O, Applied Numerical Analysis, Addison-Wesley Publishing Company
4. James J.F, A students guide to Fourier Transforms, Cambridge
5. John Bird, Engineering Mathematics Pocket Book, Newness
6. Michael D.Greenberg, Advanced Engineering Mathematics, Prentice Hall
7. Montgomery Douglas C. and. Runger George C, Applied Statistics and Probability for Engineers, John Wiley & Sons, Inc,
8. Murrey R.Spiegel, Laplace Transforms, Schaum's Outlines, McGraw Hill
9. Peter Lancaster, Salkauskas, Transform methods in applied mathematics, Wiley
10. Peter V.O'Neil, Advanced Engineering Mathematics, Thomson
11. Richard Isaac, The Pleasures of Probability, Springer Verlag, 1995.
12. Snedecor George W. Cochran William G, Statistical Methods, Affiliated East West Pres
13. Spiegel Murry R., Stephens Larry J. Statistics, (Schaum's Outline Series), McGraw Hill Company
14. Stroud, K.A, Advanced Engineering Mathematics, Palgrave MacMillen
15. Zarowski, C.J, An introduction to numerical analysis for electrical and computer engineers, Wiley

**UNIT I FUNDAMENTALS OF ANALOG COMMUNICATION**

Principles of amplitude modulation, AM envelope, frequency spectrum and bandwidth, modulation index and percent modulation, AM Voltage distribution, AM power distribution, Angle modulation - FM and PM waveforms, phase deviation and modulation index, frequency deviation and percent modulation, Frequency analysis of angle modulated waves. Bandwidth requirements for Angle modulated waves.

**UNIT II DIGITAL COMMUNICATION**

Introduction, Shannon limit for information capacity, digital amplitude modulation, frequency shift keying, FSK bit rate and baud, FSK transmitter, BW consideration of FSK, FSK receiver, phase shift keying – binary phase shift keying – QPSK, Quadrature Amplitude modulation, bandwidth efficiency, carrier recovery – squaring loop, Costas loop, DPSK.

**UNIT III DIGITAL TRANSMISSION**

Introduction, Pulse modulation, PCM – PCM sampling, sampling rate, signal to quantization noise rate, companding – analog and digital – percentage error, delta modulation, adaptive delta modulation, differential pulse code modulation, pulse transmission – Intersymbol interference, eye patterns.

**UNIT IV DATA COMMUNICATIONS**

Introduction, History of Data communications, Standards Organizations for data communication, data communication circuits, data communication codes, Error control, Error Detection, Error correction, Data communication Hardware, serial and parallel interfaces, data modems, Asynchronous modem, Synchronous modem, low-speed modem, medium and high speed modem, modem control.

**UNIT V SPREAD SPECTRUM AND MULTIPLE ACCESS TECHNIQUES**

Introduction, Pseudo-noise sequence, DS spread spectrum with coherent binary PSK, processing gain, FH spread spectrum, multiple access techniques – wireless communication, TDMA and CDMA in wireless communication systems, source coding of speech for wireless communications.

**TEXT BOOKS**

1. Wayne Tomasi, "Electronic Communication Systems: Fundamentals Through Advanced", Pearson Education, 2001. (UNIT I - IV Chapters- 3,4,6,7,12,13,15).
2. Simon Haykin, "Communication Systems", 4<sup>th</sup> Edition, John Wiley & Sons., 2001. (Unit V Chapters- 7,8).

**REFERENCES**

1. H.Taub,D L Schilling ,G Saha ,"Principles of Communication"3/e,2007.
2. B.P.Lathi,"Modern Analog And Digital Communication systems", 3/e, Oxford UniversityPress, 2007.
3. Blake, "Electronic Communication Systems", Thomson Delmar Publications, 2002
4. Martin S.Roden, "Analog and Digital Communication System", 3<sup>rd</sup> Edition, PHI,2002
5. B.Sklar,"Digital Communication Fundamentals and Applications"2/e Pearson Education 2007.

## EBC4AT123 DESIGN AND ANALYSIS OF ALGORITHMS

3 2 0 4

### 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

### UNIT II

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

### UNIT III

The Greedy Method : General method, Optimal storage on tapes, Knapsack problem, Job sequencing with deadlines, Optimal merge patterns, Minimum spanning trees, Single source shortest paths.

### UNIT IV

Dynamic programming: General method, Multistage graphs, All pairs shortest paths, Optimal binary search trees, O/I Knapsack, Travelling salesperson problem.

### UNIT V

Back Tracking: General method, 8-Queens problem, Sum of subsets, Graph coloring, Hamiltonian cycles - NP hard and NP complete Problems-Basic Concepts-Non deterministic Algorithms- The classes NP hard and NP Complete-definitions and examples.

Note : Topics involved in analysis related theorems are not included in the syllabus

### TEXT BOOKS

1. Anany Levitin, “Introduction to the Design and Analysis of Algorithm”, Pearson Education Asia, 2<sup>nd</sup> Edition 2006 (Unit I).
2. Ellis Horowitz, Sartaj Sahani, Sanguthevar Rajasekaran – “Fundamentals of Computer Algorithms ” – W.H. Freeman and Co. 1996

## **EBC4AT124 OPERATING SYSTEMS**

**3 0 0 3**

### **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 Greg Gagne, “Operating System Concepts”, Sixth Edition, John Wiley & Sons (ASIA) Pvt. Ltd, 2003.

### **REFERENCES**

1. Harvey M. Deitel, “Operating Systems”, Second Edition, Pearson Education Pvt. Ltd, 2002.
2. Andrew S. Tanenbaum, “Modern Operating Systems”, Prentice Hall of India Pvt. Ltd, 2003.
3. William Stallings, “Operating System”, Prentice Hall of India, 4<sup>th</sup> Edition, 2003.
4. Pramod Chandra P. Bhatt – “An Introduction to Operating Systems, Concepts and Practice”, PHI, 2003

**UNIT - I**

**Basic Computer Organisation:** Instruction Codes - Computer registers - Computer Instructions-timing and Control-Instruction Cycle-Memory Reference instructions-Input/Output Instructions -Complete computer Description.

**UNIT - II**

**Central Processing Unit:** Introduction – General Register Organization-Stack Organization-Instruction formats-Addressing modes-Data Transfer and manipulation - Program Control.

**UNIT - III**

**Computer Arithmetic:** Addition and Subtraction – Multiplication Algorithm – Division Algorithm – Floating Point Arithmetic operations – Decimal Arithmetic Unit – Decimal Arithmetic Operations.

**UNIT - IV**

**Pipeline and Vector Processing:** Parallel Processing-Pipelining-Arithmetic Pipeline-Instruction Pipeline-RISC Pipeline-Vector Processing-Array Processors.

**UNIT-V**

**Input / Output and Memory Organization:** Input/output Interface-Asynchronous Data Transfer-Priority Interrupt-Direct Memory Access -Memory Hierarchy-Main memory-Auxiliary memory-Cache memory-Virtual memory-Memory Protection.

Total periods: 75

**TEXT BOOK**

1. M.Morris Mono, Computer System Architecture. Prentice Hall of India (Pvt) Ltd, New Delhi. Third Edition 1994.

## EBC4BT126 MICROPROCESSOR AND MICROCONTROLLER

3 2 0 4

### UNIT – I

**8085 Microprocessor:** Introduction, Microprocessor architecture and its operation, memory, I/O devices, 8085 microprocessor – pin diagram, Core architecture. Microprocessor communication and Bus Timings, Multiplexing and Demultiplexing of Address Bus, Decoding and Execution, Instruction set – Classification, Instruction Format, Addressing Modes, Simple Assembly Language Programs, 8085 Interrupt Process, Hardware and Software Interrupts.

### UNIT – II

**Peripheral Support Chips:** PPI (8255), Timer (8253), PIC (8259), PCI (8251), Keyboard Display Interface IC (8279). **Interfacing applications:** ADC / DAC Interface, Stepper Motor Interface, DMA Controller Interface

### UNIT – III

**8086 Microprocessor:** Introduction, 8086 Microprocessor – Pin diagram, and Signal Description, Core Architecture. Memory Segmentation, Minimum mode Operation and Maximum Mode Operation, Interrupt and Interrupt Service Routine. Instruction Set – Classification. Instruction Format Addressing modes, Simple Assembly Language Programs

### UNIT – IV

**Advanced microprocessors:** salient features of 80286 – internal architecture, real addressing mode, PVAM. Features of 80386 internal architecture, real addressing mode, protected mode segmentation and paging. Features of 80486 – internal architecture, features of Pentium – system architecture

### UNIT – V

**Microcontroller:** architecture of 8051-signals-operational features-memory and i/o addressing – interrupt-instruction sets-applications.

#### **TEXT BOOKS:**

R.S.Gaonkar – Penram - Microprocessor Architecture, Programming and applications international publications Fourth Edition Unit I & II

B.Ram, Fundamentals of Microprocessors and Microcomputers, Dhanpat Rai Publications Unit II

A.K RAY & K.M. Bhurchandi, Advanced Microprocessor and Peripherals– Tata Mc Graw Hill Pub. Unit III, IV

M.Raffiqzaman., Microprocessor Theory and Application Unit IV

Mohamedali Mazidi ,jaince Gillispie mazidi,” the 8051 microcontroller and embedded systems”,pearson education 2004. UnitV

**EBU4JT057 - SANSKRIT & INDIAN CULTURE**

**UNIT I**

1.Hitopadesha Introduction 2.prologue 3.Important verses

A.**kao|qa-: pu~oNa** B.**gauINagaNa** C.**]Vmaona**

**UNIT II**

Mitralabha - acquisition of friends

1.Fable I (Old tiger and traveler ) 2.Fable II (Cat and Vulture)

3.Important Slokas A.**maÉsqalyaama\** B.**sa ih gagana**

**C.tavad\Bayasya**

**UNIT III**

Suhridbheda - separation of friends

1.Fable 7 (Pair of crows) 2.Fable 9 (pair of Tittibhas)

3.Important Slokas A.**]payaona** B.**A=\gaai=\gaBaava**

**c.du:Kmaa%maa**

**Unit IV**

Vigraha - War

1.Fable 3 (Rabbits and elephants) 2. Fable 7 (Jackal) 3.Important Slokas

A.**spRSannaip** B.**Aa%mapxama\** C.**ya: svaBaavaao**

**Unit V**

Sandhi -Peace

1.Fable 6 (Crane and crab) 2.Fable 10 (Camel)

3.Important Slokas A.**]pk~a-irNaa** B.**%yajao%xauQaata-** C.**na**

**BaUp`danama\**

## **EBU4JT057-INDIAN CULTURE**

### **Part I**

**Unit I** – Religion and different philosophical Schools - evolution of religious thoughts and ritual practices; astica and nastica sets; Jaina & Buddhist philosophy;

**Unit II – Bhakti Movement** – evolution of trimurti tradition and Bhakti movement; Shankara, Ramanuja, Madhwa, Vellabha, Bhaskara, etc. personalities and their contribution in Indian philosophy; Alwars, Nayanmars, Kabir, Tulasi, Meera, Goswami, etc. and their role in Bhakti movement;

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

### **Part II**

**Unit IV** – Significance of Yoga in daily life.

**Unit V** – Vedic Mathematics, Astrology & Astronomy, Jyotism, etc. early Indian works and its importance in day to day life.

### **REFERENCE BOOKS**

Datta, B. & A.N. Singh. 1962(rp). *History of Hindu Mathematics*. 2 Vols. Asian Publishing House. Bombay.

Jagadguru Swami Sri Bharati Krishna Tirthaji Maharaj. 1994 *Vedic Mathematics*. Motilal Banarasidas. New Delhi.

Kulkarni, R.P. 1983. *Geometry according to Sulba Sutra*. Samsodhana Mandal. Pune.

Radhakrishna, S. 1993(rp). *Indian Philosophy*. Vol I & II. Oxford University Press. Delhi.

Rao, J. 1960. *Principles and Practices of Medical Astrology*. Raman Publications. Banglore.

Swami Satyananda Saraswati. 1997 (rp). *Asanas Pranayama Mudra Bandha*. Bihar Yoga Bharati. Bihar.

1. Write a program that implements tower of Hanoi.
2. Write a program that implements Fibonacci series.
3. Write a program that implements insertion sort.
4. Write a program that implements Selection sort.
5. Write a program that implements Binary search.
6. Write a program that implements knapsack using greedy method.
7. Write a program to find the minimum and maximum value using divide and conquer.
8. Write a program that implements N-Queen Problem
9. Write a program that implements travelling sales person problem.
10. Write a program that implements All pair Shortest path.
11. Implement Quick sort
12. Implement Merge sort

## EBC4AP122 OPERATING SYSTEMS LABORATORY

0 0 2 1

1. Basic UNIX commands.
2. Shell Programming.
3. Illustration of Grep, sed, awk .
4. File system related system calls.
5. Process management – Fork, Exec.
6. Implement CPU Scheduling using
  - (i) FIFOs.
  - (ii) Round Robin.
7. Process synchronization using semaphores (Solutions to synchronization problems like producer consumer problem, dining philosophers' problem etc...)
8. Bankers Algorithm.

**EBC4BP123 MICROPROCESSOR/ MICROCONTROLLER & ASSEMBLY LANGUAGE  
PROGRAMMING LAB**

0      0      4      2

**ASSEMBLY LANGUAGE PROGRAMS USING INTEL 8085 MICROPROCESSOR/8051  
MICROCONTROLLER**

- 1) Study of 8085/8086 Microprocessor trainer kits
- 2) Addition/ Subtraction/Division/Multiplication – 8 Bit Hex/BCD Number
- 3) Addition/ Subtraction/Division/Multiplication – 16 Bit
- 4) Search/ Sort an array of data Largest/Smallest , Ascending /Descending order
- 5) Evaluation of function & series  
(Square/square root of a number & Sum of series / Fibonacci series)
- 6) Code conversions between Hexa decimal – ASCII Code & Hexadecimal – BCD Number

**ASSEMBLY LANGUAGE PROGRAMS USING INTEL 8086 MICROPROCESSOR**

- 7) 16 – Bit Addition/ Subtraction/ Multiplication / Division &  
Separation of odd/even Numbers
- 8) Matrix multiplication/Block move of strings

**INTERFACING PERIPHERAL WITH 8085 MICROPROCESSOR/8051 MICROCONTROLLER**

- 9) Messaging the display
- 10) Programming the PPI – 8255 IC in various modes
  - IO Mode (Interfacing Keys, LEDs and 7 segment LED)
  - BSR Mode (Square wave generation)
- 11) Stepper motor interface
- 12) Interfacing ADC/DAC (Includes wave form generation)  
Study of hardware interrupt RST 7.5 (Interrupt driven clock)

# **V SEMESTER**

## EBC5AT121 SYSTEM SOFTWARE

3 2 0 4

### UNIT I **Introduction**

System software and machine architecture – The Simplified Instructional Computer (SIC) - Machine architecture - Data and instruction formats - addressing modes - instruction sets - I/O and programming.

### UNIT II **Assemblers**

Basic assembler functions - A simple SIC assembler – Assembler algorithm and data structures - Machine dependent assembler features - Instruction formats and addressing modes – Program relocation - Machine independent assembler features - Literals – Symbol-defining statements – Expressions - One pass assemblers and Multi pass assemblers - Implementation example - MASM assembler.

### UNIT III **Loaders and Linkers**

Basic loader functions - Design of an Absolute Loader – A Simple Bootstrap Loader - Machine dependent loader features - Relocation – Program Linking – Algorithm and Data Structures for Linking Loader - Machine-independent loader features - Automatic Library Search – Loader Options - Loader design options - Linkage Editors – Dynamic Linking – Bootstrap Loaders - Implementation example - MSDOS linker.

### UNIT IV **Macro Processors**

Basic macro processor functions - Macro Definition and Expansion – Macro Processor Algorithm and data structures - Machine-independent macro processor features - Concatenation of Macro Parameters – Generation of Unique Labels – Conditional Macro Expansion – Keyword Macro Parameters-Macro within Macro-Implementation example - MASM Macro Processor – ANSI C Macro language.

### UNIT V **System Software Tools**

Text editors - Overview of the Editing Process - User Interface – Editor Structure. - Interactive debugging systems - Debugging functions and capabilities – Relationship with other parts of the system – User-Interface Criteria.

### TEXT BOOK

1.Leland L. Beck, “System Software – An Introduction to Systems Programming”, 3rd Edition, Pearson Education Asia, 2000.

### REFERENCES

- 1.D. M. Dhamdhere, “Systems Programming and Operating Systems”, Second Revised Edition, Tata McGraw-Hill, 1999.
- 2.John J. Donovan “Systems Programming”, Tata McGraw-Hill Edition, 1972.

## EBC5AT122 JAVA PROGRAMMING

3 2 0 4

### Unit I

Introduction to Java: Comparing C++ and Java - Features of Java, Data Types, operators, control statements, Arrays, Classes, Objects, Inheritance, Interfaces, Abstract Classes, Final, static and Packages - Exploring java.lang: String, StringBuffer and Wrapper Classes – Exception Handling

### Unit II

Multithreading: Runnable, Thread and ThreadGroup – Exploring java.io- Overview; BufferedInputStream & BufferedOutputStream , File I/O, Object I/O, Piped I/O, Sequence I/P, Buffered I/O, Checked I/O, Inflater/Deflator and LineNumber I/P Streams – File and StreamTokenizer – Reader/Writer Classes

### Unit III

Introduction to java.awt - Applets–LayoutManagers, Basic components, Advanced components – Event Handling - Listener interfaces and Adapter classes- Window- Keyboard-Mouse Adapters

### Unit IV

Exploring java.util: Interfaces: Collection, Enumeration, Iteration, List and Set – Classes: Array, HashTable, LinkedList, Stack and Vector – Exploring java.net: InetAddress, ServerSocket, Socket, DatagramPacket, DatagramSocket, MulticastSocket

### Unit V

Introduction to javax.swing – Swing Vs AWT – Top Level Containers – Swing GUI Components - Introduction to n-tier architecture - JDBC principles – Exploring java.sql: Connection, DriverManager, Statement, ResultSet, CallableStatement, PreparedStatement, ResultSetMetaData & DatabaseMetaData

### TEXT BOOKS:

1. James Jaworski, “Java Unleashed”, SAMS Techmedia Publications, 4<sup>th</sup> revised edition 1998
2. Herbert schildt , “JAVA 2-The Complete Reference”, Fifth Edition, Tata McGraw Hill Publishing Limited , New Delhi 39<sup>th</sup> reprint 2007

### REFERENCE BOOKS:

1. Java Blackbook, Kogent Publications
2. Campione, Walrath and Huml, “The Java Tutorial”, Addison Wesley.
3. Java Network Programming, Second Edition, O’Reilly, (for Java.net package in Unit III)
4. Java Database Programming Bible, John O’ Donahue (for Unit V)

**UNIT I**

**INTRODUCTION:** Introduction to database management system -Data Abstraction - Data Models - Data Dictionary – Architecture - Entity relationship model - Entities and relations -E-R diagram. Design of E-R and database schema.

**UNIT II**

**FILES AND STORAGE :** Primary file organizations and storage structures - indexing and hashing - Indexes for files - Single level ordered indexes - Multilevel indexes - Dynamic multilevel indexes using B- trees and B+ trees.

**UNIT III**

**RELATIONAL MODEL AND DESIGN :** Relational model - Key and Referential integrity constraints - Relational algebra - Selection Projection - Join and other operators - Query expression in relational algebra - Mapping ER-model description to relational-model description. SQL language - Data definition - Query formulation - Update operations - View specification in SQL - Embedded SQL. Relational Database Design- Normal forms- Normalisation using functional dependencies - multivalued dependencies and Join dependencies - Domain Key Normal Form.

**UNIT IV**

**IMPLEMENTATION TECHNIQUES :** Query processing-Query Optimization-Transaction Processing-Concurrency control-Recovery.

**Unit V**

**CURRENT TRENDS:** Introduction to Distributed Databases-Object Oriented Databases, Mobile Database – Geographic Information Systems – Multimedia Database –Spatial Databases, Temporal Databases -XML and Web Databases.

**TEXT BOOK:**

1. Silberschatz, H. Korth and S. Sudarshan, "Database System Concepts", McGraw-Hill International, 5th Edition 2006
2. R. Elmasri and Shamakant B. Navathe, "Fundamentals of Database Systems", 4th reprint 1999, Addison Wesley.

\*Unit I - Chapter1,2,3 Refer R. Elmasri and Shamakant B. Navathe  
Unit II-Chapter 4,5 Refer R. Elmasri and Shamakant B. Navathe  
Unit III-Chapter 6,7,8,12&13 Refer R. Elmasri and Shamakant B. Navathe  
Unit IV-Chapter 16,17,18,19 Refer R. Elmasri and Shamakant B. Navathe  
Unit V-Chapter22,23 Refer R. Elmasri and Shamakant B. Navathe  
Unit V-Chapter 9,22 Refer Silberschatz, H. Korth and S. Sudarshan

**REFERENCE BOOKS:**

1. Raghu Ramakrishnan, " Database Management Systems ", WCB, McGraw Hill
2. C.J. Date, "An introduction to Database Systems", Seventh Edition, Pearson Education
3. Thomas Connolly , Carolyn Begg , "Database Systems, A Practical Approach to Design, Implementation and Management", 3<sup>rd</sup> Edition, Pearson Education.
4. Rob Coronel , "Database Systems , Design , Implementation & Manage

**UNIT I**

Introduction - Line - Circle and Ellipse drawing Algorithms – Attributes of output primitives.

**UNIT II**

2D Concepts- Two dimensional transformations - Two-Dimensional Viewing-Two dimensional clipping

**UNIT III**

3D Concepts- Three-dimensional object representation – Polygonal representations, Spline representation, Bezier Curves and surfaces - 3D TRANSFORMATIONS – 3D Projections - Hidden surface and hidden line elimination –

**UNIT IV**

Visualization and rendering - color models - Texture mapping - animation – morphing.

**UNIT V**

Introduction – Multimedia applications – Multimedia System Architecture - Compression & Decompression - Multimedia Authoring & User Interface – Hypermedia messaging - Mobile Messaging .

**TEXT BOOK :**

1. Donald Hearn and Pauline Baker, Computer Graphics, C version - PHI First Impression 2006, New Delhi.[Units – I to IV]
2. Prabat K Andleigh and Kiran Thakrar, “Multimedia Systems and Design”, PHI, 1996 [Unit - V]

**REFERENCES :**

1. Foley J.D, Van Dam A, Feiner S.K, Hughes J.F, computer Principles and practice, Addison, Wesley publication company.
2. Siamon J. Gibbs and Dionysios C. Tsichritzis, Multimedia programming, Addison, Wesley.

**UNIT I**

Introduction –S/W Engineering Paradigm – system engineering – computer based system – Software characteristics -verification – validation -life cycle models-Water fall, Prototype, spiral, WINWIN Spiral, Agile, Evolutionary, Incremental, Object oriented -Software cost estimation-COCOMO Model.

**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-types of design- 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**

Transform mapping and transaction mapping. Design for Real – Time Systems: System considerations-User interface design-real time systems-analysis and simulation of real time Systems-Software Configuration Management.

**UNIT V**

Software Testing Methods: Software testing fundamentals. White Box Testing: Basis path testing and control structure testing-black box testing-testing for specialized Environments. Software Testing Strategies: A strategic approach to software testing- Unit testing-integration testing validation testing-system testing. Software Maintenance.

**TEXT BOOKS:**

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

**REFERENCES:**

1. P fleeger, " Software Engineering ", Prentice Hall, 1999.
2. Carlo Ghezzi, Mehdi Jazayari, Dino Mandrioli " Fundamental of Software Engineering ", Prentice Hall of India.
3. Watts S.Humphrey,"A Discipline for Software Engineering", Pearson Education, 2007.

**UNIT I**

I.rGauvaMSapircaya: II.p`QaanaSlaaoka: -

- 1.AnyaoVura%maanaucarsya Baavama\
- 2.saa duYp`QaYaa-
- 3.tdlyamaaEindtma\
- 4.ttao maRgaond`sya
- 5.vaamaotrstsya
- 6.tmaaya-gaR(ma\
- 7.AlaM mauhpala
- 8.kOlaasagaaOrma\
- 9.AmauM pur: pSyaisa

**UNIT II**

I.p`QaanaSlaaoka: -

- 1.kNDUyamaanaona
- 2.tda p`BaR%yaova
- 3.tsyaalamaoYaa
- 4.sa%vaMinavat-sva
- 5.[it p`galBama\
- 6.p`%yaba`valccaOnama\
- 7.maanya: sa mao
- 8.sa %vaM madlyaona
- 9.AqaanQakarma\

**UNIT III**

I.p`QaanaSlaaoka: -

- 1.ekatp~ma\
- 2.BaUtanaukmpa
- 3.AqaOkQaonao: 4.td\ rxa
- 5.etavadu@%vaa
- 6.inaSomya dovaanaucarsya
- 7.xatai%kla
- 8.kqaM nau Sa@ya: 9.saoyaM svadohap-Na

**UNIT IV**

I.p`QaanaSlaaoka: -

- 1.BavaanapIdma\
- 2.ikmaPyaihMsya:
- 3.sambanQamaaBaaYaNapUva-ma\
- 4.tqaoit gaamau>vato
- 5.tismana\ xaNao
- 6.]i<aYz va%saoit
- 7.tM ivaismatM QaonauEvaaca
- 8.Ba@%yaa gauraO
- 9.tt: samaanalya

**UNIT V**

I.p`QaanaSlaaoka: -

- 1.santanakamaaya
- 2.va%sasya
- 3.[%qaM ixatISaona
- 4.sanaindnalstnyama\
- 5.p`atya-qaao>va`tparNaanto
- 6.p`dixaNalkR%ya
- 7.tmaaihtaO%sau@ya
- 8.purndrEal: 9.Aqa nayanasa%qama\

## II.kailadasasya pircaya:

### **EBU5JT057-INDIAN CULTURE (Syllabus for Fifth Semester B.E.)**

#### **Part I**

**Unit I** – Temple worship – Evolution of religious establishments; worship in temples; ritual requirements; daily rituals; symbolism of rituals.

**Unit II** – Temple Festivals – Daily, monthly, yearly, occasionally, etc.; different *vahanas*; *mudras* in worship; *yajna* and *yajna vedicas* for different sacrifices; other worships and programs related to religious and human welfare.

#### **Part II**

**Unit III** – Significance of Gandharva veda; Evolution & development of music; Karnataka & Hindustani music; main styles; different famous personalities & their contribution. different early musical instruments.

**Unit IV** – Evolution & development of dance; different schools; important famous personalities.

**Unit V** – Different schools and contribution of music, dance and dramas to preserve cultural heritage.

#### **REFERENCE BOOKS**

1. Rao, S.R.K. 1992. *Alaya and Aradhana*. Agama-Kosha (Agama Encyclopaedia). Kalpatharu Research Academy Publications. Vol VI. Banglore.
2. Sharma, S. 1997. *Comparative study of Evolution of Music in India and the West*. Pratibha Prakashan. Delhi.
3. Sanyal, R. 1987. *Philosophy of Music*. Somaya Publications Pvt. Ltd. Bombay.

## EBC5AP121 COMPUTER GRAPHICS AND MULTIMEDIA LAB

0 0 2 1

1. To implement Bresenham's algorithms for line
2. To implement Bresenham's circle drawing algorithms.
3. To perform 2D Transformations such as translation, rotation, scaling, reflection and shearing.
4. To implement Cohen-Sutherland 2D clipping
5. To implement window-viewport mapping.
6. To perform 3D Transformations such as translation, rotation and scaling.
7. To visualize projections of 3D images.
8. To convert between color models.
9. To perform animation using any Animation software.
10. To perform basic operations on image using any image editing software

## EBC5AP122 JAVA PROGRAMMING LAB

0 0 4 2

1. Write 2 threads for sorting the given integer array in ascending order and to find the sum of minimum and maximum values
2. Write a file copy utility using command line arguments and File I/O Streams.
3. Write an utility program to compress and decompress a file
4. Write a SB Account maintenance program to credit and debit amount to the given account number using HashTables
5. Write a program in java to demonstrate the following swing controls
  1. JScrollBar
  2. JOptionButton
  3. JList
  4. JCheckBox
6. Write a java program to demonstrate the use of following Layouts
  - a) Flow Layout
  - b) Border Layout
  - c) Grid Layout
  - d) Grid Bag Layout
  - e) Card Layout
7. Write a program in java to create a simple paintbrush applet
8. Write a program to create a simple calculator interface with basic arithmetic operations.
9. Get student marks and insert the calculated results in Student database.
10. Design an interface to list the various functions available in the connected database using DatabaseMetaData and StringTokenizer

## EBC5AP123 DBMS LAB

0 0 4 2

1. Data Definition Language (DDL)
2. Create Table, Alter and Drop Table
3. Date, Aggregate Function, Math and Set Operators
4. Joins, Views and Sequence
5. Write a PL/Sql program for inserting record into Table.
6. Write a PL/Sql program for retrieve the row from table.
7. Write a PL/Sql block to generate Even numbers
8. Write a PL/Sql program to raise a Application Error
9. Write a PL/Sql program to display all the records in Employee table using Cursor.
10. Write a PL/Sql program to copy the content of one table to another table using Cursor.
11. Write a PL/Sql program not Updating Saturday and Sunday in a Table using Trigger.
12. Write a PL/Sql program not Inserting more than twenty Rows in a Table using Trigger.
13. Write a PL/Sql program to find the factorial of No using Function.
14. Write a PL/Sql program to return a value using Procedure.

# **VI SEMESTER**

**MAUFT1261 – AUTOMATA THEORY AND APPLICATIONS**  
**(B.E SIXTH SEMESTER – COMPUTER SCIENCE ENGINEERING)**  
**(For students admitted from 2012-13)**

3      2      0      4

**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.

**PRESCRIBED TEXT BOOK**

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

## REFERENCES

1. Anderson, A.James, Automata theory with modern applications, Cambridge
2. Carlos Martín-Vide, Victor Mitrana, Grammars and Automata for String Processing, Taylor & Francis
3. Hopcroft John E., Ullman Jeffery D, Introduction to Automata theory, Languages and Computation, First Edition, Narosa Publishing House.
4. Linz Peter, An introduction to formal languages and automata, Narosa Publishing House, New Delhi
5. Martin J.C, Introduction to languages and the Theory of Computation, Tata McGraw Hill Publishing Company Ltd
6. Xavier, Theory of automata, formal languages and Computation, New Age international publishers

## EBC6AT122 DOT NET TECHNOLOGIES

3 2 0 4

### 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 - Creating Windows Installer

### 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 , 9<sup>th</sup> Reprint 2006 (Units 1 & 2)
2. Evangelos Petroustos , Mastering Visual Basic. NET, BPB Publications Reprinted 2005 (Units 1 & 2)
3. Michael Otey , Denielle Otey, ADO.NET Complete Reference, Tata McGrawHill, 4<sup>th</sup> reprint 2005 (Unit IV & V)
4. Evangelos Petroustos , Ali Bilgin, .Mastering Visual Basic. NET Database Programming BPB Publications – 2002 (Unit 1 & 2)
5. Pro C# with .NET 3.0 – Andrew Troelsen – Special Edition 2007 (Unit V)

## EBC6AT123 COMPUTER NETWORKS

3 2 0 4

### UNIT – I

**Introduction to computer Networks:** Network topology Network models, Networks components – Type of Networks OSI reference model.

**Theoretical basis for data communication.:** Transmission Media - Twisted pair cable, coaxial cable fiber optic cable, wireless. – Analog transmission – Digital transmission and switching.

### UNIT – II

**Error correction and Detections :** Types of Errors, Error detection & Corrections. Interfaces RS232C & RS422. **Data Link control & protocols:** Flow and Error Control – Stop & wait ARQ, Go back N-ARQ , Selective Repeat ARQ. HDLC.

### UNIT III

**The Network Layer :** Network Layer Design Issues, ARP – RARP –DHCP – ICMP – Queuing discipline – Routing algorithms – RIP – OSPF – Sub netting– CIDR – Inter domain routing, routing – BGP Congestion control- Congestion- avoidance – QoS

### UNIT IV

**The Transport layer :** Transport layer design issues –Connection management UDP / TCP / IP Protocol. **The Session Layer :** Session layer design issues, Remote procedure calls.

### UNIT V

**The Presentation Layer :** Presentation layer design issues – Data compressions techniques- Cryptography. **The Application layer:-** Design issues – File transfer, access and management – Electronic mail-Virtual terminals – PGP – SSH-DNS- Other applications.

### TEXT BOOKS

1. Behrouz Fourzan, Data Communication and Networking 4<sup>th</sup> Edition 2006

### REFERENCE BOOKS

1. William Stallings , Data and Computer Communications, MacMillan Publishing Co, second edition.
2. Computer Networks by Andrew Tanenbaum
3. Comer, “Computer Networks and Internets with Internet Applications”, Fourth Edition, rePearson Education.

## EBC6AT124 DATA WAREHOUSING AND DATA MINING

3 0 0 3

### 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:

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- Mining frequent patterns- association-correlation

### UNIT III

#### CLASSIFICATION & CLUSTERING:

Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners – Clustering techniques – , Partitioning methods- k-means- Hierarchical Methods – distance based agglomerative and divisive clustering– Outlier Analysis

### UNIT IV

Introduction to Mining Data Streams – Mining Time-Series Data – Graph Mining – Social Network Analysis

### UNIT V

#### APPLICATION ,PRODUCT AND CASE STUDIES

Data warehousing and mining Applications - Products - Case studies - The Future of Data Mining - Privacy and Security of Data Mining

#### TEXT BOOK

1. J.Han,M.Kamber , "Data Mining: Concepts and Techniques", Academic Press, Morgan Kaufman Publishers, 2<sup>nd</sup> edition 2006

#### REFERENCE BOOKS

1. Arun K Pujari , " Data mining" , Andhra University Press
2. C.S.R. Prabhu , "Data Ware housing: Concepts, Techniques, Products and Applications", Prentice Hall of India, 2001.
3. W.H.Inmon," Building the Data Warehouse" , 3rd Edition, Wiley Dreamtech '02.
4. Sam Anabory & Dennis Murray, "Data Warehousing in the real world", Addison Wesley,1997
5. Morgrat A. Dunham, " Introduction to Data Mining techniques", Pearson Education

## EBC6AT125 MOBILE COMPUTING

3 2 0 4

### 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.

### UNIT IV

#### MOBILE NETWORK LAYER

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

### UNIT V

#### TRANSPORT AND APPLICATION LAYERS

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

#### TEXT BOOKS

1. Jochen Schiller, "Mobile Communications", PHI/Pearson Education, Second Edition, 2003. (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, 1<sup>st</sup> Indian reprint 2002. (Unit I Chapter – 7&10-Unit II Chap 9)

#### REFERENCES

1. Kaveh Pahlavan, Prasanth Krishnamoorthy, "Principles of Wireless Networks", PHI/Pearson Education, 2003.
2. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, "Principles of Mobile Computing", Springer, New York, 2003.
3. Hazysztof Wesolowshi, "Mobile Communication Systems", John Wiley and Sons Ltd, 2002.

UNIT I

A. ?gvaod: B.yajauvao-d: C.saamavaod: & Aqava-vaod:

UNIT II

A.YaD=\gaaina B.]pinaYad: C.dSa-naaina

UNIT III

A.puraNaaina B.[ithasa: C.stao~aiNa

UNIT IV

A.kailadasa: B.Baasa: C.kaOiTlya:

UNIT V

A.Sa=\kracaaya-: B.ramaanaujaacaaya-:  
C.maQvaacaaya-:

## EBU6JT057-INDIAN CULTURE

### Part I

**Unit I** – Art forms as cultural expression; technology & aesthetics; their relation to the social structure.

**Unit II** – Evolution of religious structures & architecture in Indian; different early schools and art centers; important other secular structures.

**Unit III** – Development of regional styles in Indian art & architecture; important features of Nagara, Dravida & Vesara styles in temple architecture. Sculpture, Iconography and Paintings – different centers and contribution on Indian culture.

### Part II

**Unit IV** – Significance of Stapatya veda; Silpa and Vastu Sastra – significance of vastu in architecture. Vishvakarma, Mayamata, Manasara, Samarangana, Stapatya, etc., personalities and their contribution in Indian Architecture.

**Unit V** – the decorative art & craft; precious stones & metal; textiles & carpets; calligraphy & other important works;

### REFERENCE BOOKS

1. Banerji, J.N. 1941. *The Development of Hindu Iconography*. University of Calcutta. Calcutta.
2. Gopinath Rao, T.R. 1914. *Elements of Hindu Iconography*. Vol I & II.
3. Meister, M.W. (ed) 1983. *Encyclopaedia of Indian Temple Architecture*. American Institute of Indian Studies. University of Pennsylvania Press. Philadelphia.
4. Sukla, D.N. 1993. *Vastu-Sastra. Hindu Science of Architecture*. Munshiram Manoharlal Publishers Pvt. Ltd. New Delhi.

**Computer Networks Lab (Using C++ & Java)**

1. Write a program to simulate Sliding window protocol.
2. Write a program to simulate shortest path algorithm.
3. Write a program to simulate Distance vector Routing algorithm.
4. Write a program to know your IP Address and to check whether it is Broadcasting address or not.
5. Write a program to establish a TCP Socket connection between 2 system and communicate "Hello" message.
6. Design a Broadcasting server to send "hello" message to 5 other clients.
7. Design a searching tool to check for the availability of a file in server.
8. Design FTP to download a given file from another system using TCP Sockets.
9. Design a simple chat application for communicating between 2 systems using swing components and DatagramSockets.
10. Perform a case study about the different routing algorithms to select the network path with its optimum and economical during data transfer.
  - Shortest path routing
  - Flooding
  - Flow based routing
  - Distance vector
  - Link State
  - Hierarchical
  - Broadcast /Multicast routing

## EBC6AP122 . NET LAB

0 0 4 2

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.

1. To implement multi-dimensional data model using SQL queries
2. To perform various OLAP operations such slice, dice, roll up, drill up, pivot etc
3. Introduction to Data Mining Tool
4. Data Preprocessing using tool
5. Classification using tool
6. Clustering using tool
7. Association rule mining using tool
8. 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. Tool companion manual(s)

# **VII SEMESTER**

**UNIT – I**

Introduction to Compiler- Phases of a Compiler- Cousins of compiler- The grouping of phases- Compiler construction tools. Role of a lexical analyzer - Input buffering-Specification of tokens – Finite Automata-Regular Expressions to Finite Automata- Minimizing the number of states in DFA

**UNIT – II**

Context free grammars- Capabilities of a context free Grammars. Parsers- Top down and bottom up parsing - Shift reduce parser -Operator precedence and Predictive parsers – LR Parsers - Error Detection and Recovery.

**UNIT – III**

Syntax directed translation scheme – Intermediate code generation –Postfix notation, Three address codes- quadruples and triples, parse trees and syntax trees - Methods of translating assignment statement, Boolean Expressions, Flow of control statements, Array references, Procedure calls, Declaration, Case statements, Back patching .

**UNIT – IV**

Introduction to Code Optimization- Principle sources of optimization - Loop optimization - Peephole optimization- Optimization of basic blocks - Representation of information in symbol table- data structures for symbol tables.

**UNIT – V**

Introduction to code generation -Issues in the design of a code generator-A simple code generator-Register allocation and assignment-The dag representation of basic blocks - Generating code from dags.

**TEXT BOOK**

1.A.V.Aho. J.Dullman - Principles of Compiler Design - Narosa Publishing House 25<sup>th</sup> reprint 2002.

**REFERENCE BOOKS :**

1. Alfred Aho, Ravi Sethi, V.Jeffery Ullman D. "COMPILERS PRINCIPLES, TECHNIQUE AND TOOLS ", Addison- Wesley Publications
2. DHAMDHERE, D.M.Complier construction - Principles and Practice MacMillan Indian Ltd
3. DAVID GRIES, Complier construction - for Digital computers, Willey International Edition.
4. Allen Holub I. " Compiler Design in C", Prentice Hall of India.

## EBC7AT122 OBJECT ORIENTED SYSTEM ANALYSIS AND DESIGN

3 2 0 4

### UNIT - I

Object Orientation – System development – Review of objects - inheritance - Object relationship – Dynamic binding – OOSD life cycle – Process – Analysis – Design – prototyping – Implementation – Testing- Overview of Methodologies

### UNIT - II

Rumbaugh methodology, OMT – Booch methodology, Jacobson methodology – patterns – Unified approach – UML – Class diagram – Dynamic modeling.

### UNIT-III

Use case model – Creation of classes – Noun phrase approach – responsibilities – Collaborators – Object relationships – Super-Sub class – Aggregation.

### UNIT- IV

OO Design axioms – Class visibility – refining attributes – Methods –Access layer – OODBMS – Table – class mapping view layer

### UNIT- V

Quality assurance testing - Inheritance and testing – Test plan – Usability testing – User satisfaction – Testing.

### TEXT BOOK

1. Ali Bahrami, "Object Oriented System Development", McGraw-Hill International Edition 2008.

### REFERENCES

1. Booch G., "Object oriented analysis and design", Addison- Wesley Publishing Company 3<sup>rd</sup> edition.
2. Rumbaugh J, Blaha.M. Premeriani, W., Eddy F and Loresen W., "ObjectOriented Modeling and Design", PHI.

### UNIT I Fundamentals

Introduction to distributed computing system, Evolution, Different models, Gaining popularity, Definition, Issues in design, DCE, Message Passing – Introduction, Desirable feature of a good message passing system, Issues in IPC, Synchronization, Buffering, Multi datagram, Process addressing, Failure handling, Group communication.

### UNIT – II RPC

Introduction, RPC model, transparency of RPC, Implementing RPC mechanism, Stub generation, RPC messages, Marshalling arguments and results, Server management, parameter-passing semantics, Call semantics, communication protocols for RPCs, Complicated RPC, Client-server binding, exception handling, security, Special types of RPC, RPC in heterogeneous environments, Lightweight RPC, Optimization for better performance, case studies – Sun RPC, DCE, RPC.

### UNIT – III Distributed Shared Memory and Synchronization

Introduction, General architecture of DSM systems, Design and implementation issues of DSM, Granularity, Structure of shared memory space, consistency model, Replacement strategy, Threshing, Different approaches to DSM, Advantages of DSM, Clock synchronization, Event ordering, Mutual exclusion, Deadlock, Election algorithm.

### UNIT – IV Resource Management and Process Management

Desirable features of Good Global Scheduling Algorithm - Task assignment approach - Load-balancing approach - Load sharing approach - Process migration - Threads

### UNIT – V DFS and Security

Desirable features of good DFS - File models - File models - File accessing models - File sharing semantics - File caching schemes - File replication - Fault tolerance - Atomic transaction - Design principles - **Case Study** : DCE Distributed File Service - Potential attacks to computer System - Access control - Digital signatures - Design principles - DCE Security Service.

#### TEXT BOOKS

1. PRADEEP K.SINGHA, Distributed Operating System – PHI 2007.

#### Reference

1. ANDREW S.TENENBAUM Modern Operating System – 2<sup>nd</sup> Edition, PHI

## EBC7AT124 EMBEDDED SYSTEMS

3 0 2 4

### UNIT I EMBEDDED COMPUTING

Challenges of Embedded Systems – Embedded system design process. Embedded processors – 8051 Microcontroller, ARM processor – Architecture, Instruction sets and programming.

### UNIT II MEMORY AND INPUT / OUTPUT MANAGEMENT

Programming Input and Output – Memory system mechanisms – Memory and I/O devices and interfacing – Interrupts handling.

### UNIT III PROCESSES AND OPERATING SYSTEMS

Multiple tasks and processes – Context switching – Scheduling policies – Intercrosses communication mechanisms – Performance issues.

### UNIT IV EMBEDDED SOFTWARE

Programming embedded systems in assembly and C – Meeting real time constraints –Multi-state systems and function sequences. Embedded software development tools –Emulators and debuggers.

### UNIT V EMBEDDED SYSTEM DEVELOPMENT

Design issues and techniques – Case studies – Complete design of example embedded systems.

#### TEXT BOOKS:

1. Wayne Wolf, "Computers as Components: Principles of Embedded Computer System Design", Elsevier, 3<sup>rd</sup> edition 2006
2. Michael J. Pont, "Embedded C", Pearson Education , 2007, 1<sup>st</sup> Edition.

#### REFERENCES:

1. Steve Heath, "Embedded System Design", Elsevier, 2005.
2. Muhammed Ali Mazidi, Janice Gillispie Mazidi and Rolin D. McKinlay, "The 8051 Microcontroller and Embedded Systems", Pearson Education, Second edition, 2007

## EBC7AP121 SOFTWARE DEVELOPMENT LAB USING CASE TOOLS

0 0 6 3

Prepare the following documents for two or three of the experiments listed below and develop the software engineering methodology.

1. Program Analysis and Project Planning.  
Thorough study of the problem – Identify project scope, Objectives, Infrastructure.
2. Software requirement Analysis  
Describe the individual Phases / Modules of the project, Identify deliverables.
3. Data Modeling  
Use work products – Data dictionary, Use diagrams and activity diagrams, build and test class diagrams, Sequence diagrams and add interface to class diagrams.
4. Software Development and Debugging
5. Software Testing  
Prepare test plan, perform validation testing, Coverage analysis, memory leaks, develop test case hierarchy, Site check and Site monitor.

### **Suggested List of Applications:**

1. Student Marks Analyzing System
2. Quiz System
3. Online Ticket Reservation System
4. Payroll System
5. Course Registration System
6. Expert Systems
7. ATM Systems
8. Stock Maintenance
9. Real-Time Scheduler
10. Remote Procedure Call Implementation

EBC7AP122 **WEB TECHNOLOGY LAB**

**2 0 4 3**

**Introduction to Web Technology**

- Introduction to WWW, HTTP
- Web Page Types, Tiers, Comparison of technologies (Microsoft vs Java)
- Static Web page creation (HTML Tags)
- Introduction to IDE for Web Development(Suggested: Dreamweaver)

**Web pages – Forms and Dynamic Web Pages**

HTML Frames & Forms  
Introduction to Web Servers – IIS(or Apache)  
Web server Installation and Configuration  
Server side scripting with ASP ( or JSP)  
Client side scripting with VBScript( or Javascript)

**Advanced dynamic web pages**

Creating Dynamic web pages with ASP.NET (or J2EE) with relevant controls and appropriate IDE

**Advanced web technologies -1**

Introduction to Session Management  
Introduction to CSS  
Introduction to XML

**Advanced web technologies -2**

Introduction to Web Services  
Introduction to AJAX

**Books:**

Achyut S Godbole, Atul Kahate, Web Technologies, Tata Mcgraw Hill, 1<sup>st</sup> Reprint 2003.  
Appropriate references/ lecture notes for specific web technologies

# **VIII SEMESTER**

## **EBC8AT121 PRINCIPLES OF MANAGEMENT AND ETHICS**

**3 0 0 3**

### **UNIT I**

#### **HISTORICAL DEVELOPMENT**

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 AND ORGANISING**

Planning – Nature & purpose, Kinds of plans – Decision making process and kinds of decision – Organization process – organization structure, delegation, Decentralization, staffing.

### **UNIT III**

#### **DIRECTING AND CONTROLLING**

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**

#### **ENGINEERING ETHICS**

Senses of 'Engineering Ethics' - variety of moral issued - types of inquiry - moral dilemmas - moral autonomy - Models of Professional Roles - theories about right action - Self-interest - customs and religion - uses of ethical theories. Engineering as experimentation - engineers as responsible experimenters - codes of ethics

### **UNIT V**

#### **GLOBAL ISSUES**

Multinational corporations - Environmental ethics - computer ethics - weapons development - engineers as managers-consulting engineers-engineers as expert witnesses and advisors -moral leadership-sample code of Ethics like ASME, ASCE, IEEE, Institution of Engineers (India), Indian Institute of Materials Management, Institution of electronics and telecommunication engineers (IETE),India, etc.

#### **TEXT BOOKS:**

1. Harold Koortz & Heinz Weihrich “Essentials of Management”, Tata McGraw-Hill, 7<sup>th</sup> Edtion1998
2. Mike Martin and Roland Schinzinger, “Ethics in Engineering”, McGraw-Hill, 3<sup>rd</sup> Edition, 7<sup>th</sup> Reprint 2004

**REFERENCE BOOKS :**

1. Govindarajan M, Natarajan S, Senthil Kumar V. S, “Engineering Ethics”, Prentice Hall of India, New Delhi, 2004.
2. L.M..Prasad Principles & Practice of Management, Tata McGraw-Hill,2003
3. Harold Knoontz ,Heinz Weihrich – Essentials of Management, TATA McGRAW Hill
4. Engineering Economics and Management by R.Senapathy ARS publications
- 5.. Charles D. Fleddermann, “Engineering Ethics”, Pearson Education / Prentice Hall, New Jersey, 2004 (Indian Reprint)

# **ELECTIVES**

### LIST OF ELECTIVES

SI No	Code	III YEAR
1	A	Advanced Computer System architecture
2	B	Advanced operating systems
3	C	Neural Networks
4	D	Artificial Intelligence
5	E	Electronic Commerce
6	F	Resource Management Techniques
7	G	Advance Databases
8	H	Management Information System
9	I	Digital Image Processing

### LIST OF ELECTIVES

SI No	Code	<u>IV YEAR</u>
1	J	Cloud Computing
2	K	Ethical hacking and Digital Forensics
3	L	Online And Real Time Systems
4	M	Cryptography and Network Security
5	N	Natural Language Processing
6	O	Software Quality Assurance
7	P	Robotics
8	Q	Grid Computing
9	R	Ad-Hoc and Sensor networks
10	S	Middleware Technologies
11	T	Pervasive computing
12	U	Soft Computing
13	V	Agent Technology
14	W	Applied Graph Theory
15	X	Digital Signal Processing
16	Y	Network Programming Management
17	Z	VLSI Design

## A- ADVANCED COMPUTER SYSTEM ARCHITECTURE

3 2 0 4

### UNIT – I

Introduction to Parallel Processing : Evolution of Computer System – Parallelism in Uniprocessor System - Parallel Computer Structures – Architectural Classification Schemes - Parallel Processing Applications.

### UNIT – II

Principles of pipelining and Vector Processing : Principles of Linear pipelining - Classifications of pipeline processors - Interleaved memory organizations - Vector processing requirements - Characteristics of Vector Processing.

### UNIT – III

Pipeline computers and Vectorization Methods : The Space of Pipelined Computers – Recent Vector Processors – The Architecture of Cyber - 205 - Vectorization and Optimization Methods - Parallel languages for Vector Processing - Optimization of Vector Functions – Performance Evaluation of Pipeline Computers.

### UNIT – IV

Multiprocessor architecture : Functional structures - Lossely Coupled Multiprocessors - Tightly Coupled Multiprocessors - Processor characteristics for Multiprocessing - Interconnection Networks - Time Shared or common Buses – Performance of Interconnection Networks – Parallel Memory Organizations – Performance Tradeoffs in Memory Organizations - Classification of Multiprocessor Operating Systems – Data Flow Computer Architecture : Static and Dynamic Data Flow Computer.

### UNIT – V

Advanced Processor Technology : Design Space of Processors – Instruction Set Architecture - CISC Scalar Processor – Example : Architecture of MC68040 Processor – RISC Scalar Processors – Example : SPARC Architecture

### TEXT BOOKS

1. Kai Hwang and Faye A.Briggs, "Computer Architecture and parallel processing", McGraw Hill International Edition-15 (UNIT I ,II, III, IV)
2. Kai Hwang, "Advanced Computer Architecture", Parallelism, Scalability, Programmability McGraw Hill Second Edition 18<sup>th</sup> Reprint 2008 (UNIT V)

## B- ADVANCED OPERATING SYSTEMS

3 2 0 4

### UNIT I

**INTRODUCTION:** Overview - Functions of an Operating System – Design Approaches – Types of Advanced Operating System - Synchronization Mechanisms – Concept of a Process, Concurrent Processes – The Critical Section Problem, Other Synchronization Problems – Language Mechanisms for Synchronization – Axiomatic Verification of Parallel Programs – Process Deadlocks - Preliminaries – Models of Deadlocks, Resources, System State – Necessary and Sufficient conditions for a Deadlock – Systems with Single-Unit Requests, Consumable Resources and Reusable Resources.

### UNIT II

**DISTRIBUTED OPERATING SYSTEMS:** Introduction – Issues – Communication Primitives – Inherent Limitations - Lamport’s Logical Clock; Vector Clock; Causal Ordering; Global State; Cuts; Termination Detection. Distributed Mutual Exclusion – Non-Token Based Algorithms – Lamport’s Algorithm - Token-Based Algorithms – Suzuki-Kasami’s Broadcast Algorithm – Distributed Deadlock Detection – Issues – Centralized Deadlock-Detection Algorithms - Distributed Deadlock-Detection Algorithms - Agreement Protocols – Classification - Solutions – Applications.

### UNIT III

**DISTRIBUTED RESOURCE MANAGEMENT:** Distributed File systems – Architecture – Mechanisms – Design Issues – Distributed Shared Memory – Architecture – Algorithm – Protocols - Design Issues. Distributed Scheduling – Issues and Components .

### UNIT IV

**FAULT TOLERANCE:** Basic Concepts-Classification of Failures – Basic Approaches to Recovery- Recovery in Concurrent System- Synchronous and Asynchronous Checkpointing and Recovery- Check pointing in Distributed Database Systems- Fault Tolerance- Issues - Two-phase and Nonblocking Commit Protocols- Voting Protocols- Dynamic Voting Protocols.

### UNIT V

**MULTIPROCESSOR AND DATABASE OPERATING SYSTEMS:** Structures – Design Issues – Threads – Process Synchronization – Processor Scheduling – Memory Management – Reliability / Fault Tolerance; Database Operating Systems – Introduction – Concurrency Control – Distributed Database Systems – Concurrency Control & Algorithms.

#### TEXT BOOK:

1. Mukesh Singhal and N. G. Shivaratri, “Advanced Concepts in Operating Systems”, McGraw- Hill Edition 2001 21<sup>st</sup> reprint 2008.

#### REFERENCES: .

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”, Second Edition, Addison Wesley,2001.

## C- NEURAL NETWORKS

3 2 0 4

### UNIT I

Introduction : Humans and Computers , the structure of the brain , Learning in machines , The differences. Pattern Recognition : Introduction Pattern Recognition in perspective , Pattern recognition – a definition, Feature vectors and feature space , discriminant Functions , classifications Techniques , pattern recognition – a summary.

### UNIT II

The Basic Neuron : Introduction , Modeling the single neuron , Learning in Simple neuron , The perception : a vectorial Perspective , The perception learning rule , Proof , Limitations Of the perceptions.

The Multi Layer Perception : Introduction , Altering the perception model , the new model , the new learning rule , The multi layer perception algorithm , The XOP problem reverted , Visualizing network behaviour , Multi layer perceptions As classifiers , Generalization , Fault tolerance , Learning difficulties , Radial basis functions , applications.

### UNIT III

Kohonen Self- Organizing Networks : Introduction , The Kohonen Algorithm , Weight training , Neighborhood ,Reducing the neighborhood , Learning vector Quantisation, The Phonetic type writer.

### UNIT IV

Hopfields Networks : The Hopfield model , The energy landscape , The Boltzman Machine , constraint satisfaction . ADAPTIVE RESONANCE MEMORY : Adaptive resonance theory, Architecture and operation , ART network , Clarification Conclusion , Summary of ART.

### UNIT V

Associative Memory : Standard Computer memory , Implementing Associative memory , Implementation In RAM's, FAMS & N - tupling, Willshaw 's associative net , The ADAM system , Kaneva's sparse distributed memory , Bi-directional associative Memories.Hardware and software implementations , Optical Computing , Neural networks .

### TEXT BOOK:

R.Beale & T.Jackson , Neural Computing , An Introduction , Adam Hilger , 1990.

### REFERENCE BOOK :

Pao Y.H Adaptive Pattern Recognition and Neural Networks , Addison Wesley , 1989.

## D- ARTIFICIAL INTELLIGENCE

3      2      0      4

### UNIT I PROBLEM SOLVING

Introduction – Agents – Problem formulation – uninformed search strategies – heuristics – informed search strategies – constraint satisfaction.

### UNIT II LOGICAL REASONING

Logical agents – propositional logic – inferences – first-order logic – inferences in first order logic – forward chaining – backward chaining – unification – resolution

### UNIT III PLANNING

Planning with state-space search – partial-order planning – planning graphs – planning and acting in the real world – Introduction to knowledge representation (Semantic nets).

### UNIT IV UNCERTAIN KNOWLEDGE AND REASONING

Uncertainty – review of probability - probabilistic Reasoning – Bayesian networks – inferences in Bayesian networks – Temporal models – Hidden Markov models

### UNIT V LEARNING

Learning from observation - Inductive learning – Decision trees – Explanation based learning – Statistical Learning methods - Reinforcement Learning

#### 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.

J. Nilsson, "Artificial Intelligence: A new Synthesis", Elsevier Publishers

## **E- ELECTRONIC COMMERCE**

**3      2      0      4**

### **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”, Tata McGraw-Hill, 2003.
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.
5. Effy Oz, “ Foundations of E-Commerce”, PHI, 2001.
6. Jim A Carter, “Developing E-Commerce Systems”, PHI, 2001.

## F- RESOURCE MANAGEMENT TECHNIQUES

3 2 0 4

### 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**

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

## **REFERENCES**

1. H.A.Taha, Operations Research, Sixth Edition, Mac Millen Ltd.,
2. Richard Bronson, Operations Research, (Schaum's Outline Series, McGraw Hill Company, 1982.
3. S.Hillier and J.Liebermann, Operations Research, Sixth Edition, Mc Graw Hill Company, 1995.
4. J.K.Sharma, Operation Research (Theory and Applications), Mac Millen Ltd., 1997.
5. Barry Render, Ralph M. Stair, Allyn Bacon, Quantitative Analysis for Management, Fifth Edition, Boston, 1994.

## G- ADVANCED DATABASES

3 2 0 4

### UNIT I

#### DISTRIBUTED AND PARALLEL DATABASES

Distributed Database Concepts - Distributed Data Storage – Distributed Transactions – Commit Protocols – Concurrency Control – Distributed Query Processing- Parallel Databases: I/O Parallelism – Inter and Intra Query Parallelism – Inter and Intra operation Parallelism — Case Studies.

### UNIT II

#### OBJECT-ORIENTED DATABASES

Object oriented data model: Object structure -object classes–Inheritance–Object Identity- Object Containment- Persistent Programming Languages– Persistent C++ Systems: ODMG C++ ODL – ODMG C++ OML– OQL – Persistent Java Systems.

### UNIT III

#### XML DATABASES

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

### UNIT IV

#### MOBILE DATABASES

Mobile Databases: Location and Handoff Management - Effect of Mobility on Data Management - Location Dependent Data Distribution - Mobile Transaction Models - Concurrency Control - Transaction Commit Protocols- Mobile Database Recovery Schemes.

### UNIT V

#### MULTIMEDIA DATABASES

Image Databases:Representing Image DBs with Relations and R-Trees – Text/Document Databases: TV-Trees - Video Databases : Video Segmentation and Standards– Audio Databases – Multimedia Database Design.

#### TEXT BOOKS:

1. Henry F Korth, Abraham Silberschatz, S. Sudharshan, “Database System Concepts”, Fourth Edition, McGraw Hill, 2002.
2. Vijay Kumar, “ Mobile Database Systems”, John Wiley & Sons, 2006.
3. V.S.Subramanian, “Principles of Multimedia Database Systems”, Harcourt India Pvt Ltd.,2001.

Unit I – Chapter19,20 Refer Henry F Korth, Abraham Silberschatz, S. Sudharshan

Unit II-Chapter 8 Refer Henry F Korth, Abraham Silberschatz, S. Sudharshan

Unit III-Chapter 10 Refer Henry F Korth, Abraham Silberschatz, S. Sudharshan

Unit IV-Chapter 3,6.2,7.6,7.13,7.14,8.3Refer Vijay Kumar

Unit V-Chapter 5.6, 5.7 ,6.4, 7.3, 7.4, 8, 9.2 Refer V.S.Subramanian

#### 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.

## H- MANAGEMENT INFORMATION SYSTEMS

3 2 0 4

### 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

1. Gordon B. Davis And Maggrethe H.Olson , Management Information Systems, Mc Graw Hill International Edition – Second Edition , 1998

### 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.

## I- DIGITAL IMAGE PROCESSING

3 2 0 4

### UNIT I DIGITAL IMAGE FUNDAMENTALS AND TRANSFORMS

Elements of visual perception – Image sampling and quantization Basic relationship between pixels – Basic geometric transformations-Introduction to Fourier Transform and DFT – Properties of 2D Fourier Transform – FFT – Separable Image Transforms -Walsh – Hadamard – Discrete Cosine Transform, Haar, Slant – Karhunen – Loeve transforms.

### UNIT II IMAGE ENHANCEMENT TECHNIQUES:

Spatial Domain methods: Basic grey level transformation – Histogram equalization – Image subtraction – Image averaging –Spatial filtering: Smoothing, sharpening filters – Laplacian filters – Frequency domain filters : Smoothing – Sharpening filters – Homomorphic filtering.

### UNIT III IMAGE RESTORATION:

Model of Image Degradation/restoration process – Noise models – Inverse filtering -Least mean square filtering – Constrained least mean square filtering – Blind image restoration – Pseudo inverse – Singular value decomposition.

### UNIT IV IMAGE COMPRESSION

Lossless compression: Variable length coding – LZW coding – Bit plane coding- predictive coding-DPCM.

Lossy Compression: Transform coding – Wavelet coding – Basics of Image compression standards: JPEG, MPEG,Basics of Vector quantization.

### UNIT V IMAGE SEGMENTATION AND REPRESENTATION

Edge detection – Thresholding - Region Based segmentation – Boundary representation: chain codes- Polygonal approximation – Boundary segments – boundary descriptors: Simple descriptors-Fourier descriptors - Regional descriptors –Simple descriptors- Texture

### TEXT BOOKS

1. Rafael C Gonzalez, Richard E Woods, Digital Image Processing - Pearson Education 2003 2nd Edition.

### REFERENCES

1. William K Pratt, Digital Image Processing John Willey (2001)
2. Image Processing Analysis and Machine Vision – Millman Sonka, Vaclav hlavac, Roger Boyle, Broos/colic, Thompson Larniy (1999).
3. A.K. Jain, PHI, New Delhi (1995)-Fundamentals of Digital Image Processing.
4. Chanda Dutta Magundar – Digital Image Processing and Applications, Prentice Hall of India, 2000

**UNIT I  
UNDERSTANDING CLOUD COMPUTING**

Cloud Computing – History of Cloud Computing – Cloud Architecture – Cloud Storage – Why Cloud Computing Matters – Advantages of Cloud Computing – Disadvantages of Cloud Computing – Companies in the Cloud Today – Cloud Services.

**UNIT II  
DEVELOPING CLOUD SERVICES**

Web-Based Application – Pros and Cons of Cloud Service Development – Types of Cloud Service Development – Software as a Service – Platform as a Service – Web Services – On-Demand Computing – Discovering Cloud Services Development Services and Tools – Amazon Ec2 – Google App Engine – IBM Clouds

**UNIT III  
CLOUD COMPUTING FOR EVERYONE**

Centralizing Email Communications – Collaborating on Schedules – Collaborating on To-Do Lists – Collaborating Contact Lists – Cloud Computing for the Community – Collaborating on Group Projects and Events – Cloud Computing for the Corporation

**UNIT IV  
USING CLOUD SERVICES**

Collaborating on Calendars, Schedules and Task Management – Exploring Online Scheduling Applications – Exploring Online Planning and Task Management – Collaborating on Event Management – Collaborating on Contact Management – Collaborating on Project Management – Collaborating on Word Processing - Collaborating on Databases – Storing and Sharing Files.

**UNIT V  
OTHER WAYS TO COLLABORATE ONLINE**

Collaborating via Web-Based Communication Tools – Evaluating Web Mail Services – Evaluating Web Conference Tools – Collaborating via Social Networks and Groupware – Collaborating via Blogs and Wikis.

**TEXT BOOKS :**

1. Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online, Que Publishing, August 2008.
2. Haley Beard, Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs, Emereo Pty Limited, July 2008.

## **K- ETHICAL HACKING AND DIGITAL FORENSICS**

**3 2 0 4**

### **UNIT I**

Hacking windows – Network hacking – Web hacking – Password hacking. A study on various attacks – Input validation attacks – SQL injection attacks – Buffer overflow attacks - Privacy attacks.

### **UNIT II**

TCP / IP – Checksums – IP Spoofing port scanning, DNS Spoofing. Dos attacks – SYN attacks, Smurf attacks, UDP flooding, DDOS – Models. Firewalls – Packet filter firewalls, Packet Inspection firewalls – Application Proxy Firewalls. Batch File Programming.

### **UNIT III**

Fundamentals of Computer Fraud – Threat concepts – Framework for predicting inside attacks – Managing the threat – Strategic Planning Process.

### **UNIT IV**

Architecture strategies for computer fraud prevention – Protection of Web sites – Intrusion detection system – NIDS, HIDS – Penetrating testing process – Web Services – Reducing transaction risks.

### **UNIT V**

Key Fraud Indicator selection process customized taxonomies – Key fraud signature selection process – Accounting Forensics – Computer Forensics – Journaling and its requirements – Standardized logging criteria – Journal risk and control matrix – Neural networks – Misuse detection and Novelty detection.

### **TEXT BOOKS :**

1. Kenneth C.Brancik “Insider Computer Fraud” Auerbach Publications Taylor & Francis Group, 2008.
2. Ankit Fadia “ Ethical Hacking” second edition Macmillan India Ltd reprinted 2002

## L- ONLINE AND REAL TIME SYSTEMS

3 2 0 4

### UNIT I

Introduction – Terms and concepts – Characteristics of some typical systems – process Control, Business systems, Transactions systems, Data Acquisition systems. Types of systems –simplex , Master Slave , Duplexed , Shared file , Multiprocessor systems.

### UNIT II

Hardware requirements-Processor sub system , interrupts , communications network, terminal subsystem, disk storage .Factors in selection – System costs and specifications – Hard ware configurations.

### UNIT III

Design Guidelines – Operational models-Interrupts processing, Major cycle models: Applications to message switching system.

Average throughput rate capability calculation using memory disk-Effect of buffer size variations , variable record lengths and multiprogramming .

Design calculations- Mathematical modeling , Simulations , Statistics Generations using sampling and event stream approaches .

### UNIT IV

Design of data communications and terminals – Error Characteristics , Error control, Achievable throughput ,Terminals

Calculations . Cost performance criteria and trade offs.

Applications – Stock Brokerage System , Message Switching System, Medical Online Data Base System.

### UNIT V

Applications Program- Concepts , Objectives , modular programming , Overlap of CPU and I/O , minimize disk accesses.

File organization concepts –Directories buffering , Simultaneous access , File security , File recovery.

### TEXT BOOK :

1. S.Stimler , Real Time Data Processing Systems , Mc Graw Hill , 1969.

### REFERENCE BOOK :

1. E.Yourdon, Design of On-Line Computer System , Prentice Hall , 1972.

## M-CRYPTOGRAPHY AND NETWORK SECURITY

3 2 0 4

### 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 Number Theory(Prime Numbers, Fermat's & Euler's Theorem, Testing for Primality)-Public Key Cryptography – RSA - Diffie-Hellman key Exchange - Key Management.

### 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:

1. William Stallings, "Cryptography And Network Security – Principles and Practices", Prentice Hall of India, Fourth Edition 2006.

#### REFERENCES :

1. Atul Kahate, "Cryptography and Network Security", Tata McGraw-Hill, 2003.
2. Bruce Schneier, "Applied Cryptography", John Wiley & Sons Inc, 2001.
3. Charles B. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", Third Edition, Pearson Education, 2003

## **N-NATURAL LANGUAGE PROCESSING.**

**3      2      0      4**

### **UNIT I**

Introduction-The issues and difficulties in natural language processing-Linguistics and computational linguistics language understanding and generation understanding of spoken , written and textual information.

### **UNIT II**

Syntactic parsing – English grammar-Structure of the sentence-Words and organization of the lexical-Context free and context sensitive grammar-Transformational grammar-The role of syntax analysis in semantics ATN 's –Definite class grammar and WASP parser.

### **UNIT III**

Semantic interpretation- The conceptual dependency model for semantic representation – Semantic networks- Frames and scripts-Semantics in the lexicon.

### **UNIT IV**

Discourse interpretation-The interconnections between Pragmatics-Pragmatics in discourse analysis- Speech acts plan-Based theory of speech acts- Analysing intention in utterances – The representations and the use of focus in understanding discourse- Focusing in comprehension of anaphora.

### **UNIT V**

Generation - Strategies for generation – Planning English referring expressions- KING, a natural language generation systems.

Typical systems – ELIZA – Baseball – GUS – PARRY – LADDER - SOPHIE & POET current trends in NLP

### **TEXT BOOKS:**

1. James Allen, Natural Language Understanding, Benjamin Cummings Pub Co.,
2. Grosz , Jones And Webber ,Reading in Natural Language Processing ,Morgan Kaufmann Publisher,1986.
3. Windgrad ,Language as a Cognitive Process, Syntax, Addison Wesley publication ,1983.
4. Popov , Talking with Computer In Natural Language , Springer - Verlag ,1986.

## O-SOFTWARE QUALITY ASSURANCE

3 2 0 4

### 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 – Comparison of ISO 9000 Model with SEI's CMM

#### TEXT BOOKS:

1. Mordechai Ben-Menachem / Garry S Marliss, "Software Quality", Vikas Publishing House, Pvt, Ltd., New Delhi 1997.(UNIT III to V)
2. Watts S Humphrey, " Managing the Software Process", Pearson Education Inc 1989. (UNIT I and II)

#### REFERENCES:

1. Gordon G Schulmeyer, "Handbook of Software Quality Assurance", Third Edition, Artech House Publishers 2007
2. Nina S Godbole, "Software Quality Assurance: Principles and Practice", Alpha Science International, Ltd, 2004

## P-ROBOTICS

3 2 0 4

### UNIT I

Introduction: Automatic and robotics- History of robotics –robot anatomy – work volume – robot drive systems – control systems and dynamic performance – precision of movement – robot application. Control Components: Robot activation and feedback components position sensors, velocity sensors – acutors – power transmission systems- Robot joint control design.

### UNIT II

Robot Motion Analysis and Control: Manipulator kinematics- homogeneous transformations and robot kinematics – manipulator path control – Robot dynamics – Configuration of a robot controller.

Robot and Effectors : Types of end Effectors – Grippers – Tools and End Effectors – Robot /End interface- Gripper selection.

### UNIT III

Sensing: Sensors –range sensing – Proximity sensing – Touch sensors – force and torque sensing.

Lowlevel Vision: Image acquisition – illumination techniques – imaging geometry- basic relationships between pixels – preprocessing.

### UNIT IV

High Level Vision: Segmentation – Description – Segmentation and Description of three dimensional structures – recognition – interpretation.

Robot Programming Languages: Characteristics of robot level languages – Characteristics of task level languages.

### UNIT V

Robot Intelligence And Task Planning: state space search – problem reduction – use of predicate logic – means – ends- Analysis- Problem- Solving – Robot learning – Robot Task Planning – Basic Problems in task planning.

### TEXT BOOK:

1. Mikell P. Groover, M. Weiss , R.N. Nagal And N.G. Odrey, industrial robotics, McGraw Hill International Editions,1986 .

### REFERENCE BOOKS:

1. K.S.Fu.R.C. Gonzalez And C.S.G. Lee, Robotics – McGraw Hill International Edition, 1987.
2. V.Daniel Hunt, Smart Robots, Champman and hall, 1985.
3. Syndern, Industrial Robots, Computer interfacing and Control prentice hall, 1988.
4. Fairhurst, Computer vision for Robotics Systems, An Introduction, Prentice Hall, 1988.

## Q-GRID COMPUTING

3 2 0 4

### UNIT

#### I INTRODUCTION TO GRID COMPUTING

Introduction – The Grid – Past, Present and Future – Applications of grid computing organizations and their roles.

### UNIT II

#### GRID COMPUTING ARCHITURE

Grid Computing anatomy – – Scheduling & Security - Next generation of Grid computing initiatives–Merging the Grid services architecture with Web services architecture.

### UNIT III

#### GRID COMPUTING TECHNOLOGIES

OGSA – Sample use cases that drive the OGSA platform components – OGSI and WSRF– OGSA Basic Services – Security standards for grid computing.

### UNIT IV

#### GRID COMPUTING TOOL KIT

Globus Toolkit –Versions – Architecture –GT Programming model –A sample grid service implementation.

### UNIT V

#### HIGH LEVEL GRID SERVICES

High level grid services – OGSI .NET middleware Solution Mobile OGSI.NET for Grid computing on Mobile devices.

#### TEXT BOOKS:

1. Joshy Joseph & Craig Fellenstein, “Grid Computing”, Pearson/PHI PTR-2003.

#### REFERENCES:

1. Fran Berman, Geoffrey Fox, Anthony J.G. Hey, “Grid Computing: Making the Global Infrastructure a reality “, John Wiley and sons,2003.
2. Ahmar Abbas, “Grid Computing: A Practical Guide to Technology and Applications”, Charles River media, 2003.

## **R- AD-HOC AND SENSOR NETWORKS**

**3      2      0      4**

### **UNIT I AD-HOC MAC**

Introduction – Issues in Ad-Hoc Wireless Networks. MAC Protocols – Issues, Classifications of MAC protocols, Multi channel MAC & Power control MAC protocol.

### **UNIT II AD-HOC NETWORK ROUTING & TCP**

Issues – Classifications of routing protocols – Hierarchical and Power aware. Multicast routing – Classifications, Tree based, Mesh based. Ad Hoc Transport Layer Issues. TCP Over Ad Hoc – Feedback based, TCP with explicit link, TCP-BuS, Ad Hoc TCP, and Split TCP.

### **UNIT III WSN –MAC**

Introduction – Sensor Network Architecture, Data dissemination, Gathering. MAC Protocols – self-organizing, Hybrid TDMA/FDMA and CSMA based MAC.

### **UNIT IV WSN ROUTING, LOCALIZATION & QOS**

Issues in WSN routing – OLSR, AODV. Localization – Indoor and Sensor Network Localization. QoS in WSN.

### **UNIT V MESH NETWORKS**

Necessity for Mesh Networks – MAC enhancements – IEEE 802.11s Architecture – Opportunistic routing – Self configuration and Auto configuration – Capacity Models – Fairness – Heterogeneous Mesh Networks – Vehicular Mesh Networks.

#### **TEXT BOOK:**

1. C.Siva Ram Murthy and B.Smanoj, “ Ad Hoc Wireless Networks – Architectures and Protocols”, Pearson Education, 2004 (Units I & II)
2. Feng Zhao and Leonidas Guibas, “Wireless Sensor Networks”, Morgan Kaufman Publishers, 2004. (Unit III)
3. C.K.Toh, “Ad Hoc Mobile Wireless Networks”, Pearson Education, 2002. (Unit IV & V)
4. Thomas Krag and Sebastin Buettrich, “Wireless Mesh Networking”, O’Reilly Publishers, 2007. (Unit IV & V)

## **S- MIDDLEWARE TECHNOLOGIES**

**3      2      0      4**

### **UNIT I CLIENT / SERVER CONCEPTS**

Client-Server - File server - Database server - Group server - Object server – Web server - Middleware - General middleware - Service specific middleware - Client / server building blocks - RPC - Messaging - Peer-to-Peer.

### **UNIT II EJB ARCHITECTURE**

EJB - EJB architecture - Overview of EJB software architecture - View of EJB - Conversation - Building and deploying EJBs - Roles in EJB.

### **UNIT III EJB APPLICATIONS**

EJB session beans - EJB entity beans - EJB clients - EJB deployment - Building an application with EJB.

### **UNIT IV CORBA**

CORBA - Distributed systems - Purpose - Exploring CORBA alternatives - Architecture overview - CORBA and networking Model - CORBA object model - IDL - ORB - Building an application with CORBA.

### **UNIT V COM**

COM - Data types - Interfaces - Proxy and stub - Marshalling – Implementing Server/Client - Interface pointers - Object creation - Invocation - Destruction - Comparison COM and CORBA - Introduction to .NET - Overview of .NET architecture - Marshalling - Remoting.

### **TEXT BOOKS**

1. Robert Orfali, Dan Harkey and Jeri Edwards, "The Essential Client/Server Survival Guide", Galgotia Publications Pvt. Ltd., 2002.
2. Tom Valesky, "Enterprise Java Beans", Pearson Education, 2002
3. Jason Pritchard, "COM and CORBA side by side", Addison Wesley, 2000
4. Jesse Liberty, "Programming C#", 2nd Edition, O'Reilly Press, 2002.

### **REFERENCES**

1. Mowbray, "Inside CORBA", Pearson Education, 2002.
2. Puder, "Distributed System Architecture – A Middleware Approach", Elsevier, 2008.

## T-PERVASIVE COMPUTING

3 2 0 4

### UNIT I

Pervasive Computing Application - Pervasive Computing devices and Interfaces - Device technology trends, Connecting issues and protocols.

### UNIT II

Pervasive Computing and web based Applications - XML and its role in Pervasive Computing - Wireless Application Protocol (WAP) Architecture and Security – Wireless Mark-Up language (WML) – Introduction.

### UNIT III

Voice Enabling Pervasive Computing - Voice Standards - Speech Applications in Pervasive Computing and security.

### UNIT IV

PDA in Pervasive Computing – Introduction - PDA software Components, Standards, emerging trends - PDA Device characteristics - PDA Based Access Architecture.

### UNIT V

User Interface Issues in Pervasive Computing, Architecture - Smart Card- based Authentication Mechanisms - Wearable computing Architecture.

### TEXT BOOKS

1. Jochen Burkhardt, Horst Henn, Stefan Hepper, Thomas Schaefer & Klaus Rindtorff. Pervasive Computing Technology and Architecture of Mobile Internet Applications, Addison Wesley, Reading, 2002.
2. Uwe Hansman, Lothar Merk, Martin S Nicklous & Thomas Stober: Principles of Mobile Computing, Second Edition, Springer-Verlag, New Delhi, 2003.

### REFERENCES

1. Rahul Banerjee: Internetworking Technologies: An Engineering Perspective, Prentice-Hall of India, New Delhi, 2003. (ISBN 81-203-2185-5) (Units I, II & III)
2. Rahul Banerjee: Lecture Notes in Pervasive Computing, Outline Notes, BITS-Pilani, 2003. (Units IV & V)

## U- SOFT COMPUTING

3 2 0 4

### 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 Multilayer 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

1. J.S.R.Jang, C.T.Sun and E.Mizutani, “Neuro-Fuzzy and Soft Computing”, PHI, 2004, Pearson Education 2004.

#### REFERENCES

1. Timothy J.Ross, “Fuzzy Logic with Engineering Applications”, McGraw-Hill, 1997.
2. Davis E.Goldberg, “Genetic Algorithms: Search, Optimization and Machine Learning”, Addison Wesley, N.Y., 1989.
3. S. Rajasekaran and G.A.V.Pai, “Neural Networks, Fuzzy Logic and Genetic Algorithms”, PHI, 2003.
4. R.Eberhart, P.Simpson and R.Dobbins, “Computational Intelligence - PC Tools”, AP

## V-AGENT TECHNOLOGY

3 2 0 4

### UNIT I

#### **.Agents – Overview**

Agent definition – agent programming paradigms – Agents Vs objects – aglets – mobile agents – agent frame works – agent reasoning

### UNIT II

#### **Java Agents**

Processes – threads – daemons – components – Java Beans – ActiveX – Sockets, RPCs – distributed computing – aglets programming – Jini architecture – actors and agents – typed and proactive messages

### UNIT III

#### **Multi Agent Systems**

Interaction between agents – reactive agents – cognitive agents – interaction protocols – agent coordination – agent negotiation – agent cooperation – agent organization – self –interested agents in electronic commerce applications

### UNIT IV

#### **Intelligent Software Agents**

Interface Agents – Agent Communication Languages – Agent Knowledge Representation – Agent Adaptability – Belief Desire Intension – Mobile Agent Applications

### UNIT V

#### **Agents and Security**

Agent Security Issues – Mobile Agents Security – Protecting Agents Malicious Hosts – Un trusted Agents – Black box Security – Authentication for Agents – Security issues for Aglets.

### REFERENCES:

1. Constructing intelligent agents with Java, Bigus & Bigus, Wiley.
2. Software Agents, Bradshaw, MIT Press, 2000
3. Artificial Intelligence: a modern approach, Russel & Novirg, Prentice Hall
4. Intelligent Software Agents, Richard Murch, Tony Johnson, Prentice Hall, 2000.

## W- APPLIED GRAPH THEORY

3 2 0 4

### UNIT I (PATHS AND CYCLES)

Introduction to graphs - Basic definitions - Matrix representations - Complete graphs - Regular graphs - 1Connectivity - Cutsets - Cut vertices - Eulerian graphs - Hamiltonian graphs - Shortest path algorithm - Chinese postman problem.

### UNIT II (TREES AND PLANAR GRAPHS)

Trees and forests - Fundamental cutsets - Counting trees : Cayley's theorem - Minimum connector problem - Searching trees : Depth first search and breadth first search (concept only) - Planar graphs - Kuratowski's graphs - Euler's formula - Dual graphs : Abstract dual.

### UNIT III (COLORING)

Coloring vertices - Chromatics number - Six color and five color theorem - Brooks' theorem - Coloring maps - Coloring edges - Chromatic index - Chromatic polynomials.

### UNIT IV (DIGRAPHS)

Directed graphs - Strongly connected graphs - Critical path problem - Eulerian digraphs and tournaments - Hamiltonian digraphs - Markov chain - Transition matrix.

### UNIT V (MATCHING PROBLEMS)

Hall's marriage theorem - Edge disjoint and vertex disjoint paths - Menger's theorem - Implication of Menger's theorem - Network flows - Zero and non zero flows - Maximum flows - Max flow min cut theorem.

#### REMARKS

**"THE PAPER IS NOT THEORY ORIENTED AND THE CONTENTS OF THE PRESCRIBED TEXT BOOK ARE TO BE STRICTLY FOLLOWED" "EACH UNIT IS TO BE COVERED IN 12 PERIODS EACH OF 50 MINUTES DURATION"**

#### PRESCRIBED TEXT BOOK

Robin J. Wilson, Introduction to Graph Theory, Longman Ltd., 2000.

Unit I : Chapters 1, 2, 3 (Except section 4)

Unit II : Chapters 4, 5 (Except section 14, 16)

Unit III : Chapter 6 (All Sections)

Unit IV : Chapter 7 (All Sections)

Unit V : Chapter 8 (Except sections 26, 27)

#### REFERENCES

1. Narsingh Deo, Graph Theory (With Applications to Engineering and Computer Science), Prentice Hall of India, 2000.
2. Douglas B. West, Introduction to Graph Theory, Prentice Hall of India, 1999.
3. Harary, Graph Theory, Narosa Publishing House, New Delhi, 1998.
4. K.R.Parthasarathy, Basic Graph Theory, Tata McGraw Hill Publishing Company, 1994.

## **X- DIGITAL SIGNAL PROCESSING**

**3      2      0      4**

### **UNIT I SIGNALS AND SYSTEMS**

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

### **UNIT II FREQUENCY TRANSFORMATIONS**

Introduction to DFT – Properties of DFT – Filtering methods based on DFT – FFT Algorithms Decimation – in – time Algorithms, Decimation – in – frequency Algorithms – Use of FFT in Linear Filtering – DCT.

### **UNIT III IIR FILTER DESIGN**

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

### **UNIT IV FIR FILTER DESIGN**

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

### **UNIT V APPLICATIONS**

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

#### **TEXT BOOKS:**

1. John G. Proakis & Dimitris G.Manolakis, “Digital Signal Processing – Principles, Algorithms & Applications”, Fourth edition, Pearson education / Prentice Hall, 2007.
2. Emmanuel C..Ifeachor, & Barrie.W.Jervis, “Digital Signal Processing”, Second edition, Pearson Education / Prentice Hall, 2002.

#### **REFERENCES:**

1. Alan V.Oppenheim, Ronald W. Schafer & Hohn. R.Back, “Discrete Time Signal Processing”, Pearson Education, 2nd edition, 2005.
2. Andreas Antoniou, “Digital Signal Processing”, Tata McGraw Hill, 2001

## Y- NETWORK PROGRAMMING AND MANAGEMENT

3 2 0 4

### UNIT I ELEMENTARY TCP SOCKETS

Introduction to Socket Programming – Overview of TCP/IP Protocols –Introduction to Sockets – Socket address Structures – Byte ordering functions – address conversion functions – Elementary TCP Sockets – socket, connect, bind, listen, accept, read, write, close functions – Iterative Server – Concurrent Server.

### UNIT II APPLICATION DEVELOPMENT

TCP Echo Server – TCP Echo Client – Posix Signal handling – Server with multiple clients – boundary conditions: Server process Crashes, Server host Crashes, Server Crashes and reboots, Server Shutdown – I/O multiplexing – I/O Models – select function – shutdown function – TCP echo Server (with multiplexing) – poll function – TCP echo Client (with Multiplexing)

### UNIT III SOCKET OPTIONS, ELEMENTRY UDP SOCKETS

Socket options – getsockopt and setsockopt functions – generic socket options – IP socket options – ICMP socket options – TCP socket options – Elementary UDP sockets – UDP echo Server – UDP echo Client – Multiplexing TCP and UDP sockets – Domain name system – gethostbyname function – Ipv6 support in DNS – gethostbyadr function – getservbyname and getservbyport functions.

### UNIT IV ADVANCED SOCKETS

Ipv4 and Ipv6 interoperability – threaded servers – thread creation and termination – TCP echo server using threads – Mutexes – condition variables – raw sockets – raw socket creation – raw socket output – raw socket input – ping program – trace route program.

### UNIT V SIMPLE NETWORK MANAGEMENT

SNMP network management concepts – SNMP management information – standard MIB's – SNMPv1 protocol and Practical issues – introduction to RMON, SNMPv2 and SNMPv3.

#### TEXT BOOKS

1. W. Richard Stevens, "UNIX NETWORK PROGRAMMING Vol-I" Second Edition, PHI / Pearson Education, 1998. (Units – I, II, III & IV.) (Chapter – 1-10, 23, 25)
2. William Stallings, "SNMP, SNMPv2, SNMPv3 and RMON 1 and 2", Third Edition, Addison Wesley, 1999. (Unit - V) (Chapter – 4-7)

#### REFERENCE

1. D.E. Comer, "Intrenetworking with TCP/IP Vol- III", (BSD Sockets Version), second Edition, PHI, 2003.

## UNIT – I

**Introduction to CMOS and MOS Transistor theory:** Introduction to IC Technologies and the MOORE's Law. MOS as a switch, CMOS logic CIRCUITS: The CMOS Inverter, Combinational logic implementation, Memory-latches and registers. The nMOS Transistor (enhancement) – Structure and operating regions. pMOS transistor (Enhancement)-structure only. Threshold voltage, Body effect. MOS device design equations (First order effects). The CMOS inverter characteristics, Noise margin,  $\beta_n/\beta_p$  ratio. Introduction to the CMOS transmission gate. BiCMOS Technology –BiCMOS Inverter. Merits of CMOS technology

## UNIT – II

**CMOS processing technology and Layouts:** Silicon Semiconductor technology, wafer preparation and fabrication processes: Oxidation, Epitaxy, Ion Implantation, deposition and diffusion. Silicon gate nMOS process. CMOS Fabrication methods: n-well process, SOI Process, and Twin-Tub process. Latchup in CMOS circuits.

**Layout design rules** – Need for design rules.  $\lambda$  based rules. CMOS Layout diagrams – Basic Inverter, NAND, NOR, and Transmission gates. Scaling CMOS circuits

## UNIT – III

**MOS Circuit and Logic design process:** MOS device capacitances – model. Switching characteristics of CMOS Inverter -Rise time, Fall time, delay time. Distributed RC effects. Transistor Gate Sizing basics. Stage ratio.

## UNIT – IV

**ASIC Design Process, VerilogHDL Programming:** Circuit and System representations – Behavioral, Structural and Physical, and the Y diagram. ASIC Design Flow –Front End and BackEnd. Basic programming concepts in Verilog HDL: Behavioral, RTL and Structural modeling in Verilog. Solving Combinational and sequential problems using Verilog HDL.

## UNIT –V

**VLSI CAD Tools** – An overview of Contemporary CAD Tools used for VLSI Design

**Testing of VLSI circuits** – Fault models, Gate level testing, Scan-based Testing, and Test Pattern generation.

## TEXT BOOK:

1. Neil Weste and Kamran Eshraghian. "Principles of CMOS VLSI Design "

## REFERENCEBOOKS:

1. VLSI Design Principles- John P. Uyemura.
2. Randall L .Geiger and P.E. Allen, "VLSI design techniques for analog and digital circuits"
3. Peter J. Ashenden,"The designers guide to VHDL"
4. Douglas A. Pucknell and Kamran Eshraghian "Basic VLSI Design systems and circuits".