

III to VIII Semester B.E.  
(Computer Sc. & Engineering)

Prospectus No.101725

संत गाडगे बाबा अमरावती विद्यापीठ

**SANT GADGE BABA AMRAVATI UNIVERSITY**

(FACULTY OF ENGINEERING & TECHNOLOGY)

## PROSPECTUS

PRESCRIBED FOR  
FOUR YEAR DEGREE COURSE  
BACHELOR OF ENGINEERING  
COMPUTER SCIENCE & ENGINEERING  
III TO VIII SEMESTER  
EXAMINATIONS, 2009-2010  
SEMESTER PATTERN



2009

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Price Rs. 15/-

PUBLISHED BY  
**Prof. J.S.Deshpande**  
Registrar  
Sant Gadge Baba  
Amravati University,  
Amravati. 444 602

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**SYLLABUS  
PRESCRIBED FOR  
THIRD & FOURTH SEMESTER  
B.E. COMPUTER SCIENCE &  
ENGINEERING EXAMINATIONS  
SEMESTER PATTERN  
THIRD SEMESTER**

**GENERAL INSTRUCTIONS**

- 1) Students are encouraged to utilize web based resources from MIT USA's open course ware for the relevant and appropriate portion of their curriculum. This course ware is available at [ocw.mit.edu](http://ocw.mit.edu)
- 2) Instructors are advised to undertake web based search for tutorial assignments, presentations, quizzes, articles including research papers as per their own teaching requirements. They can also try subscribing to web based course management tools. One such tool is made available on internet at [www.pageout.net](http://www.pageout.net). At present this has free access to teachers from bonafide institutes as password protected account on subscription basis from McGraw Hill publishers. Instructors should encourage students to use such tools wherever possible.
- 3) For all mini and major project assignments the students should use open source code for studying best programming practices and present those in seminars/projects. Open source code is freely available on web. The industrious programming practices, data structure implementations should be studied from the open source code and used for software implementation of the projects from problem domain.
- 4) Students can use open source research papers from [www.citeseer.org](http://www.citeseer.org) and [scholar.google.com](http://scholar.google.com) for literature survey requirements.

**Inplant Training & Industrial Visit** in the faculty of Engineering & Technology

- 1)
  - a) the inplant training shall not be compulsory,
  - b) the inplant training shall be taken by students strictly during Summer vacation. after IVth or VIth Semester examination and / or during Winter vacation after Vth or VIIth Semester examinations,
  - c) the inplant training shall not be part of examination system, however, student shall prepare and submit report after completion of training to the concerned Head of Department alongwith certificate issued by the industry,
  - d) the inplant training shall be of minimum two weeks duration,

- e) there shall not be any liability whatsoever on the Institution with respect to inplant training of the students,
  - f) students shall undertake inplant training on their own risk and cost. An undertaking in this regards signed by student and parents shall be submitted before proceeding for training to the concerned Head of Department/ Head of Institution.
  - g) the students shall complete inplant training under the supervision of concerned person in the industry,
  - h) Institutes shall help students to organise inplant training by way of correspondance,
- 2) Industrial Visit : Industrial visit may be organised for the students. Students should prepare & submit the report on Industrial visit to the concerned Head of Department/Head of Institution.

**3SRN1**

**MATHEMATICS-III  
SECTION-A**

- |          |   |
|----------|---|
| UNIT-I   | <b>Ordinary differential equations:-</b> Complete solution, Operator D, Rules for finding complementary function, the inverse operator, Rules for finding the particular integral, Method of variations of parameters, Cauchy's an Legendre's linear differential equations. (10 Hrs.)  |
| UNIT-II  | <b>Laplace transforms:-</b> definition, standard forms, properties of Laplace transform, inverse Laplace transform, initial and final value theorem, convolution theorem, Laplace transform of impulse function, Unit step function, Laplace transforms of periodic function Solution of Linear differential equations, Simultaneous differential equation by Laplace transform method. (10 Hrs.)   |
| UNIT-III | <ol style="list-style-type: none"> <li>a) <b>Difference equation:-</b> solution of difference equations of first order Solution of difference equations of higher order with constant co-efficients,</li> <li>b) <b>Z-transform:-</b> Definition, standard forms, Z-transform of impulse function, Unit step functions, Properties of Z-transforms (linearity, shifting, multiplication by k, change of scale), initial and final values, inverse Z-transforms (by direct division and partial fraction), Solution of difference equation by Z-transforms. (10 Hrs.)</li> </ol> |
| UNIT-IV  | <p style="text-align: center;"><b>SECTION-B</b></p> <ol style="list-style-type: none"> <li>a) <b>Fourier transforms:-</b> Definition, standard forms, inverse Fourier transforms, properties of Fourier transforms, convolution theorem, Fourier sine and Fourier cosine transforms and integrals.</li> <li>b) <b>Partial differential equation of first order of following</b></li> </ol>  |

**form:-**

(i)  $f(p,q)=0$ ; (ii)  $f(p,q,z)=0$ ; (iii)  $f(x,p)=g(y,q)$ ; (iv)  $Pp+Qq=R$  (Lagranges Form); (v)  $Z=px+qy+f(p,q)$  (Clairaut form)

(10 Hrs.)

UNIT-V **Complex Analysis :-** Functions of complex variables, Analytic function, Cauchy-Reimann conditions, Harmonic function, Harmonic conjugate functions, Milne's method conformal mappings (translation, rotation, magnification, and bilinear transformation), singular points, expansion of function in Taylor's and Laurent's series. (10 Hrs.)

UNIT -VI **Vector calculus:-** Scalar and vector point functions, Differentiation of vectors, Curves in space, Gradient of a scalar point function, Directional derivatives, Divergence and curl of a vector point function and their physical meaning, expansion formulae (with out proof), line, surface, volume integrals, irrotational and solenoidal vector fields. (10 Hrs.)

**BOOKS RECOMMENDED:-**

- 1) Elements of Applied Mathematics by P.N. Wartikar and J.N. Wartikar
- 2) A Text Book of Differential Calculus by Gorakh Prasad.
- 3) Engg. Mathematics by Chandrika Prasad.
- 4) Advancing Engg. Mathematics by E.K. Kreyzig.
- 5) A Text Book of Applied Mathematics by P.N. Wartikar and J.N. Wartikar.
- 6) Higher Engg. Mathematics by B.S. Grewal.
- 7) Control System by Gopal and Nagrath.
- 8) Integral transforms by Goyal & Gupta.

**3SRN2 PROGRAMMING METHODOLOGY****SECTION-A (8 Hrs./Unit)**

Unit I: Introduction to Computer and Languages, OOPS and Software development: Software Engineering and SDLC. Java Basics: Program Components, Compilation cycle. Introduction to Applet and Application, Data types and Variables

Unit II: Operators: Arithmetic operators, relational operators, Assignment operators. Control statement: Selection statement: if, nested if, switch statement. Repetition statements: while, do-while, for, nested loops. Introduction to Math class. Arrays: Basics, One dimensional, Multidimensional, Array of Objects, Passing array to method.

Unit III: Introducing classes, class fundamentals, declaring objects, methods, class data, & instance data, constructor, this keyword, access control, Introduction to String and String Buffer classes

**SECTION-B**

Unit IV: Applet class and its methods, Introduction to AWT, AWT classes: Button, TextField, Label. Working with Graphics, Working with colors, AWT controls, Fundamentals: Adding and removing controls, responding to control.

Unit V: Event handling: Event handling mechanism, Delegation Event model, Event, EventListener: ActionListener, mouseListener, mouseMotionListener, windowListener, Using delegation Event model: Handling mouse events, Adapter classes, Inheritance, Polymorphism, Abstract classes and Interface, Packages

Unit VI: Java File I/O: File, FileDialog object, Low and High level File I/O, the Stream classes, Byte Stream: Input stream, Output stream, File Input stream, File Output stream, Data Input stream, Data Output stream, PrintWriter, Exception handling: Exception types, uncaught Exceptions using try and catch, throw, throws, finally. GUI objects programming: Frame class, menus and other GUI objects.

**TEXT BOOKS:**

- 1) Herbert Schildt : Java Complete References (McGraw Hill)
- 2) C. Thomas Wu: An Introduction to OOP with Java (McGraw Hill)

**REFERENCES**

- 1) Liag: Java Programming (PHI)

**LIST OF PROGRAMS**

The sample list of program is given below. This list can be used as guide line for problem statements but the scope of the laboratory should not be limited to the same. Aim of the list is to inform about minimum expected outcomes.

- | Sr No | Name of Program   |
|-------|---|
| 1     | Write a Java application to print a given format<br><pre style="margin-left: 200px;">* * * * * * * * * *</pre>  |
| 2     | Design an Applet to Draw a String inside a Pentagon with specified font and color   |
| 3     | Write an Java application for Loan Calculator   |
| 4     | Write an Applet that accepts the user name via Text Field object. When user presses the Enter Key the Applet displays a "Welcome <user name>" with <user name> replaced with actual name entered by user. |
| 5     | Write an Applet that displays a BMI of a person given his or her weight in Kilogram and height in Meters  |

- 6 Write an Application program in Java using Switch statement to print A-Z, a-z, 0-9 by inputting ASCII value of first character
- 7 Write an application in Java which reads a string from user as a command line argument and checks the string for vowels, and when the vowel encounters it append the word “egg” before each vowel
- 8 Write an application in Java to design “Simple Calculator”
- 9 Write an application in Java which creates an AddressBook class which manages collection of Person object and allows programmer to add, delete, search a Person object in the Address Book
- 10 Write an application in Java which reads and writes User defined Byte Array from and to a file using Low Level File I/O
- 11 Write an application in Java which creates a File menu on Frame with menuItem “DialogBox”.  
When user clicks on menuItem one Dialog Box will appear on the Frame with one TextField and two Buttons “OK” and “CANCEL”. After entering the data in the TextField and clicking the OK Button Dialog Box closes and data will appear on a Frame Window and when presses CANCEL Button Dialog Box closes and control comes back on Frame Window
- 12 Write an application in Java which return current x,y coordinates when any mouse button is Pressed and draws freehand drawing when mouse is Dragged.

**3SRN3****DISCRETE STRUCTURE****SECTION ‘A’** (8 Hrs./Unit)

- UNIT I:- Mathematical Logic :  
Statements & Notation, Connectives, Normal forms, The theory of inference for the statement calculus : Validity using truth tables, predicate calculus.
- UNIT II :- Set Theory :  
Basic concepts, Relation and ordering, Functions, Recursive function. Sets & Predicates.
- UNIT III :- Algebraic Structures :  
Semigroups and Monoids, Product & Quotients of semigroups, Grammars & Languages, Polish expression & their compilation, Groups, Product and Quotients of Groups.

**SECTION ‘B’**

- UNIT IV :- Lattice & Boolean Algebra:-  
Lattices, Partially ordered sets, Boolean Algebra, Functions on Boolean Algebras, Boolean Functions as Boolean Polynomials, Minimization of Boolean Functions.

- UNIT V:- Graph Theory :  
Basic concepts, Paths, reachability & connectedness, Matrix representation of graphs, Trees: tree searching, Undirected trees, Minimal spanning trees.
- UNIT VI:- Computability theory:-  
Finite state machines, Finite state acceptors and regular grammars. Turning, machines and partial recursive functions.

**TEXT BOOK :-**

1. J.P.Trembley, R. Manohar : "Discrete Mathematical Structures with application to Computer Science" 1988 (MCG)

**REFERENCE BOOKS:-**

1. C.L.Lill : "Combinational Mathematics" Mc Graw Hill, 1988
2. Stanant "Discrete Structure" Prentice Hall.
3. C.L.Lill "Element of Discrete Mathematics" Second Edition McGraw Hill, 1987
4. Bernard Kolman, Robert C. Busby, Sharon Ross: "Discrete Mathematical Structures" Third Edition PHI

**3 SRN 4****ELECTRONIC DEVICES & CIRCUITS****SECTION-A**

- UNIT I: Diodes : Characteristics of semiconductor diodes, diode resistance. Rectifying circuits & do power supplies, HWR, FWR, BR, comparison. Filter circuits for power supplies: Inductor, Capacitor, LC, IT Filters.
- UNIT II : Concept of amplification,  $A_i$ ,  $A_v$  and  $A_p$ ;  $R_i$ ,  $R_o$ . Conversion efficiency. Basic transistor operation, Basic characteristics of transistor amplifier. Transistor input characteristics, CB amplifier, CC amplifier.
- UNIT III: The CE amplifier Graphical analysis, Input & output resistance, Input wave form consideration, Comparison of amplifiers. Transistor biasing : Stability Factor, CB bias, Emitter bias, Bias compensation.

**SECTION-B**

- UNIT IV : Oscillators : Effect of positive feedback. phase-shift oscillator, Wein-Bridge oscillator, RC Oscillator, Transistor as a switch, switching time in transistors, Multivibrators.
- UNIT V : FET amplifiers: Advantages & disadvantages of FET. Principle of operation, characteristics, Common source AC amplifier. Fixed Bias. Source follower, Frequency Response. Introduction is MOSFETS.
- UNIT VI: Opto Electronic Devices : Fundamentals of light, photoconductive sensors, photodiodes, phototransistors, their principle of operation & applications. photovoltaic

sensors. photoemissive sensors. Light emitters, Alphanumeric displays. photocouplers.

#### Text Books :

1. Malvino : Principles of Electronics (TMH)
2. Millman & Halkias : Electronic Devices & Circuits (Mc Graw Hill)
3. Millman & Halkias: Integrated Electronics (Mc Graw Hill)
4. David A Bell "Electronic Devices & Circuits" (5/e) (Oxford University Press).

### 3SR5 OBJECT ORIENTED TECHNOLOGIES

#### SECTION-A

- UNIT I. Objects & Classes in C++ : Declaring & using classes, Constructors, Objects as functions arguments, Copy Constructor, Static class data. Arrays of objects, C++ String class.
- UNIT II. Operator overloading : Overloading unary & binary operators. Data conversion. Pitfalls of operator overloading. Pointers & arrays. Pointers & functions. new & delete operators. Pointers for objects.
- UNIT III. Inheritance in C++ : Derived class & base class, Derived class constructors, Function overloading, class hierarchies, Public and private inheritance, Multiple inheritance. Containership : classes within classes.

#### SECTION-B

- UNIT IV. Virtual functions concepts, Abstracts classes & pure virtual functions. Virtual base classes, Friend functions, Static functions, Assignment and copy initialization, the this pointer. Dynamic type information.
- UNIT V. Streams & Files in C++ : Stream classes, stream errors, disk file I/O with streams, File pointers, Error handling in file I/O. File I/O with members functions, overloading the extractions & insertion operators, Memory as a stream object, command-line arguments. Multifile programs.
- UNIT VI. Function Template, Class templates, Exception syntax, Multiple exceptions, exception with arguments. Introduction to the Standard Template Library. Algorithms, Sequential Containers, Iterates, Specialized iterates, Associative containers. Function objects.

#### Text-Book :

1. Robert Lafore Object-Oriented Programming in C++ (Galgotia)

2. Herbert Schildt C++ : Complete Reference (TMH)

#### References :

1. Bjarne Stroustrup C++ Programming Language (Addison-Wesley)
2. Venugopal Mastering C++ (TMH)
3. Lipmann C++ Primer (Addison-Wesley)

#### LIST OF PROGRAMS

The sample list of program is given below. This list can be used as guide line for problem statements but the scope of the laboratory should not be limited to the same. Aim of the list is to inform about minimum expected outcomes.

- 1 Write a C++ program to implement a stack with its constructor and two member functions PUSH and POP
- 2 Write a C++ program to find product of two same numbers from 0 to 9 stored in an object array of 10 objects and then free the memory space occupied by an object array
- 3 Write a C++ program to overload minus operator as an unary and binary operator
- 4 Write a C++ program using friend operator function to overload plus binary operator
- 5 Write a C++ program to calculate the circumference of an earth (subclass) after getting distance of it measured from sun from planet (super class)
- 6 Write a C++ program for an inventory that stores the name of an item, the number on hand, and its cost. Include an inserter and an extractor for this class
- 7 Write a C++ program that creates an output file, writes information to it, closes the file and open it again as an input file and read the information from the file
- 8 Write a C++ program that counts number of words in a file
- 9 Write a C++ program to create an abstract class area having an abstract function get Area which will find an area of derived classes rectangle and triangle
- 10 Write a C++ program to create a generic function that swaps the values of the two variables it is called with"

### 3 SR 6 Computer Laboratory - I

This Lab is based on Web publishing. The topics to be covered include :

- 1) Web Publishing
- 2) Web Page Design
- 3) Exposure to IE & NN browsers
- 4) Dynamic HTML

Each group of 2 students should prepare their own Website.

**Text book :**

M.Petrovsky:Dynamic HTML in Action(TM)

#### FOURTH SEMESTER

4 SRN 1

#### DATA STRUCTURES

##### SECTION-A (8 hrs/unit)

- Unit I: Data structures basics, Mathematical /algorithmic notations & functions, Complexity of algorithms, Subalgorithms. String processing: storing strings, character data type, string operations, word processing, and pattern matching algorithms.
- Unit-II: Linear arrays and their representation in memory, traversing linear arrays, inserting & deleting operations, Bubble sort, Linear search and Binary search algorithms. Multidimensional arrays, Pointer arrays. Record structures and their memory representation. Matrices and sparse matrices.
- Unit-III: Linked lists and their representation in memory, traversing a linked list, searching a linked list. Memory allocation & garbage collection. Insertion deletion operations on linked lists. Header linked lists, Two-way linked lists.
- Unit-IV: Stacks and their array representation. Arithmetic expressions: Polish notation. Quick sort, an application of stacks, Recursion. Tower of Hanoi problem. Implementation of recursive procedures by stacks, Queues. Deques. Priority queues.
- Unit-V: Trees, Binary trees & and their representation in memory, Traversing binary trees. Traversal algorithms using stacks, Header nodes : threads. Binary search trees, searching, inserting and deleting in binary trees. Heap and heapsort. Path length & Huffman's algorithm. General trees.
- Unit-VI: Graph theory, sequential representations of graphs, Warshalls' algorithm, Linked representation, operations & traversing the graphs. Posets & Topological sorting. Insertion Sort, Selection Sort. Merging & Merge-sort, Radix sort, Hashing.

**Textbook :**

Seymour Lipschutz : " Theory & Problems of Data Structures"  
Schaum's Outline series (Mc Graw-Hill) International Editions.

**REFERENCES:**

1. Ellis Horowitz, Sartaj Sahni – Fundamentals of Data Structures (CBS Publications)
2. Trembley, Sorenson:- An Introduction to Data Structures with

Applications.

3. Aho Ullman : Analysis and Design of Algorithms.
4. Standish: Data Structures in Java
5. Bhagat Singh, Naps : Introduction to Data Structures.

4SRN1

#### DATA STRUCTURES-LABORATORY

The sample list of program is given below. This list can be used as guide line for problem statements but the scope of the laboratory should not be limited to the same. Aim of the list is to inform about minimum expected outcomes.

1. Write an application to implement Tower of Hanoi Problem Algorithm.
2. Write an application to implement Abstract data type stack
3. Write a program to evaluate Post fix expression using stack
4. Write a program to implement Abstract data type queue.
5. Write a program to implement singly linked list that performs various operation such as insertion, deletion, searching a node in linear linked list.
6. Write a program to implement Preorder Traversal of a binary tree.
7. Write a Program to search a given element using Binary Search.
8. Write a Program to implement Selection Sort.
9. Write a Program to implement Merge Sort.
10. Write a Program to Perform insertion or search in a specified level of a stack implemented tree- structured symbol table.

4 SRN 2

#### NUMERICAL & STATISTICAL METHODS

##### SECTION-A (8 hrs/unit)

- UNIT-I Problem solving & computers, Numerical methods for roots of equations, polynomial, transcendental, quadratic equations. Bisection, False Position, Newton-Raphson & Direct substitution methods.
- UNIT-II Solution of Simultaneous Equations: Gauss Elimination, Gauss Seidel, Gauss-Jordan Methods. Matrix methods & Inversion Interpolation : Linear & polynomial.
- UNIT-III Numerical differentiation by polynomial fit, Numerical integration by Trapezoidal Rule, Simpson Rule, Gaussian Quadrature.

##### SECTION-B

- UNIT-IV Sampling frequency distribution, measures of central tendency, dispersion moments. Discrete probability distributions. Probability, Various types of distributions.
- UNIT-V Regression : Linear LS fit, Nonlinear fit. Polynomial function. Correlation : Coefficient, Properties of correlation coefficient. Multiple, Partial and Rank correlation.

UNIT-VI Test of significance: Introduction, The  $\chi^2$ -test. The t-test, the F-test .

**Text Books:**

1. V Rajaraman : Computer Oriented Numerical Methods (PHI)
2. J.N. Kapoor : Mathematical Statistics (MCG)

**Reference :**

1. Sastry: Numerical Computation Methods(PHI)
2. M.R. Spiegel: Statistics (McGraw Hill)

**4SR3**

**ANALOG AND DIGITAL ICs**

**SECTION-'A'** (8 hrs/unit)

UNIT-I: Introduction to ICs: Monolithic IC technology, the planar process, fabrication, BJT, FETs, CMOS Technology, characteristic of IC components, LST, Operational amplifier, Block schematic internal circuits, Level shifting, Overload protection, study of IC 741 op-amp, Measurement of op-amp parameter.

UNIT-II: Linear and Non-Linear Application Op-amp: Inverting and noninverting amplifiers, Voltage follower, integrator, differentiator differential amplifier, Sinusoidal RC-phase shift and Wein bridge oscillators, clipping, clamping and comparator circuits using opamps. Astable, bistable and monostable multivibrator using opamps.

UNIT-III: Other linear ICs:- Block schematic of regulator IC 723, and applications, SMPS, Block schematic of timer IC 555 and application as a timer, astable, monostable, bistable multivibrator and other applications.

**SECTION-'B'**

UNIT-IV: Basic Logic Circuits:  
Logic gate characteristics, NMOS inverter, propagation delay, NMOS logic gate, CMOS inverter, CMOS logic gates, BJT inverter, TTL NAND gate, TTL output stage. TTL logic families, ECL circuits, comparison of logic families.

UNIT-V: Combinational Digital Circuits: Standard gate assemblies, Binary address, Arithmetic functions, Digital comparator, Parity check generators, Decode-multiplexer, Data selector multiplexer, Encoder, ROM, 2-dimensional addressing of ROM, ROM applications, PROM.

UNIT-VI: Sequential Circuits and Systems: Bistable Latch, Flip-Flops clocked SR, J-K, T, D type shift Registers, F.F. Design of counters, Ripple and synchronous types, application of counters, Dynamic MOS shift registers, RAM Bipolar RAM cells.

**BOOKS :**

1. Millaman : Microelectronic : 2nd Ed. Mc Graw Hill.
2. David A Bell "Electronic Devices & Circuits" (5/e) (Oxford University Press).
3. Gayakwad : Op-Amp & Linear IC's, 2nd Ed.
4. Malvino & Leach : Digital Principles & Applications, 4th Ed. Mc Graw Hill.

**Analog & Digital ICs Laboratory**

List of Experiments:

1. INV-NON INV Amplifier using IC 741.
2. INTEGRATOR & DIFFERENTIATOR using IC 741.
3. Voltage follower using IC 741.
4. Weinbridge oscillator using IC 741.
5. Astable Multivibrator using IC 741.
6. Astable Multivibrator using IC 555.
7. Voltage regulator using IC 723
8. Verification of MUX using IC 74151.
9. Study of various DEMUX chips & verification of DEMUX using IC 74155.
10. Verification of transistor inverter.
11. Verification of BCD to seven segment using IC 7447.
12. Verification of J-K FF by using IC 7476.
13. Verification of Comparator using IC 7485.
14. Verification of BCD to decimal decoder using IC 7442.
15. Verification of decade counter.
16. Code converters using PLAs.

**NOTE :** Any six from Sr.No. 1 to 7 and six from Sr.No. 8 to 16.

**4SRULEIN4**

**SOCIAL SCIENCES & ENGINEERING**

**ECONOMICS**

**SECTION - A** (8 hrs/unit)

- Unit I : Study of Social Science : Importance to Engineer, salient features of Indian constitution. Fundamental Rights and Duties. Directive Principles of State Policy.
- Unit II : Indian Parliament : composition and powers.  
President of India : Election and Powers.  
Council of Ministers and Prime Minister
- Unit III: Impact of Science and Technology on culture and Civilization.  
Human Society : Community Groups, Social Control :  
Meaning, Types and Agencies. Marriage and Family :  
Functions, Types and problems.

**SECTION - B**

- Unit IV: Nature and scope of Economics : Special significance of Economics to Engineers.  
Production : Factors of production, Laws of return, Various Economic systems, Forms of Business Organisation.
- Unit V : Banking : Functions of Central and Commercial Banks.  
Taxation : Principle of taxation, Direct and Indirect taxes.  
Market : Forms, perfect and imperfect competition, pricing under perfect and imperfect competition, prices discrimination under monopoly.
- Unit VI: Economics of Development : Meaning, Characteristics of under development, obstacles to Economic growth and vicious circle of poverty.  
Economic Planning : meaning, objective and salient features of current five years plan of India.  
Planning horizons, life structuring the alternatives.  
Economics of comparison of different alternative projects.

**Books Recommended :**

1. Pylee M.V. : Constitutional Govt. in India, S.Chand and Co.
2. Joshi G.N. : The Constitution of India, Macmillan India Ltd.
3. Mahajan : The Constitution of India, S.Chand, New Delhi.
4. Maclaver and Page : Principle of Sociology.
5. Davis K. : Human Society
6. Dewett and Varma J.D. : Elementary Economic Theory, S.Chand and Co.
7. A.N.Agrawal : Indian Economy, Problem of Development and Planning (Wiley Eastern Ltd), New Delhi.
8. S.K.Mishra : Indian Economy, Its Development Experience. Himalaya Pub.House, Bombay.
9. Datt R.K. : Indian Economy, S.Chand and Comp. New Delhi P.M.Sundharam
10. Dhingra I.C. : Indian Economy
11. E.Kuper : Economics of W.R.Development, McGraw Hill Co.,
12. James L.E., R.R.Lee : Economics of W.R.Planning, McGraw Hill Co.

**4 SRN 5 ASSEMBLY LANGUAGE PROGRAMMING****SECTION-A (8 hrs/unit)**

- Unit I: 8086 architecture and pin configuration, Software model of 8086 microprocessor. Memory addresses space and data organization. Data types. Segment registers, memory segmentation. IP & Data registers, Pointer, Index registers. Memory addresses generation.

- Unit II: 8086 Instruction set overview, addressing modes. 8086 instruction formats. 8086 programming : Integer instructions and computations: Data transfer instructions, Arithmetic instructions and their use in 8086 programming.
- Unit III: 8086 programming: logical instructions. Shift and rotate instructions and their use in 8086 programming. 8086 flag register and Flag control instructions, compare instruction, control flow and jump instructions, Loops & loop handling instructions. 8086 programming using these instructions.

**SECTION B**

- Unit IV: The 8086 stack segment and stack related instructions. 8086 I/O Address space. Subroutines and related instructions, Parameter passing, Concept of Macros, Status saving on stack. Concept of recursion at assembly program level. 8086 Programming using subroutines, recursion and macros.
- Unit V: 8086 I/O: Types of input output, isolated I/O interface, input output data transfers, I/O instructions and bus cycles. Programmable Peripheral Interface 8255 PPI: pin diagram, internal organization, modes of operation. 8086 I/O programming using 8255.
- Unit VI: 8086 Interrupts types, priority and instructions. Interrupt vector table, External hardware-interrupt interface signals & interrupts sequence. Software interrupts. Non-maskable interrupts. Programmable Interrupt Controller 8259: pin diagram, internal organization, modes of operation. 8086 Interrupt-driven programming using 8259.

**TEXT BOOKS:**

1. W. A. Triebel & Avatar Singh: The 8088/8086 Microprocessors (4e) (PHI /Pearson Education)
2. Liu & Gibson: The 8088/8086 Microprocessor (2/e) (PHI)

**REFERENCES:**

1. Barry B. Brey : The Intel Microprocessor Architecture, Programming & Interfacing (6/e)(PHI)
2. Ray & Bhurchandi: Advanced Microprocessors & Peripherals (TMH).
3. John P Uffenbeck, "8086/8088 Families: Designing, Programming and Interfacing". Prentice Hall .

**4SRN5 ASSEMBLY LANGUAGE PROGRAMMING- LABORATORY**

The sample list of program is given below. This list can be used as

guide line for problem statements but the scope of the laboratory should not be limited to the same. Aim of the list is to inform about minimum expected outcomes.

- Write a program in TASM to manipulate the two given operands with general arithmetic operators +, -, \*, / and store the result at the given location 2000H to 2003H respectively.
- Write an instruction sequence that generates a byte size integer in the memory location defined as RESULT. The value of the integer is to be calculated from logical equation  $[\text{RESULT}] = [\text{AL}] * [\text{NUM1}] + [\text{NUM2}] * \text{AL} + \text{BL}$
- Assume that all parameters are byte- sized. NUM1, NUM2 and RESULT are the offset addresses of the memory location in the current data segment.
- Given a number XY, write a program using TASM to store 0X in BX register and 0Y in CX register.
- Write a TASM program to sort the elements using Bubble Sort Algorithm.
- Write a program in TASM to search for a single item from a list of elements using Binary Search Algorithm. Show that if the element is found or not.
- Write a program in TASM to convert the given binary number into decimal number. The unsigned eight-bit value is stored in variable BINVAL; the three-digit ASCII result is stored in three memory locations HUN, TEN and ONE.
- Given 16-bit binary number in DX, write a program that converts it into its equivalent BCD number. If result is bigger than 16-bit, place all 1's in DX
- Write a program using TASM by using DOS INT 21H, function 09H to display string. The string to be displayed must have a '\$' as its last character. The string address of the string must be loaded into register DX and the string must reside within current data segment.
- Write a program using TASM to echo command line text to the screen using INT 21H, function 02H.
- Write a program using TASM to read the date maintained by the system and return the following information using DOS INT 21H, function 2AH.
  - DH = Month
  - DL = Day of month
  - CX=Year
  - AL=Day of the week
- Using DOS INT 21H function 08H write a program in TASM to obtain a secret Password from user. The password is not echoed to the screen. The password is stored in PWTXT and may be of any length, but must be terminated by a carriage return.

Using DOS INT 21H, function 05H, write a program in TASM to output ASCII code contained within register DL to the printer.

#### 4 SR 6 Computer Laboratory-II

This laboratory is based on (a) Unix/Linux Operating System as well as (b) 4SRN2 Numerical & Statistical Methods.

- a. For UNIX/Linux Operating System the topics to be covered include:-
  - 1) Unix commands,
  - 2) General purpose utilities & editors,
  - 3) The shell & shell programming,
  - 4) Communication & electronic mail,
  - 5) TCP/IP networking,
  - 6) Internet with Linux/Unix.

#### Text book:-

S.Das: UNIX: Concepts & Applications (TMH)

- b. For 4SRN2 Numerical & Statistical Methods, the programming of following algorithms should be covered;
  - i. Bisection, False Position, Newton-Raphson & Direct substitution methods.
  - ii. Gauss Elimination, Gauss Seidel, Gauss-Jordan Methods.
  - iii. Numerical differentiation by polynomial fit,
  - iv. Numerical integration by Trapezoidal Rule, Simpson Rule, Gaussion Quadratre.
  - v. Regression : Linear LS fit, Nonlinear fit. Polynomial function. Correlation
  - vi. Test of significance: The -test. The t-test, the F-test.

#### Text books :-

1. V Rajaraman: Computer Oriented Numerical Methods (PHI).
2. J.N. Kapoor: Mathematical Statistics (MCG).
3. B.H.Flowers "An Introduction to Numerical Methods in C++" (Oxford University).

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**ENVIRONMENTAL STUDIES****Total Marks : 100****PART-A****SHORT ANSWER PATTERN****25 Marks****1. The Multidisciplinary nature of environmental studies**

- . Definition, scope and importance.
- . Need for public awareness.

(2 lecture hours)

**2. Social Issues and the Environment**

- . From Unsustainable to Sustainable development
- . Urban problems related to energy
- . Water conservation, rain water harvesting, watershed management
- . Resettlement and rehabilitation of people; its problems and concerns. Case studies.
- . Environmental ethics : Issues and possible solutions.
- . Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
- . Wasteland reclamation.
- . Consumerism and waste products.
- . Environment Protection Act.
- . Air (Prevention and Control of Pollution) Act.
- . Water (Prevention and Control of Pollution) Act.
- . Wildlife Protection Act.
- . Forest Conservation Act.
- . Issues involved in enforcement of environmental legislation.
- . Public awareness.

(7 lecture hours)

**3. Human Population and the Environment**

- . Population growth, variation among nations.
- . Population explosion - Family Welfare Programme.
- . Environment and human health.
- . Human Rights.
- . Value Education.
- . HIV / AIDS.
- . Women and Child Welfare.
- . Role of Information Technology in Environment and human health.
- . Case Studies.

(6 lecture hours)

**PART-B****ESSAY TYPE WITH INBUILT CHOICE****50 Marks****4. Natural resources :****Renewable and non-renewable resources :**

- . Natural resources and associated problems.
  - Forest resources : Use and over exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
  - Water resources : Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
  - Mineral resources : Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
  - Food resources : World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer - pesticide problems, water logging, salinity, case studies.
  - Energy resources : Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources, Case studies.
  - Land resources : Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
- . Role of an individual in conservation of natural resources.
- . Equitable use of resources for sustainable lifestyles.

(8 lecture hours)

**5. Ecosystems**

- . Concept of an ecosystem.
- . Structure and function of an ecosystem.
- . Producers, consumers and decomposers.
- . Energy flow in the ecosystem.
- . Ecological succession.
- . Food chains, food webs and ecological pyramids.
- . Introduction, types, characteristic features, structure and function of the following ecosystem :-
  - Forest ecosystem
  - Grassland ecosystem
  - Desert ecosystem
  - Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

(6 lecture hours)

**6. Biodiversity and its conservation**

- . Introduction - Definition : genetic, species and ecosystem diversity.
- . Biogeographical classification of India.
- . Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values.
- . Biodiversity at global, National and local levels.
- . India as a mega-diversity nation.
- . Hot-spots of biodiversity.

- . Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts.
- . Endangered and endemic species of India.
  - . Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity. (8 lecture hours)

### 7. Environmental Pollution

- . Definition
  - . Causes, effects and control measures of :-
    - Air pollution
    - Water pollution
    - Soil pollution
    - Marine pollution
    - Noise pollution
    - Thermal pollution
    - Nuclear hazards
- . Solid Waste Management : Causes, effects and control measures of
  - . Role of an individual in prevention of pollution.
  - . Pollution case studies.
  - . Disaster management : floods, earthquake, cyclone and landslides. (8 lecture hours)

### PART-C ESSAY ON FIELD WORK 25 Marks

#### 8. Field work

- . Visit to a local area to document environmental assets - river / forest / grass land / hill / mountain
- . Visit to a local polluted site - Urban / Rural / Industrial / Agricultural
- . Study of common plants, insects, birds.
- . Study of simple ecosystems - pond, river, hill slopes, etc. (5 lecture hours)

- (Notes :**
- i) Contents of the syllabys mentioned under paras 1 to 8 shall be for teaching for the examination based on Annual Pattern.
  - ii) Contents of the syllabys mentioned under paras 1 to 4 shall be for teaching to the Semester commencing first, and
  - iii) Contents of the syllabys mentioned under paras 5 to 8 shall be for teaching to the Semester commencing later.

#### LIST OF REFERENCES :-

- 1) Agarwal, K.C., 2001, Environmental Biology, Nidi Publ. Ltd., Bikaner.
- 2) Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad - 380 013, India, Email : [mapin@icenet.net](mailto:mapin@icenet.net) (R)
- 3) Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p.
- 4) Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)

- 5) Cunningham, W.P.Cooper, T.H.Gorhani, E & Hepworth, M.T., 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p.
- 6) De A.K., Environmental Chemistry, Wiley Eastern Ltd.
- 7) Down to Earth, Centre for Science and Environment (R)
- 8) Gleick, H.P. 1993, Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press. 473p.
- 9) Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Mumbai (R)
- 10) Heywood, V.H. & Watson, R.T. 1995, Global Biodiversity Assessment, Cambridge Univ. Press 1140p
- 11) Jadhav, H & Bhosale, V.M. 1995, Environmental Protection and Laws, Himalaya Pub. House, Delhi. 284 p.
- 12) Mckinney, M.L. & Schoch, R.M. 1996, Environmental Science Systems & Solutions, Web Enhanced Edition. 639 p.
- 13) Mhaskar A.K., Matter Hazardous, Techno-Science Publications (TB)
- 14) Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co. (TB)
- 15) Odum, E.P., 1971, Fundamentals of Ecology, W.B.Saunders Co., U.S.A., 574p.
- 16) Rao M.N. & Datta A.K., 1987, Waste Water Treatment, Oxford & IBH Publ. Co. Pvt. Ltd. 345 p.
- 17) Sharma B.K., 2001, Environmental Chemistry, Goel Publ. House, Meerut.
- 18) Survey of the Environment, The Hindu (M)
- 19) Townsend C., Harper J., and Michael Begon, Essentials of Ecology, Blackwell Science (TB)
- 20) Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I and II, Enviro Media (R)
- 21) Trivedi R.K. and P.K. Goel, Introduction to Air Pollution, Techno-Science Publications (TB)
- 22) Wagner K.D., 1998, Environmental Management, W.B.Saunders Co., Philadelphia, USA 499p.
- 23) डॉ. विठ्ठल घारपुरे : पर्यावरणशास्त्र- पिंपळापूरे अॅन्ड कंपनी पब्लीशर्स, नागपूर.(R)
- 24) Dr. Deshpande, A.P.Dr. Chudiwale, A.D., Dr. Joshi, P.P., Dr. Lad, A.B.: Environmental Studies, Pimpalpure & Co., Publishers, Nagpur. (R)
- 25) R.Rajagopalan : Environmental Studies, Oxford University Press, New Delhi, 2005 (R)

(M) Magazine  
(R) Reference  
(TB) Textbook

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**FIFTH SEMESTER**  
**GENERAL INSTRUCTIONS**

- 1) Students are encouraged to utilize web based resources from MIT USA's open course ware for the relevant and appropriate portion of their curriculum. This course ware is available at [ocw.mit.edu](http://ocw.mit.edu)
- 2) Instructors are advised to undertake web based search for tutorial assignments, presentations, quizzes, articles including research papers as per their own teaching requirements. They can also try subscribing to web based course management tools. One such tool is made available on internet at [www.pageout.net](http://www.pageout.net). At present this has free access to teachers from bonafide institutes as password protected account on subscription basis from McGraw Hill publishers. Instructors should encourage students to use such tools wherever possible.
- 3) For all mini and major project assignments the students should use open source code for studying best programming practices and present those in seminars/projects. Open source code is freely available on web. The industrious programming practices, data structure implementations should be studied from the open source code and used for software implementation of the projects from problem domain.
- 4) Students can use open source research papers from [www.citeseer.org](http://www.citeseer.org) and [scholar.google.com](http://scholar.google.com) for literature survey requirements.

**5SRN1 PRINCIPLES OF MANAGEMENT**  
**SECTION - A**

**(8 hours/unit)**

- UNIT I.** Introduction : Definition and concepts of management ,Importance of management .Various management functions & control, responsibilities. Human resources planning , Decision-making, Trade unions & collective bargaining.
- UNIT II.** Organization planning, design and development: Production resources, Production planning, types of production system, production systems, production control.
- UNIT III.** Product design & development : Introduction, design of the product, New product development; Material planning and control. Inventory control technique .

**SECTION - B**

- UNIT IV.** Maintenance and system reliability: Concepts and Objectives of maintenance. Failure analysis, Reliability Maintenance system & Classification. Maintenance planning, TQM ISO 9000 and Quality audit.

- UNIT V.** Marketing management : Introduction, marketing planning . Consumer behavior, product management, Pricing & promotion decision. Financial planning. Source of finance.
- UNIT VI.** Project Management: Concepts and importance of project, Project implementation, MIS. MIS meaning and objectives. Types of data, methods of data collection, analysis and presentation of data. Editing, reporting and presentation of data, Decision options.

**Text book :**

A.K.Gupta, J.K. Sharma : Management of Systems (Macmillan)

**Referances :**

1. Appleby : Modern Business Administration, 6/e (Macmillan)
2. Tritaphy & Reddy: Principals of Management, 2/e (TMH)
3. Gupta, Sharma et: Principales of Practices of Management (Kalyani)

**5SR2 SWITCHING THEORY & LOGIC DESIGN**

**SECTION-A**

( 8 Hrs./Unit)

- UNIT I.** VHDL Modeling Concepts, VHDL Fundamentals: Constants, Variables, Scalar types, Type Classification, Expressions, Operators, Sequential Statements, If, Case, Null, Loop, Assertion, Reports statements.
- UNIT II.** Array & VHDL, Unconstrained array types, Array operations & referencing, Records Basic Modeling constructs: Entity declarations, Architecture bodies, Behavioral descriptions, Structural descriptions, Design processing.
- UNIT III.** Subprograms: Procedures, Procedure parameters, Concurrent Procedure calls, Funtions, Overloading, Visibility, Package declaration, Package bodies, Use Clause, Basic Resolved Signals & Ports, Generic constants.

**SECTION – B**

- UNIT IV.** Boolean Algebra, De Morgan's theorem, SOP & POS forms of logic functions, simplification techniques using K-map, Queen McCusky method, Iterative Consensus method.
- UNIT V** Combinational logic design procedure, design of code converter, decoders, encoders, multiplexer, binary adders, subtractor & parity genertor using logic gates and above combinational circuits.
- UNIT VI.** Analysis & synthesis of sequential circuits, design of shift registers, design of synchronous & asynchronous counters, VHDL representation of shift registers, synchronous and asynchronous counters.

**TEXT BOOKS :**

1. Peter J. Ashenden, "The Designer's Guide to VHDL", 2<sup>nd</sup> Edn, Harcourt Asia
2. Moris Mano & C.R. Kime. "Logic and Computer Design Fundamentals", 2<sup>nd</sup> Edn, Pearson Education.

**REFERENCES:**

- a. J. Bhaskar, "VHDL Primer", Person Education
- b. Perry "VHDL", Tata McGraw Hill
- c. J.F. Wakerly, "Digital Logic Design, PHI
- d. V.P. Nelson Et at, Digital Logic Circuits, Analysis & Design, PHI

**Laboratory:****Minimum 12 experiments based on above syllabus.**

The sample list of programs is given below. This list can be used as guideline for problem statements but the scope of the laboratory should not be limited to the same. Aim of the list is to inform about minimum expected outcomes.

Sr. No. Name of the Experiment

1. Design of Code Converter (4- bit Binary to Gray Code Converter) using logic gates and simulation using VHDL.
2. Design of 2 line to 4- line Decoder and simulation using VHDL.
3. Design of 4:1 Multiplexer and simulation using VHDL.
4. Design of 2- bit Binary Adder and simulation using VHDL.
5. Design of 4-bit Counter and simulation using VHDL.
6. Realization of Decade Counter and simulation using VHDL.
7. Realization of 5-bit Comparator and simulation using VHDL.
8. Realization of Parity Generator and simulation using VHDL.
9. Write a VHDL Program for 4-bit Ripple Carry Adder (Behavioral Description)
10. Realization of BCD to Excess-3 Code Converter and simulation using VHDL.

**5SR3 COMPUTER ORGANIZATION & ARCHITECTURE****SECTION – A (8 Hrs./Unit)**

- Unit I: Computer components & functions. Interconnection structures, Bus Interconnection, PCI, Computer memory system overview, semiconductor main memory, chip logic, error correction, cache memory, elements of cache design, Associative mapping, Advanced DRAM organization.
- Unit II. External devices, I/O modules, Programmed I/O, DMA, Interrupt I/O, I/O channels & IOPs, SCSI & fire wire interfaces. Integer representation and arithmetic, Booths's algorithm, Floating point representation and arithmetic, Precision considerations, guard bits, rounding, quiet and signaling NaNs, denormalised numbers, Little, Big and Bi-

Endian

- Unit III. ALU: Machine instruction characteristics, operand types, operation types, Addressing modes, Instruction formats, CPU structure, processor organization, register organization, instruction cycle, instruction pipelining, and Branch prediction.

**SECTION – B**

- Unit IV. RISC machine, Instruction Execution characteristics, Register file concept, Compiler based register optimization, RICS architecture, RISC pipelining, RISC v/s CISC, Case study SPARC, superscalar overview, Design issues in instruction level parallelism and machine parallelism, Case study of PowerPC
- Unit V.: Control unit operation: Micro-operations, control of the processor, Hardwired implementation. Micro-programmed control: Concepts, microinstruction sequencing and execution, Applications of microprogramming.
- Unit VI. Multiple processor organizations, Symmetric processors, Mainframe SMP, Cache coherence and MESI protocol, clusters, Non-uniform Memory Access, Vector computation.

**TEXT BOOKS :**

- 1) William Stallings Computer Organization & Architecture, 5/e, (Pearson Education)
- 2) A. S. Tanenbaum Structured Computer Organization, 4/e, McGraw Hill (ISE)

**REFERENCES:**

1. C. Hamacher, R Zaky Computer Organization, 5/e, McGraw Hill (ISE)
2. J.P.Hayes Computer Architecture & Organization, 4/e, McGraw Hill (ISE)
3. M.Mano & C. Kime Logic & Computer design fundamentals, (2/e), (Pearson Education)

**5SR4 FILE STRUCTURES & DATA PROCESSING****SECTION-A**

- UNIT I. Introduction : File structure design, File processing operations : open, close, read, write, seek. Unix directory structure. Secondary storage devices: disks, tapes, CD-ROM. Buffer management. I/O in Unix.
- UNIT II. File Structure Concepts : Field & record organization, Using classes to manipulate buffers, Record access, Record

structures. File access & file organization. Abstract data models for file access. Metadata. Extensibility, Portability & standardization.

UNIT III. Data Compression, Reclaiming spaces in files, Introduction to internal sorting and Binary searching. Keysorting. Indexing concepts. Object I/O. Multiple keys indexing., Inverted lists, Selective indexes, Binding.

UNIT IV. Cosequential processing : Object-Oriented model, its application. Internal sorting : a second look. File Merging : Sorting of large files on disks. Sorting files on tapes. Sort-merge packages. Sorting and Cosequential processing in Unix.

UNIT V. Multilevel indexing : Indexing using Binary Search trees. OOP based B-trees. B-tree methods Search, Insert and others. Deletion, merging & redistribution. B\*trees. Virtual B-trees. VL records & keys. Indexed sequential file access and Prefix B+trees.

UNIT VI. Hashing : Introduction, a simple hashing algorithm. Hashing functions and record distributions. Collision resolution. Buckets. Making deletions. Pattern of record access. External hashing. Implementation. Deletion. Performance. Alternative approaches.

#### Textbook :

Michael J.Folk, Bill Zoellick, Greg Riccard : File Structures : An Object-Oriented Approach using C++. (Addison-Wesley) (LPE)

#### References :

1. M.Loomis Data Management & File Processing (PHI)
2. O.Hanson Design of Computer Data Files McGraw-Hill (IE)

**5SR4 Laboratory :** Programing project as given in the textbook should be implemented for each unit, and a project report (journal) should be submitted. Programing project should span over Chapters 1,2,4,6,7,8,9,10 and 12. This lab should be based on Unix/Linux system.

#### 5 SR 5 DESIGN & ANALYSIS OF COMPUTER ALGORITHMS ( 8 Hrs./Unit)

Unit-I: Introduction to elementary algorithmic, problems & instances, Efficiency of algorithms, Average & worst-case analysis, Efficiency considerations. Elementary operations. Asymptotic notation, conditional asymptotic notation.

Unit-II: Analysis of algorithms: control structures analysis; sequencing, 'for' loops, recursive calls, while & repeat loops, Average-case analysis, amortized analysis. Solving

recurrences.

Unit-III: Advanced data structures: Heap, Binomial heaps, disjoint structures. Greedy algorithms: general characteristics. Graphs: minimum spanning trees, Kruskals' algorithm, Prims' algorithm, Shortest-path algorithms, Knapsack Problem. Scheduling.

Unit-IV: Divide-and-Conquer: Introduction, Multiplying integers, general template, binary search, Sorting : Merge-sort, Quick-sort. Insertion sort, Heap sort, Finding median, Matrix multiplication, Exponentiation, Cryptography.

Unit V: Exploring Graphs: Traversing trees; Depth-first search for undirected & directed graphs. Breadth-first search. Backtracking. Branch-and-bound. The minimax problem, Hashing.

Unit VI: Dynamic programming; Binomial coefficients & world series examples. Principle of optimality, Knapsack problem, Shortest-paths, chained matrix multiplication, Using recursion. Memory functions. Introduction to NP-completeness; class N & NP. Polynomial reduction. NP-complete problems.

#### Text-Books :

1. Aho, Hopcroft & Ullman "The Design & Analysis of Computer Algorithms" (Addison-Wesley)
2. G.Brassard, P.Bratley "Fundamentals of Algorithmics" (PHI)

#### References :

1. Horowitz & Sahani 'Fundamental Algorithms' (Galgotia)
2. Cormen, T.H, Lierson & Rivest "Introduction to Algorithms" (Mcgraw-hill)
3. Donald E. Knuth 'Fundamental Algorithms" (Addison-Wesley).

#### 5 SRN 6 COMMUNICATION SKILLS

Unit I: Comprehension over an unseen passage.

Comprehension - A - word study :-

Synonym, antonym, meanings, matching words, adjectives, adverbs, prefix and suffix, correct forms of commonly misspelled words, understanding of the given passage.

Comprehension - B - Structure study :-

Simple and compound sentences, types of conjunctions, singular and plural, tenses and their effect on verb forms. Use of - not only - but also, if clause, since, may, can, could, would, too etc.

Active and passive forms, negative and interrogative, punctuation and capitalization. (10 Hours)

Unit II : Theoretical background - importance of communication, its process, model of communication its components & barriers. Verbal communication, its significance, types of written communication, organization of a text (Titles, summaries, headings, sequencing, signaling, cueing etc.), Important text factors (length of paragraph, sentences, words, clarification and text difficulty). Evaluation of written communication for its effectivity and subject content.

Non-verbal communication, types of graphics and pictorial devices. (10 Hours)

Unit III : Specific formats for written communication like - business correspondence, formal reports, technical proposals, research papers and articles, advertising and graphics. Format for day-to-day written communication like applications, notices, minutes, quotations, orders, enquiries etc.

Oral communications - Important objectives of interpersonal skills, (verbal and non-verbal), face to face communications, group discussion and personal interviews.

Methodology of conduction of meetings, seminars, symposia, conference and workshop. (10 Hours)

#### BOOKS RECOMMENDED :

- 1) Krishna Mohan, Meera Banerjee : Developing Communication Skills, MacMillan India Limited.
- 2) Chrissie Wright (Editor) : Handbook of Practical Communication Skills, Jaico Publishing House.
- 3) Curriculum Development Centre, TTTI WR, Bhopal : A Course in Technical English, Somaiya Publication Pvt. Ltd.
- 4) F.Frank Candlin : General English for Technical Students, University of London Press Ltd.

#### COMMUNICATION SKILLS LABORATORY

##### Objective :

On completion of this laboratory the candidate should be able to demonstrate adequate skills in oral and written communication for technical English language, actively participate in group discussions and interviews and exhibit the evidence of vocabulary building. Candidates should be assessed through continuous monitoring and evaluation.

The sample list of experiments is given below. This list can be used as guideline for problem statements but the scope of the laboratory should not be limited to the same. Aim of the list is to inform about minimum expected outcomes.

1. Assignments and tests for vocabulary building
2. Technical report writing

3. Group discussions
4. Interview techniques
5. Projects and tasks such as class news letter
6. Writing daily diaries and letters
7. Interactive language laboratory experiments.

TEXT BOOK : Norman Lewis : Word Power Made Easy  
<http://www.teachingenglish.org.uk>

#### 5SR7

#### Computer Lab III : Hardware Lab.

This lab is based on PC organization, troubleshooting & maintenance.

Student should perform practical on the following areas of PC :

1. PC models
2. Inside the PC
3. Preventive maintenance.
4. PC troubleshooting
5. Semiconductor memories
6. Power supplies & power protection
7. Hard Disks : installing, configuring & maintenance
8. SCSI drives
9. Printers & their troubleshooting
10. Modems & serial interfaces
11. Keyboard, Mice, Video adapters & displays
12. Sound boards, Video capture & CD ROMs.

#### Books :

1. Mark Minasi : Complete PC upgrade & Maintenance Guide (BPB)
2. Scott Mueller : Upgrading and Repairing PCs 12/e (Que)

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#### SIXTH SEMESTER

#### 6SR1

#### SYSTEM SOFTWARE

##### SECTION-A

( 8 Hrs./Unit)

Unit I: Introduction to Compiling: The phases of a compiler, Lexical Analysis: The role of lexical analyzer, input buffering, specification of tokens, recognition of tokens, and language for specifying lexical analysis, lex and yacc tools for lexical analysis.

Unit II: Syntax Analysis: The role of the parser, Review of context free grammar for syntax analysis. Top down parsing: recursive descent parsing, predictive parsers, Transition diagrams for predictive parsers, Non recursive predictive parsing, FIRST and FOLLOW, Construction of predictive parsing tables, LL (1) grammars. Error recovery in predictive parsing

Unit III: Bottom up parsing: Handle pruning, Stack implementation of Shift Reduce Parsing, conflicts during shift reduce parsing, LR parsers: LR parsing algorithm, Construction of SLR parsing table, canonical LR parsing tables and canonical LALR parsing tables. Error recovery in LR parsing.

### SECTION B

Unit IV: Syntax Directed Translation: Syntax directed definitions, attributes, dependency graphs, construction of syntax trees. Syntax directed definition for constructing syntax trees, directed acyclic graphs for expressions. Bottom up evaluation of s-attributed definitions, L-attributed definition. Top down translation, Design of a predictive translator.

Unit V: Run Time Environments: Source language issues: Activation trees, control stacks, storage organization, subdivision of run time memory, activation records, Storage allocation strategies, static allocation, stack allocation, dangling references. Symbol table: Entries, Storage allocation, Hash tables, Scope information.

Unit VI: Code Generation: Intermediate languages, Translation of Declarations & Assignments statements. Design issues of a Code generator, Target machine, Runtime storage management, Basic blocks and flow graphs. Introduction to code optimization, principal sources of optimization.

### TEXT BOOK:

A V Aho, R Sethi, J D Ullman “Compilers Principles, Techniques and Tools”, Pearson Education (LPE).

### REFERENCES:

1. D. M. Dhamdhare, Compiler Construction—Principles and Practice, (2/e), Macmillan India
2. Andrew Appel, Modern Compiler Implementation in C, Cambridge University press
3. K C. Louden “Compiler Construction—Principles and Practice” India Edition, CENGAGE
4. Bennett J.P., “Introduction to Compiling Techniques”, 2/e (TMH).

### Lab: (The implementation language can be either C or Java)

1. Write a program to simulate a DFA
2. Some programs based on Lex
3. Some programs based on Yacc
4. Design and implementation of a Lexical Analyser
5. Design and implementation of a Predictive parser

6. Design and implementation of a LR parser

### REFERENCES:

1. Andrew Appel, Modern Compiler Implementation in C, Cambridge University press
2. Andrew Appel, Modern Compiler Implementation in Java, Cambridge University press.

### 6SR2

### DATA COMMUNICATION

#### SECTION-A

Unit I: Introduction: Components, Networks, Protocols and standards, Basic Concepts: Line Configuration, Topology Transmission mode, analog and digital signals, periodic and aperiodic signals, analog signals, time and frequency domains, composite signals, digital signals.

Unit II: Encoding and modulating: digital –to- digital conversion, analog-to-digital conversion, digital to analog conversion, analog to analog conversion, digital data transmission, DTE-DCE interface, modems, cable modems, transmission media: guided media, unguided media, transmission impairment. Performance, wavelength, Shannon capacity, media comparison.

Unit III: Multiplexing: Many to one/ one to many, frequency division multiplexing, wave division multiplexing, TDM, multiplexing applications: the telephone system, Error detection and correction: types of errors, detection, VRC, Longitudinal redundancy check, cyclic redundancy check, checksum, error correction.

#### SECTION B

Unit IV: Data link Control: Line Discipline, flow control, error control, Data link Protocols: Asynchronous Protocols, synchronous protocols, character oriented protocols, bit-oriented protocols, link access procedures.

Unit V: Local Area Networks: Ethernet, other Ethernet networks, token bus, token ring, FDDI, Comparison, MAN: IEEE802.6 (DQDB) SMDS, Switching: circuit switching, packet switching, message switching, integrated services digital networks (ISDN): services, history, subscriber access to ISDN.

Unit VI: Frame relay: introduction, frame relay operation, frame relay layers, congestion control, leaky bucket algorithm, traffic control, and other features.

**TEXT BOOKS:**

- 1) Behrouz A. Forouzan: Data Communication and Networking, 2e (TMH)
- 2) William Stallings: Data & Computer Communications, 6/e, Pearson Education.

**REFERENCES:**

- 1) William L. Schweber : Data Communication, McGraw Hill.
- 2) J.Freey : Computer Communication & Networks, AEW Press.
- 3) D. Corner : Computer Networks & Internet, Pearson Education.

**6SR3 SYSTEMANALYSIS & DESIGN****SECTION-A**

- UNIT I. Introduction : System Analysis & Design concepts. Role of system analyst. Review of System DLC. Organization as systems. Levels of management culture. Project fundamentals. Feasibility study. Activity planning & control. Managing analysis & design activities.
- UNIT II. Sampling and investigating hard data. Interviewing. Planning & conducting interview & reporting. Joint application design. Using questionnaires. Planning designing and administering the questionnaire.
- UNIT III. Coservation of a decision-makers behavior and office environment. Prototyping : User reactions. Approaches to prototyping & developing prototype. Data flow aproach to requirements. Developing DFDs. Logical & Physical DFDs. Examples of DFDs.

**SECTION-B**

- UNIT IV. Data dictionary concept. Data repository. Creating & using data dictionary. Overview of process specifications. Structured English, Decision tables/trees. Decision support system & decision making concepts relevant to DSS. Semi structured decisions. Multiple-criteria decision-making.
- UNIT V. System Proposal : Ascertaining hardware/software needs. Identifying & forecasting cost/benefit & comparing cost/benefit. Writing and presenting the systems proposals. Principles of Delivery.
- UNIT VI. Output Design Objectives. Designing printed output, Screen output. Input Design objectives. Form Design. Screen Design for input. Introduction to OOSAD. : Object-Oriented Analysis. Object-Oriented Design.

**Text-book :**

Kenneth E.Kendall &: "System Analysis and Design" (Prentice Hall) 3/e  
Julie E.Kendall

**References :**

1. Yeates "System Analysis & Design" (Macmillan)
2. J.Fitzgerald & A.Fitzgerald. "Fundamentals of System Analysis & Design" (John-Wiley) 3/e
3. Edward "System Analysis & Design" (McGraw-Hill)
4. Whiltlen, Bentley, Barlow "System Analysis & Design Methods" (Galgotia) 2/e.

**6SR3 Labs :** 8 to 10 Examples of SAD from text book covering each unit of syllabus, using any available SAD tool, as from one available with text book.

**6 SRN 4 THEORY OF COMPUTATION**

- Unit I: Alphabet, Language, Operations, Finite state machine, definitions, Finite automation model, Acceptance of strings and languages. Non deterministic finite automation, deterministic finite automati, equivalence between NFA and DFA. Conversion of NFA into DFA, minimisation of FSM, equivalence between two FSM's, Moore and Melay machines.
- Unit II : Regular sets, regular expressions, identity rules. Manipulation of regular expressions, equivalence between RE and FA. Inter conversion, pumping lemma, Closure properties of regular sets (proofs not required), Regular grammers, right linear and left linear grammers, equivalence between regular linear grammer and F A inter conversion between RE and RG.
- Unit III : Context free grammer, derivation trees, Chomsky normal form, Greibach normal form, push down automata, definition, model, acceptance of CFL, equivalence of CFL and PDA, interconversion, enumeration of properties of CFL (proofs omitted)
- Unit IV : Turing machine, definition, model, design of TM, computable functions, recursive ennumerable language, Church's hypothesis, counter machine, types of TM's.
- Unit V : Chomshy hierarchy of languages, linear bounded automata and context sensitive language, introduction of DCFL and DPDA, LR (O), grammer, decidability of problems.
- Unit VI: Undecidability : properties of recursive & non-recursive ennumerable languages, universal turing machine, post-

correspondance problem, introduction to recursive function theory.

#### TEXT BOOKS :

1. Introduction to Automata Theory, Languages and Computation by Hopcraft H.E. & Ullman J.
2. An Introduction to Formal Languages and Automata by Peter Linz (Chapter 1 to 12 except 6.3 & 7.4)

#### REFERENCE BOOKS :

1. Introduction to Languages and the Theory of Automata by John C.Martin.
2. Elements of Thoery of Computation by Lewis H.P. and Papadimition C.H.
3. Theory of Computation by Mishra & Chandrashekharan.

#### 6SR5

#### OPERATIONS RESEARCH

##### SECTION-A

- Unit I: Introduction, Classification of problems, OR mathematical modeling, Dynamic programming, Investment problem, Equipment replacement, stage coach.
- Unit II: Linear Programming: Introduction, concept of linear programming model, development of LP model, simplex method, Big M method, Duality theory, dual simplex method, Two phase method
- Unit III: Transportation & Assignment problem: Introduction to transportation problem, mathematical model, types of transportation problem, Optimization techniques for transportation problem , methods to find basic solution, Northwest Corner cell method, Least cost cell method, Vogel approximation method, Optimizing the basic feasible solution using U-V method. Assignment Problem: Introduction, zero-one programming model for Assignment problems, type of assignment problems.

##### SECTION-B

- Unit IV: Introduction to sequencing problem, Two machine, N job three machine sequencing problem, Introduction to Integer Programming, cutting plan Algorithm, branch & bound techniques, zero-one Implicit enumeration algorithm.
- Unit V: Probability OR Model: Basic probability statistical concepts, Introduction to decision theory-minimax decision procedure, Bayes decision procedure with & without data, Regret function versus loss function.

Unit VI: Introduction to Game Theory: minimax, maximum, pure strategies, mixed strategies & expected payoff, solution of 2x4 games, mx2 games, Brown's Algorithm. Introduction to PERT Network, ET, TE, TL ,SE, critical path, probability of completing events on schedule.

#### TEXT BOOKS :

1. B.E Gillelt ,Introduction to OR.,: TMH Edition
2. R.Panneerselvam Operation Research -: PHI

#### References :

- 1.Lp and N\W model: S.K Gupta EWI
- 2.Optimization Theory; S.S. Rao,wiley

#### 6 SR 6 Computer Laboratory

This laboratory shall be based on (a) MFC using VC++, OR (b) Dot NET programming using VB.NET, OR (c) Advanced Java Programming.

If the laboratory facilities are available these three may be also offered as lab electives to different batches.

(a) For MFC using VC++, minimum eight programs based on the following:

- i) MFC application creation
- ii) Using dialog boxes
- iii) Windows common controls
- iv) Document / View architecture
- v) Printing with MFC

#### REFERENCE :

- J. Prosis: Programming Windows with MFC (Microsoft Press).
- (b) For Dot NET programming using VB.NET, minimum eight programs based on the following :
- i) Introduction to .NET, VB.NET, and Visual Studio .NET
  - ii) Language Fundamentals: Console IO, Comments and Documenting,
  - iii) Common Language Runtime, Base Class Library, Namespaces
  - iv) Syntax comparison of VB.NET. Type Hierarchy; Object and Basic types,
  - v) References and Values, Boxing Language Features:
  - vi) Object Oriented Programming, Inheritance, Polymorphism, Garbage Collection,
  - vii) Iteration and Flow of Control, Arrays, Exception Handling, Interfaces
  - viii) Windows Application Development;, WinForms, Event Model,

## Controls and Menus

- ix) .NET Framework; File Handling, Event Handling, Thread pool and synchronization

**REFERENCE**

Microsoft Press “VB.Net Programming”.

## (c) Advanced Java Programming

- i) Multithreading in Java
- ii) Networking in Java
- iii) Swing classes and GUI
- iv) Built-in Data Structure and Java utilities
- v) Object Serialization and RMI
- vi) Java Database Connectivity

**REFERENCE**

Herbert Schildt: Java Complete References (McGraw Hill)

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**SEVENTH SEMESTER****GENERAL INSTRUCTIONS**

- 1) Students are encouraged to utilize web based resources from MIT USA’s open course ware for the relevant and appropriate portion of their curriculum. This course ware is available at [ocw.mit.edu](http://ocw.mit.edu)
- 2) Instructors are advised to undertake web based search for tutorial assignments, presentations, quizzes, articles including research papers as per their own teaching requirements. They can also try subscribing to web based course management tools. One such tool is made available on internet at [www.pageout.net](http://www.pageout.net). At present this has free access to teachers from bonafide institutes as password protected account on subscription basis from McGraw Hill publishers. Instructors should encourage students to use such tools wherever possible.
- 3) For all mini and major project assignments the students should use open source code for studying best programming practices and present those in seminars/projects. Open source code is freely available on web. The industrious programming practices, data structure implementations should be studied from the open source code and used for software implementation of the projects from problem domain.
- 4) Students can use open source research papers from [www.citeseer.org](http://www.citeseer.org) and [scholar.google.com](http://scholar.google.com) for literature survey requirements.

**7SR1 OPERATING SYSTEMS****SECTION-A**

( 8 Hrs./Unit)

- Unit-I : Introduction: Operating System(OS) definition, OS Evolution, OS Components and Services.  
Process Concept, Process Scheduling, Operations on Processes, Cooperating Processes, Interprocess Communication, Threads Overview, Multithreading Models, Threading Issues, Java Threads.
- Unit-II : CPU Scheduling Concepts, Scheduling Criteria and Algorithms. Process Synchronization:  
The Critical-Section Problem, Synchronization Hardware, Semaphores, Monitors. Deadlocks: Definition & Characterization, Deadlocks Prevention, Avoidance, Detection and Recovery from Deadlock.
- Unit-III : Memory Management Background, Swapping, Contiguous Memory Allocation Schemes, Paging, Segmentation. Virtual Memory Management: Background, Demand Paging scheme, Process Creation, Page Replacement Policies, Allocation of Frames, Thrashing.
- Unit-IV: File-System Interface; Directory Structure, File-System Mounting, File Sharing & Protection. File-System Structure, File-System Implementation. Directory Implementation, Allocation Methods, Free-Space Management. File Recovery.
- Unit-V : I/O Systems :Overview, I/O Hardware, Application I/O Interface, and Kernel I/O Subsystem.  
Transforming I/O to Hardware Operations. Disk Scheduling, Disk Management, Swap-Space Management, RAID Structure.
- Unit-VI: The Linux System; History, Design Principles, Kernel Modules, Process Management, Scheduling, Memory Management, File Systems, Input and Output, Interprocess Communication, Network Structure & Security in Linux.

**TEXT BOOK:**

Avi Silberschatz, P.B.Galvin, G. Gagne: “Operating System Concepts” (Sixth Edition) John Wiley & Sons Publication.

**REFERENCES:**

- i. A.S Tanenbaum “Modern Operating Systems” Pearson Education.
- ii. William Stallings “Operating Systems” Prentice-Hall.
- iii. D M Dhamdhare “Operating Systems” Tata McGraw-Hill.
- iv. M Milankovic “Operating Systems” McGraw-Hill.”

**7SR2 DATABASE MANAGEMENT SYSTEM****SECTION-A**

- Unit-I: Database System Applications, Database Systems versus File Systems, View of Data, Data Models, Database Languages, Database Users and Administrators, Transaction Management, Database System Structure, Application architectures, History of Database Systems. Entity-Relationship Model, Basic Concepts, Constraints, Keys, Design Issues, Entity-Relationship Diagram, Weak Entity Sets, Extended E-R Features, Design of an E-R Database Schema, Reduction of an E-R Schema to Tables.
- Unit-II: Relational Model: Structure of Relational Databases, The Relational Algebra, Extended Relational-Algebra Operations, Modification of the Database, Views, The Tuple Relational Calculus, The Domain Relational Calculus, SQL: Basic Structure, Set Operations, Aggregate Functions, Null Values, Nested Subqueries, Views.
- Unit-III: Integrity and Security, Domain Constraints, Referential Integrity, Assertions, Triggers, Security and Authorization, Authorization in SQL, Encryption and Authentication, Relational-Database Design: First Normal Form, Pitfalls in Relational-Database Design, Functional Dependencies, Decomposition, BCNF, Third, Fourth and more Normal Forms, Overall Database Design Process.
- Unit-IV: Query Processing: Overview, Measures of Query Cost, Selection Operation, Sorting, Join Operation, Other Operations, Evaluation of Expressions, Query Optimization: Overview, Estimating Statistics of Expression Results, Transformation of Relational Expressions, Choice of Evaluation Plans, Materialized Views.
- Unit-V: TRANSACTION MANAGEMENT: Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Execution, Serializability, Recoverability, Implementation of Isolation, Transaction Definition in SQL, Testing for Serializability.
- Unit-VI: Concurrency Control: Lock-Based Protocols, Timestamp-Based Protocols, Validation-Based Protocols, Multiple Granularity, Multiversion Schemes, Deadlock Handling, Insert and Delete Operations Weak Levels of Consistency, Concurrency in Index Structures. Recovery System, issues & solutions.
- TEXT:** Korth, Sudarshan : Database System Concept , Mc Graw Hill, 4<sup>th</sup> Edition

**REFERENCE:**

1. Raghuram Krishnan : Database system
2. C.J.Date : Database System, 7<sup>th</sup> ed.
3. Connolly & Begg, : Database System, Low Price Ed.

**7SR2 Database Management Systems Laboratory**

The sample list of programs based on ORACLE or MY SQL is given below. This list can be used as guideline for problem statements but the scope of the laboratory should not be limited to the same. Aim of the list is to inform about minimum expected outcomes.

1. Consider the employee database, where the primary keys are underlined & Write the Queries using following clauses & also retrieve the data from the given database.  
Employee (employee-name, street, city)  
Works (employee-name, company-name, salary)  
Company (company-name, city)  
Manages (employee-name, manager-name)  
I) Order By II) Between III) Group By IV) Having
2. Consider the above database & perform the different Join Operations which are as follows.  
I) Inner Join II) Left Outer Join III) Right Outer Join IV) Full Outer Join
3. Consider the above database & Perform the different Set Operations Which are as follows.  
I) Union II) Intersect III) Except/Minus
4. Consider the above database & perform the all Aggregate Functions.
5. Write an assertion for the bank database to ensure that the assets value for the 'perryridge' branch is equal to the sum of all amounts lent by the 'perryridge' branch.  
Customer (customer-name, customer-street, customer-city)  
Branch (branch-name, branch-city, asstes)  
Loan (loan-number, branch-name, amount)  
Borrower (customer-name, loan-number)  
Depositor (customer-name, account-number)  
Account (account-number, branch-name, balance)
6. Write an SQL trigger to carry out the following action: On delete of an account, for each owner of the account, check if the owner has any remaining accounts, and if she does not, delete her from the depositor relation.
7. Consider the above Bank database & write the SQL queries for the following views:  
I) A view containing the account numbers the customer names for all accounts at the deer park branch.

- II) A view containing the names and addresses of all customers who have an account with the bank, but do not have a loan.

8. Mini Project Using Oracle 9i & VB6

**7SR3 COMPUTER NETWORKS & INTERNET**

**SECTION – A (8 Hrs./Unit)**

UNIT – I Introduction: Brief history of computer networks & Internet, Layered architecture, Internet protocol stack, Network entities & layers, Application layer: Principles of protocols, HTTP, FTP, SMTP and DNS protocols.

UNIT – II Transport layer: services & principles, multiplexing & demultiplexing applications, UDP, principles of reliable data transfer, TCP details, principles of congestion control, TCP congestion control.

UNIT – III Network layer: network service model, routing principles, hierarchical routing, Internet Protocol (IP) & ICMP details, routing in the Internet, router internals, IPV6.

**SECTION – B**

UNIT – IV Link layer: Introduction, services, multiple access protocol, LAN addresses & ARP, CSMA / CD, PPP details.

UNIT – V Network security: Basic issues, principles of cryptography, authentication and authentication protocol, version, integrity : digital signatures, message digests, hash function algorithm, key distribution & certification, secure e- mail, E – Commerce : SSL & SET, IP sec details.

UNIT – VI Network Management: Basic principles, infrastructure for network management, The Internet Network – management framework: SMI, MIB, SNMP details, security and administration, ASN 1, Firewalls: Packet filtering and Application gateway.

**TEXT BOOK:**

1. James F. Kurose & K W Ross: Computer Networking, Pearson Education (LPE)

**REFERENCES:**

1. Douglas E. Comer: Computer Network & Internet, Addison Wesley.
2. Andrew S. Tanenbaum : Computer Networks, PHI (5E)
3. Leon Garcia & Widjaja: Communication Networks, TMH
4. William Stallings: Data & Computer Communication, Pearson Education.

**7SR4 ADVANCED MICROPROCESSOR & INTERFACING**

**SECTION – A (8 Hrs./Unit)**

Unit I: Microcontrollers: types, selection and applications of microcontrollers. 8051 microcontroller family, 8051 Microcontroller: hardware, pin configuration, internal register and functional configuration, I/O pins for ports & circuits.

Unit II: 8051 Microcontroller Internal and external memories. 8051 data memory space, Semiconductor memories like EPROM, S/DRAM, Interfacing and timing diagrams for external memories. Counters and timers: Programmable timers in 8051 and timer modes.

Unit III: 8051 Instruction set: addressing modes, data transfer instructions, Data & bit manipulation instructions, arithmetic instructions & logical instructions for the registers, internal RAM and SFRs. Program-flow control instructions.

**SECTION – B**

Unit IV: Interrupt structure in 8051, servicing of interrupts in 8051. enabling /disabling of interrupts, Polling & 8051 interrupt-driven programming. Free running counter and real time control, interrupt interval and density constraints. 8259 PIC interfacing with 8051.

Unit V: Synchronous serial-cum-asynchronous serial communication USART interface in 8051. USART interface 8251: Pin configuration, internal organization, and modes of operations, 8251 interfacing with 8051 and programming.

Unit VI: Analog-to-Digital converter ADC 0816 configuration and its interfacing with 8051. Digital-to-Analog converter DAC 808 configuration and its interfacing with 8051. LCD display controller, its interfacing and programming with 8051.

**TEXT BOOKS :**

1. Rajkamal “Microcontrollers: Architecture, Programming, Interfacing & System design”, (Pearson education)
2. Mazidi & Mazidi “The 8051 Microcontroller & Embedded systems”, (Pearson education)

**REFERENCES:**

1. Ayala, K, J. “The 8051 Microcontroller- Architecture, Programming and Applications”, Penram Pub.
2. Predko, Myke “Programming & customizing 8051 Microcontroller” McGraw-Hill.
3. Stewart, J. W. “The 8051 Microcontroller- Hardware, Software and Interfacing”, PHI.
4. Calcutt, C & Parchizadeh, “The 8051 Microcontroller- Hardware, Software & Applications” Wiley.

**ADVANCED MICROPROCESSOR & INTERFACING LAB.**

Minimum eight programs based on each unit of the syllabus. The program should cover interfacing of various peripherals with Intel 8086 processor and in addition to that at least six programs should be based on Unit V & VI.

**7SR5****ELECTIVE-I  
(I) COMPUTER GRAPHICS**

- Unit I: An overview of Computer Graphics and Graphics System : Video display devices, Raster-Scan systems, Random-Scan systems, Graphics monitors and workstations, input devices, hard copy devices, Graphics software.
- Unit II : Output primitives : Point and Lines, Line drawing algorithms, loading the frame buffer, line function, circle and ellipse generating algorithms, curves, parallel curves algorithms, Pixel addressing, filled-area primitives , functions, Cell array, character generation.
- Unit III: Attributes of output primitives : Line and curve attributes, color and grayscale levels, area fill attributes. Character attributes, bundled attributes, antialiasing.
- Unit IV: 2-D geometric transformations : basic transformations, matrix representations, composite transformations, other transformations, transformations between coordinate systems, affine transformations, transformation functions, Raster methods for transformations. Two-Dimensional viewing : viewing coordinates, Window-to-viewport coordinate transformation, viewing functions, clipping : point, line, polygon, curve, text, exterior.
- Unit V : Structures and hierarchical modeling : concepts, editing structures, basic modeling concepts, hierarchical modeling, GUI and interactive input methods : the user dialogue, input of graphical data, functions, initial values for input device parameters, interactive picture - construction techniques, virtual reality environments.
- Unit VI: Three dimensional concepts : display methods, graphics, Bezier curves and surfaces, B-spline curves and surfaces, Beta-splines, three dimensional geometric and modeling transformations : translation, rotation, scaling, three dimensional viewing : viewing pipeline, viewing coordinates, projections.

**TEXT BOOK :**

D. Hearn, M.P.Baker : Computer Graphics, II edition (Pearson Education)

**REFERENCES :**

- 1) F.S.Hill : Computer Graphics Using Open GL, II edition (Pearson Education)
- 2) W.M.Newman & R.F.Sproul : Principles of Interactive Computer Graphics, 2/e, (McGraw Hill)
- 3) F.S.Hill : Computer Graphics (McMillan)
- 4) D.Hearn & M.P.Baker : Computer Graphics (Prentice Hall)
- 5) Hamington : Computer Graphics (McGraw Hill)

**Computer Graphics Lab.**

At least eight experiments must be performed which will include at least one experiment on each Unit.

**7SR 5****ELECTIVE-I  
(II) MODELING & SIMULATION****SECTION-A ( 8 Hrs./Unit)**

- UNIT – I System Models and System studies : Basic concepts of systems and system modeling static and dynamic/physical and mathematical models-principles used in modeling-corporate models- analysis, design and postulation of system.
- UNIT – II Basic Concepts and continuous system : Techniques used-distributed log models and cobweb models continuous system Model- Analytical equations and methods of obtaining solutions –analog and hybrid computers and simulations CSSLS examples of different continuous system
- UNIT – III System dynamics, probability concepts and basic principles of discrete simulation Growth and decay models system dynamics diagrams examples-stochastic Process-probability functions and their evaluation-random number generation–rejection method-comparison of Monte-Carlo method and stochastic simulation-examples.

**SECTION – B**

- UNIT – IV Simulation of Queuing System and PERT Network  
Simulation of Queuing system: Rudiments of queuing theory, simulation of a single server queue, simulation of a two server queue, simulation of more general queues. Simulation of a PERT Network: Network model of a project, Analysis of an activity network, critical path
- UNIT – V Simulation of Inventory Control & Forecasting Design and Evaluation of Simulation Experiments  
Inventory Control and Forecasting: Elements of inventory theory, more Complex inventory models, simulation example=1, Generation of Poison and Erlanger variates,

Simulation example- 2, Forecasting and regression Analysis. Design and Evaluation of simulation Experiments: Length of Simulation runs, variance reduction techniques, Experimental layout, Validation, summary and conclusion.

- UNIT – VI Simulation of Languages and Introduction to GPSS  
Different special purpose languages used for continuous and discrete systems and comparison –factors affecting the selection of discrete system simulation languages- comparison of GPSS and SIMSCRIPT . A detailed study of GPSS with examples.

#### TEXT BOOKS:

1. Groffrey Gordon “System Simulation”, II Edition, PHI Pvt.Ltd., New Delhi- 1987.
2. Narsingh Deo, “ System Simulation with Digital Comuters” PHI Pvt.Ltd.,New Delhi.

#### REFERENCES:

1. Shannon R.E.,”System Simulation:The Art of Science” Prentic Hall,Englewood Cliffs,NY,1975.
2. Hugh j. Wston, John H.Blackstone,Jr., “Computer Simulation” Iind Edition, John Wiley & Sons.
3. James A. Payne “Introduction to Simulation: Programming Techniques and Methods of Analysis” McGraw Hill

#### MODELING & SIMULATION LAB.

Minimum twelve practical sessions based on above syllabus

### 7SR5 ELECTIVE-I

#### (III) ARTIFICIAL INTELLIGENCE

##### SECTION-A

- UNIT I. Introduction to Artificial Intelligence : Overview of Artificial Intelligence. Knowledge : General concept, Introduction to LISP : Syntax and numerical functions. Basic list manipulation function in LISP. Functions, predicates and conditional Input, output and local variables, iteration and recursion. Property list and arrays.
- UNIT II. Knowledge representation - I: Syntax and symantics for propositional logic. Syntax and symantics for FOPL. Properties of Wffs. Conversion to clausal form. Inference fuels. The resolution principle, Nondeductive inference methods. Representation using rules.
- UNIT III. Knowledge representation - II: Truth maintenance system. Default reasoning and closed world assumption. Predicate

completion and circumscription, model and temporal logics. Overview of object oriented systems, object classes messages and methods, simulation examples using OOS program.

##### SECTION-B

- UNIT IV. Knowledge organization and manipulation: Preliminary concept, Examples of search problems, Uniformed and blind search. Informed search. Searching AND-OR graphs, structure used in matching. Measures for matching: distance matrices, qualitative measures, similarity measures. Partial matching, Indexing and retrieval technique, Integrating knowledge in memory. Memory organization system.
- UNIT V. Knowledge Acquisition : General concept in knowledge acquisition, Learning by induction. Analogical and explanation based learning : Analogical learning and reasoning, Explanation and learning.
- UNIT VI. Expert system : Expert system architectures : Introduction, Rules based system architecture. Nonproductive system architecture, Dealing with uncertainty. Knowledge acquisition and validation. Knowledge system building tools.

#### Reference Books :

1. P.H.Winston, “Artificial Intelligence,” Addison- Wesley Publication Company II Edition, 1984.
2. E.Charniac and D.McDermott, “ Introduction to Artificial Intelligence,” Addison-Wesley Publishing Company, 1985.
3. F.Holtz, “LISP-The language of Artificial Intelligence,” TAB Books Inc. Blue Rodge Summit. PA17214, 1985.
4. Peter Jackson, “Introduction to expert systems, “Addison-Wesley Publishing Company, 1986.
5. D.W.Rolston, “Principles of Artificial Intelligence and Expert Systems Development,” McGraw Hill International Edition, 1988.
6. E.Rich, K.K.Knight, “Artificial Intelligence,” Tata McGraw Hill, New Delhi, 1991.

#### Artificial Intelligence Lab.

At least Twelve experiments must be performed which will include at least one experiment on each Unit.

Use of LISP/PROLOG is suggested.

**7SR5 ELECTIVE-I****(IV) COMPONENT BASED COMPUTING****SECTION-A**

- UNIT I. Introduction : Software distribution, Dynamic Linking, Portability, Encapsulation features & C++. Interfaces & implementation. Abstract based as binary interfaces. Runtime polymorphism. Object extensibility.
- UNIT II. Interfaces : IDL, Methods & results, Interfaces & IDL, IUnknown. Resource management and IUnknown. Type coercion. IUnknown implementation. Using COM interface pointers. Query Interface optimization. Data types. Attributes. Properties and Exceptions.
- UNIT III. Classes : Interface & implementation. Class objects, Activation. Using SCM. Classes & Services. Generalizations. Optimization. Monikers. Composition. Persistence. Service lifetime. Classes & IDL. Class emulation. Component categories.

**SECTION-B**

- UNIT IV. Objects : Query Interface properties: Symmetric, Transitivity, Reflexivity. Static types. Query Interface & IUnknown. Uniqueries & identity. Multiple interface and method names. Dynamic, Binary compositions. Containment.
- UNIT V. Apartments: Basic concepts. Cross-apartment Access. In-process marshalling Helpers. Standard marshalling Architecture. Life cycle management & marshalling. Custom marshalling. Free threaded marshaler.
- UNIT VI. Applications: Inprocess Activation pitfalls. Activation & SCM. Application IDS. COM and security. Programmatic security. Access control. Token management. Pointers & memory. Arrays. Dynamic Vs static invocation.

**Textbook :**

Don Box : Essential COM, Addison -Wesley (LPE)

**References :**

1. MFC Programming Unleashed (Techmedia)
2. COM/DCOM Unleashed (Techmedia)
3. J.Pritchard : COM & CORBA side by side (Pearson Education)

**COMPONENT BASED COMPUTING LAB.**

Minimum Twelve programs based on above syllabus.  
Most recent version of C++ compiler should be used.

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**EIGHT SEMESTER****8 SRN1 DIGITAL SIGNAL PROCESSING****SECTION-A**

( 8 Hrs./Unit)

- Unit I: Discrete –Time Signals and Systems:  
Introduction to DSP, Advantages, basic elements of DSP system, sampling theorem, A/D, D/A conversion, quantization. Elementary discrete-time sequences. Discrete-time systems: description, representation, classification (linear, time-invariant, static, casual, stable)
- Unit II: Analysis of DTLTI systems:  
The convolution sum, properties of convolution, Analysis of causal LTI systems, stability of LTI systems, step response of LTI systems, difference equation, recursive & non recursive discrete-time systems, solution of difference equations, Impulse response of LTI recursive system. Correlation of discrete time signals.
- Unit III: z- Transform and Analysis of LTI Systems:  
Definition of z- Transform, properties, rational z-Transforms, evaluation of the inverse z- Transforms, analysis of linear time invariant systems in z-domain, transient and steady-state responses, causality, stability, pole-zero cancellation, the Schur-Cohn stability test

**SECTION-B**

- Unit IV: Fourier Transforms, the DFT and FFT:  
Definition & properties of Fourier transform, relation with z-transform. Finite duration sequences and the discrete Fourier transform(DFT), properties, circular convolution, Fast algorithms for the computation of DFT: radix-2 and radix-4 FFT algorithms
- Unit V: Design of Digital Filters:  
Classification of filters: LP, HP, BP, FIR and IIR filters, filter specifications. Design of FIR filters using Windows and by Frequency sampling methods. Design of IIR filters from Analog filters using approximation of derivatives, Impulse invariant transformation, Bilinear transformation and Matched z-Transformation, Commonly used Analog filters and IIR Filter design example
- Unit VI: Realization of Discrete-Time systems:  
Structures for realization of Discrete-Time systems, realization of FIR systems: Direct Form, Cascade Form, Frequency sampling and Lattice structures. Realization of IIR filters: Direct Form, Signal flow graph and Transposed structures, Cascade form, Lattice and Lattice-ladder. Realization for IIR systems.

**TEXT BOOK :**

J G Prokis and D G Manolokis, “Digital Signal Processing: Principles

**REFERENCES:**

1. S K Mitra: "Digital Signal Processing: A Computer-Based Approach" (McGraw Hill)
2. E C Ifeachor and B W Jervis "Digital Signal Processing A Practical Approach" (Pearson Education)
3. A V Oppenheim, R W Schafer with J R Buck "Discrete Time Signal Processing"(PHI)

**8 SRN 1 D.S.P. LABORATORY**

Minimum 12 examples based on above syllabus. Design may be implemented using C-programs or Matlab or TMS 320 C 25 SDK or combination thereof.

**8 SR2 SOFTWARE ENGINEERING****SECTION-A**

- UNIT I. Evolving role of Software. Software crises & myths. Software engineering. Software process & process models : Linear sequential, prototyping, RAD, Evolutionary Product & Process. Project management concepts : People, Product, Process, Project. WSHH principle, critical practice.
- UNIT II. Measures, Metrics & Indicators. Metrics in process & project domains-software measurement, Metrics for software quality, small organization. Software projects Planning : Scope, resources, estimation, decomposition technique, Tools. Software risks : identification, risk projection, refinement & RMMM plan.
- UNIT III. Project Scheduling : Concepts. Peoples Efforts. Task set, Task network. Scheduling. EV analysis, Project Plan. Software quality concepts. SQ Assurance, Software reviews, technical reviews, software reliability, ISO 900 L, SQA Plan. SCM process. Version control. SCM standard.

**SECTION-B**

- UNIT IV. System engineering : Hierarchy, Business Process & Product engineering : Overviews. Requirement engineering, System modeling. Requirement analysis. Analysis principles. Software prototyping. Specification. Design Process. Design Principles & Concepts. Effective modular design. Design model & documentation.
- UNIT V. Software architecture, Data Design, Architectural styles, Requirement mapping. Transform & Transaction mappings. User-interface design : Golden Rule. UTD, Task analysis &

modeling, ID activities, Tools, design evaluation. Component level design : Structure programming, Comparison of design notation.

- UNIT VI. Software testing fundamentals ; test case design, Whitebox testing. Basis path, control structure-, Blackbox-Testing, & for specialized environments. Strategic approach to S/W testing. Unit testing, integration testing, validation testing, system testing. Debugging. Technical metrics for software.

**Textbook :**

Pressman Roger. S. : Software Engineering, A Practitioner's Approach TMH.

**References :**

1. Somerville : Software Engineering (Addison-Wesley) (5/e)
2. Fairly R. : Software Engineering (McGraw Hill)
3. Davis A. : Principles of Software Development (McGraw Hill)
4. Shooman, M.L. : Software Engineering (McGraw-Hill)

**8SR3 ELECTIVE-II****(I)ADVANCED UNIX PROGRAMMING****SECTION-A**

- UNIT I. Review of OSI model. Processes. Client server model. The Unix model : Basics. I/O. Signals. Process control in Unix, Interprocess communication under Unix : Pipes, Messages, Streams and Sockets.
- UNIT II. Communication protocols review. TCP/IP,XNS,SNA,UUCP. Berkeley sockets: Overview, Socket related system calls, input output multiplexing. system V transport layer interface.
- UNIT III. Library routines : introduction, Berkeley Library routines. Security routines : BSD routines, time & Date routines : Internet time and date client. time synchronization. Ping routines. Introduction. Internet ping client. XNS echo client.

**SECTION-B**

- UNIT IV. File transfer protocol; protocol, security, data formats, connections. UDP & TCP implementation. Line printer spoolers: BSD spoolers, System V spollers. Remote command execution.
- UNIT V. Remote login; introduction, terminal line disciplines, Examples of remote login. concepts of pseudo terminals. terminal modes, window environments, Flow control. Remote login servers, remote login clients and their implementation.

APPENDIX-B  
FOUR YEAR DEGREE COURSE  
BRANCH : COMPUTER SCIENCE & ENGINEERING  
SEMESTER PATTERN  
SEMESTER : THIRD

L : Theory Lecture  
T : Tutorial  
P : Practical  
D : Drawing / Design

ABBREVIATIONS :-  
S - Semester  
R - Computer  
U - Electronics  
L - Industrial Electronics  
E - Electrical  
I - Instrumentation

Sr. No.	Sub. Code	SUBJECT	Teaching Scheme			Examination Scheme										Grand Total
			L	T	P/D	Theory					Practical					
						Total Hours/Week	Duration of Papers (Hrs)	Max. Marks Theory Papers	Maximum Marks College Assessment	Total	Min. Pass Marks	Max. Marks External	Max. Marks Internal	Total Marks	Minimum Pass Marks	
1.	3SRN1	Mathematics-III	5	-	-	5	3	80	20	100	40	—	—	—	—	
2.	3SRN2	Programming Methodology	4	-	2	6	3	80	20	100	40	25	25	50	25	
3.	3SRN3	Discrete Structures	4	1	-	5	3	80	20	100	40	—	—	—	—	
4.	3SRN4	Electronic Devices & Ckt.	4	-	2	6	3	80	20	100	40	25	25	50	25	
5.	3SR5	Object Oriented Technologies	4	-	2	6	3	80	20	100	40	25	25	50	25	
6.	3SR6	Computer Laboratory-I	-	-	2	2	-	-	-	-	-	25	25	50	25	
TOTAL			21	1	8	30				500				200	700	

SEMESTER : FOURTH

Sr. No.	Sub. Code	SUBJECT	Teaching Scheme			Examination Scheme									
			L	T	P/D	Theory					Practical				
						Total Hours/Week	Duration of Papers (Hrs)	Max. Marks Theory Papers	Maximum Marks College Assessment	Total	Min. Pass Marks	Max. Marks External	Max. Marks Internal	Total Marks	Minimum Passing Marks
1.	4SRN1	Data Structures	4	-	2	6	3	80	20	100	40	25	25	50	25
2.	4SRN2	Numerical & Statistical Method	4	1	-	5	3	80	20	100	40	—	—	—	—
3.	4SR3	Analog & Digital ICs	4	-	2	6	3	80	20	100	40	25	25	50	25
4.	4SRULEIN4	Social Sciences and Engineering Economics	4	-	-	4	3	80	20	100	40	—	—	—	—
5.	4SRN5	Assembly Language Programming	4	-	2	6	3	80	20	100	40	25	25	50	25
6.	4SR6	Computer Laboratory-II	-	1	2	3	-	-	-	-	-	25	25	50	25
TOTAL			20	2	8	30				500				200	700

APPENDIX-C  
FOUR YEAR DEGREE COURSE  
BRANCH : COMPUTER SCIENCE & ENGINEERING  
SEMESTER PATTERN  
SEMESTER : FIFTH

L : Theory Lecture  
T : Tutorial  
P : Practical  
D : Drawing / Design

ABBREVIATIONS :-  
S - Semester Pattern  
R - Computer Sc. & Engg.

Sr. No.	Sub. Code	SUBJECT	Teaching Scheme			Examination Scheme								Grand Total	
			L	T	P/D	Theory				Practical					
	No.					Total Hours/Week	Duration of Papers (Hrs)	Max. Marks Theory Papers	Maximum Marks College Assessment	Total	Min. Pass Marks	Max. Marks	Max. Marks College Assessment	Total Marks	Minimum Pass Marks
1.	5SRN1	Principles of Management	4	-	-	4	3	80	20	100	40	—	—	—	—
2.	5SR2	Switching Theory & Logic Design	4	-	2	6	3	80	20	100	40	25	25	50	25
3.	5SR3	Computer Organisation & Architecture	4	-	-	4	3	80	20	100	40	—	—	—	—
4.	5SR4	File Structure & Data Processing	4	-	2	6	3	80	20	100	40	25	25	50	25
5.	5SR5	Design & Analysis of Algorithms	4	-	-	4	3	80	20	100	40	—	—	—	—
6.	5SRN6	Communication Skills	2	1	-	3	2	40	10	50	20	15	10	25	12
7.	5SR7	Computer Laboratory-III	-	-	2	2	-	-	-	-	-	25	25	50	25
TOTAL			22	1	6	29				550				175	725

SEMESTER : SIXTH

1.	6SR1	System Software	4	-	2	6	3	80	20	100	40	25	25	50	25
2.	6SR2	Data Communication	5	-	-	5	3	80	20	100	40	-	-	-	-
3.	6SR3	System Analysis & Design	4	-	2	6	3	80	20	100	40	25	25	50	25
4.	6SRN4	Theory of Computation	5	-	-	5	3	80	20	100	40	-	-	-	-
5.	6SR5	Operations Research	4	1	-	5	3	80	20	100	40	-	-	-	-
6.	6SR6	Computer Laboratory-IV	-	-	2	2	-	-	-	-	-	25	25	50	25
TOTAL			22	1	6	29				500				150	650

APPENDIX-D  
FOUR YEAR DEGREE COURSE  
BRANCH : COMPUTER SCIENCE & ENGINEERING  
SEMESTER PATTERN  
SEMESTER : SEVENTH

L : Theory Lecture  
T : Tutorial  
P : Practical  
D : Drawing / Design

ABBREVIATIONS :-  
S - Semester Pattern  
R - Computer Sc. & Engg.

Sr. No.	Sub. Code	SUBJECT	Teaching Scheme			Examination Scheme							Grand Total		
			L	T	P/D	Theory			Practical						
No.						Total Hours/Week	Duration of Papers (Hrs)	Max. Marks Theory Papers	Maximum Marks College Assessment	Total	Min. Pass Marks	Max. Marks	Max. Marks College Assessment	Total Marks	Minimum Pass Marks
1.	7SR1	Operating Systems	4	1	-	5	3	80	20	100	40	—	—	—	—
2.	7SR2	DataBase Management Systems	4	-	2	6	3	80	20	100	40	25	25	50	25
3.	7SR3	Computer Networks & Internet	4	1	-	5	3	80	20	100	40	—	—	—	—
4.	7SR4	Advanced Microprocessors & Interfacing	4	-	2	6	3	80	20	100	40	25	25	50	25
5.	7SR5	Elective-I*	4	-	2	6	3	80	20	100	40	25	25	50	25
6.	8SR5	Project & Seminar	-	-	2	2	-	-	-	-	-	-	-	-	-
TOTAL			20	2	8	30				500				150	650

Elective-I \* (i) Computer Graphics (ii) Modelling & Simulation (iii) Artificial Intelligence (iv) Component Based Computing

SEMESTER : EIGHT

1.	8SRN1	Digital Signal Processing	4	-	2	6	3	80	20	100	40	25	25	50	25
2.	8SR2	Software Engineering	4	-	-	4	3	80	20	100	40	-	-	-	-
3.	8SR3	Elective-II**	4	1	2	7	3	80	20	100	40	25	25	50	25
4.	8SRN4	Internet Technologies	4	1	2	7	3	80	20	100	40	25	25	50	25
5.	8SR5	Project & Seminar	-	-	6	6	-	-	-	-	-	75	75	*150	75
TOTAL			16	2	12	30				400				300	700

Elective-II \*\* (i) Advanced Unix Programming (ii) Advanced DataBase Management Systems (iii) Multimedia Technologies (iv) Embeded Systems

\*8SR5 College Assesment - 50  
Seminar - 25  
University Oral - 75

UNIT VI. Performance; IPC performance, disk performance, network performance. Introduction to remote procedure calls, transparency issues, Sun RPC, Linux RPC, Xerox courier, Appollo RPC.

**Text book :**

R.Stevens : Unix Network Programming (PHI) Vol I & II

**References :**

D.E.Comer : Internetworking with TCP/IP(PHI) Vol.I & II, III.

**8SR3**

**ELECTIVE-II**

**(II)ADVANCED DATABASE MANAGEMENT SYSTEMS**

**SECTION-A**

UNIT I: Object oriented Databases: Need for complex data types, the object oriented data model. Object Relational Databases: Nested Relations, Complex types, inheritance, Reference types, Querying with Complex Types, Functions and Procedures, Object – Oriented versus Object Relational. XML: Background, Structure of XML Data, XML documents Schema, Querying and transformations, the application program interface, Storage of XML data, XML Applications.

UNIT II: Database System Architecture: Centralized and Client-Server Architectures, Server System Architectures, Parallel Systems, Distributed Systems, Network Types. Distributed databases: Homogeneous and Heterogeneous Databases, Distributed data storage, Distributed Transactions, Commit protocols, Concurrency Control in Distributed Databases, Availability, Distributed Query Processing,

UNIT III: . Parallel databases: Introduction, I/O parallelism, Inter, Intra query parallelism, Intra-operation parallelism, Inter-operation parallelism, Design of parallel systems. Application Development and Administration: Web Interfaces to Databases, Performance Tuning, Performance Benchmarks.

**SECTION-B**

UNIT IV: Advanced Querying and Information Retrieval: Decision-Support Systems, Data Analysis and OLAP, Data Mining, Data Warehousing, Information-Retrieval Systems.

UNIT V: Advanced Data Types and New Applications: Motivation, Time in Databases, Spatial and Geographic Data, Multimedia Databases, Mobility and Personal Databases.

UNIT VI: Advanced Transaction Processing: Transaction-Processing Monitors, Transactional Workflows, Main-Memory Databases, Real-Time Transaction Systems, Long-Duration Transactions, Transaction Management in Multidatabases.

**TEXT BOOK :**

Korth, Sudarshan: “Database System Concepts” , McGrawHill (4/e)

**REFERENCE:**

Hector Garcia-Molina et al, “Database System Implementation”, Pearson Education, LPE

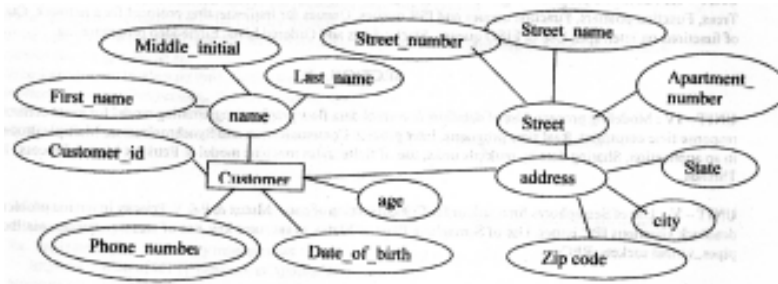
**8SR3**

**ADVANCED DATABASE MANAGEMENT SYSTEM**

**LIST OF PRACTICALS**

The sample list of program is given below. This list can be used as guide line for problem statements but the scope of the laboratory should not be limited to the same. Aim of the list is to inform about minimum expected outcomes.

1. Consider the relational database & perform the queries for the following:  
Employee (person\_name, street, city)  
Works(person\_name, company\_name, salary)  
Company(company\_name, city)  
Manages(person\_name, manager\_name)
  - i) Give the scheme definition in SQL corresponding to the relational schema shown in relational database, using references to express foreign –key relationship.
  - ii) Find the company with the most employee.
  - iii) Find the company with smallest salary.
2. Consider the above database & perform the query using SQL:1999 for the following:
  - i) Find those companies whose employee earn a higher salary on average, than the average salary at “ first bank corporation”.
3. Construct an SQL:1999 schema definition for the given database. Use inheritance where appropriate. A car rental company maintains a vehicle database for all vehicles in its current fleet. For all vehicles it includes, the vehicle identification number, license number, manufacturer, model, date-of-purchase and color. Special data are included for certain types of vehicles.
  - Truck: cargo capacity
  - Sport cars: horse power, renter age requirement
  - Vans: number of passengers
  - Off-road vehicles: ground clearance, drive train(four-or-two wheel drive)
4. Consider the E-R diagram given below which contains composite, multivalued attribute & derived attribute.



- i) Construct an SQL:1999 schema definition corresponding to the E-R diagram, use an array to represent the multivalued attribute & appropriate SQL:1999 construct to represent the other attribute types.
  - ii) Give constructors for each of the structured types defined above.
5. Given a relation S (student, subject, marks), write a query to find cumulative balances, equivalent to that given, but without using the extended SQL windowing construct
- ```

Select account_number, date-time,
      Sum(value) over
      (partition by account_number
      order by date-time
      rows unbounded preceding)
as balance
from transaction
order by account_number,date-time.
  
```
6. Write query for the given database to summarize sales number & price by store & date along with the hierarchies on store & date
- ```

Item_info(item_id,itemname,color,size,category)
Date_info(date,month,quarter,year)
Store(store_id,city,state,country)
customer(customer_id,name,street,city,state,zipcode,country)
sales(item_id,store_id,customer_id,date,number,price)
  
```
7. Study the support for spatial data offered by the database system that to be used & implement the following:
- I) A schema to represent the geographic location of the restaurants along with features such as the cuisine served at the restaurant & the level of expensiveness
  - II) A query to find moderately priced restaurants that serve Indian food and are within 5 miles of your house(assume any location for your house)

8. Consider a relation that is fragmented horizontally by plant\_number. Employee (name, address, salary, plant\_number)  
Assume that each fragment has two replicas: one stored at the New York & one stored locally at the plant site. Describe a good processing strategy for the following queries entered at the san jose site.
- a) Find all employee at the Boca plant
  - b) Find the average Salary of all Employee
9. Mini Project.(encourage project based on open source code for implementation industrious programming practices.

### 8SR3 ELECTIVE-II

#### (III) MULTIMEDIA TECHNOLOGIES

##### SECTION-A

- Unit I: Multimedia Authoring and Data Representations: Introduction, Components of Multimedia, Hypermedia and Multimedia, Overview of Multimedia Software Tools, Multimedia Authoring and Tools: Multimedia Authoring, VRML. Graphics and Image Data Representations: Graphics/Image Data Types, 1-Bit Images, 8-Bit Gray-Level, Images, Image Data Types, Popular File, Formats, GIF, JPEG, PNG, TIFF, EXIF, Graphics Animation Files, PS and PDF, Windows WMF, Windows BMP, Macintosh PAINT and PICT, X Windows PPM.
- Unit II: Color in Image and Video: Color Science, Color Models in Images, and Color Models in Video.  
Fundamental Concepts in Video: Types of Video Signals, Component Video, Composite Video, S-Video, Analog Video, NTSC Video, PAL Video, SECAM Video, Digital Video, Chroma Sub sampling CCIR Standards for Digital Video, High Definition TV.
- Unit III: Basics of Digital Audio: Digitization of Sound, Digitization, Nyquist Theorem, Signal-to-Noise Ratio (SNR), Signal-to-Quantization-Noise Ratio (SQNR), MIDI: Musical Instrument Digital Interface, Hardware Aspects of MIDI, Structure of MIDI Messages, General MIDI, MIDI-to-WAV Conversion, Quantization and Transmission of Audio, Coding of Audio, Pulse Code Modulation, Differential Coding of Audio, Lossless Predictive Coding, DPCM, DM, ADPCM.

##### SECTION-B

- Unit IV: Multimedia Data Compression: Lossless Compression Algorithms: Basics of Information Theory, Run-Length Coding, Variable-Length Coding (VLC), Dictionary-Based

- Coding, Arithmetic Coding, Lossless Image Compression. The JPEG Standard.
- Unit V: Basic Video Compression Techniques: Introduction, Video Compression Based on Motion Compensation, Search for Motion Vectors, H.261, Intra-Frame (I-Frame) Coding, Inter-Frame (P-Frame) Predictive Coding, Quantization in H.261, H.261 Encoder and Decoder, H.261 Video Bitstream Syntax, MPEG-1, Motion Compensation in MPEG-1, Major Differences from H.261
- Unit VI: Basic Audio Compression Techniques: ADPCM, Vocoders, Phase Insensitivity, Channel Vocoder, Formant Vocoder, Linear Predictive Coding, CELP. MPEG Audio Compression: Psychoacoustics, Equal-Loudness Relations, Frequency Masking, Temporal Masking, MPEG Audio, MPEG Layers, MPEG Audio Strategy, MPEG Audio Compression Algorithm, MPEG-2 AAC (Advanced Audio Coding).

**TEXT BOOK:**

Ze-Nian, Li, Mark S. Drew "Fundamentals of Multimedia" (Pearson Education)

**REFERENCES:**

1. Rajan Parekh "Principles of Multimedia" (Tata McGraw-Hill)
2. S.J.Gibbs & D.C.Tsichritzis "Multimedia Programming", Addison Wesley 1995
3. P.W.Agnew & A.S.Kellerman "Distributed Multimedia", Addison-Wesley 1996
4. C.A.Poynton, "A Technical Introduction to Digital Video" Wiley 1996
5. F.Fluckiger, "Understanding Networked Multimedia", Prentice-Hall 1995

**8SR3 Elective Laboratory :**

Minimum Eight experiments/programming assignments must be completed based on the respective syllabus covering each of the units.

**8 SR 3**

**ELECTIVE-II  
(4) EMBEDDED SYSTEMS**

- UNIT – I Introduction to embedded systems, Processor in the system, Hardware units required in the exemplary cases, Software embedded into a system. Final Machine implement able software for a product, Software in Processor specific assembly language and high level language, Device drivers device management using an operating systems, Software

- design for scheduling multiple tasks and devices using RTOS, Embedded SoC and in VLSI circuits.
- UNIT – II Structural units of the processor, Allocation of memory to program segment and blocks, memory map of the system, Memory blocks for different data sets and structures, serial communication using I<sup>2</sup>C, CAN and advanced I/O buses between the networked multiple devices, Device drivers, Virtual Devices, Device drivers for parallel port, serial and timing devices, Context and periods for context switching, deadline and interrupt latency.
- UNIT – III Software programming in assembly language and C, Use of data structures, Queues, Stacks, Lists and Trees, Function pointers, Function queues and ISR queues, Queues for implementing protocol for a network, Queuing of functions on interrupts, Use of FIFO queues, Stacks, Lists and Ordered Lists, Embedded programming

**SECTION – B**

- UNIT – IV Modeling process, Use of dataflow & control data flow graphs, Programming model for event controlled or response time constraint, Real time programs, Inter process Communication and Synchronization, Multiple processes in an application, Sharing data by multiple tasks, use of finite states machine model & Petri net Model, Process, Tasks, Threads.
- UNIT – V Use of Semaphores for a task or for Critical section of code, Mutex & P & V, Priority inversion problems & deadlock situations IPC issues, Use of Semaphore flags or Mutex as resource key, use of message queues, mailboxes, pipes, virtual sockets, RPCs.
- UNIT – VI Introduction to RTOS, OS Services, RTOS Services, Schedule management for multiple tasks in Real Time, Handling of interrupt source call, RTOS task scheduling models, Cooperative Round Robin Scheduling using a Circular Queue of ready tasks and using and Ordered list as per precedence constraints, Cycling scheduling in Time Sharing, Preemptive scheduling, Critical section service by preemptive scheduler, fixed Real Time scheduling, Precedence assignment in Scheduling algorithms. Performance metrics, IEEE Standard POSIX 1003.1B, fifteen-point strategy for Synchronization, Embedded Linux Kernel.

**TEXT BOOK:**

1. Rajkamal Embedded Systems, Architecture, Programming & Design, TMH.

**REFERENCES:**

1. Real Time Systems, Jane W. S. Liu, Pearson Education
2. Embedded System Design, A Unified Hardware/Software Introduction, Frank Vahid, Tony Givargis, John Wiley & Sons P Ltd

**PRACTICALS :** Minimum 12 experiments based on above syllabus.

**8SRN4 INTERNET TECHNOLOGIES****SECTION-A**

- UNIT I. Servlets in Java; Introduction, Servlet structure & lifecycle. Servlet API basics, Various classes & interfaces. Servlet requirements & writing. Running and debugging of Servlets: Servlet Debug Class.
- UNIT II. HTTP Redirects & Servlet API; Concepts of cookies, Servlets & cookies. State and session management with Servlet API. Server side includes and request forwarding. Servlet chaining. Jdbc Servlets.
- UNIT III. Introduction to XML; Writing XML, creating a DTD, elements & attributes definitions. XML schema. Defining simple & complex types. Namespaces, schemas and validation.

**SECTION-B**

- UNIT IV. Cascading Style Sheets (CSS) L & XML; anatomy of a style, creating and calling stylesheets for an XML/HTML document. Layout with CSS. setting up various properties of elements using CSS. Formatting Text with CSS.
- UNIT V. Introduction to JSP; Simple JSP & concepts, Request-time expressions. Concept of Beans, Bean instances & serialization; Advanced JSPs: Scripts. conditionals, loops, Try/Catch, Beans & Scriptlets.
- UNIT VI. Bean Scopes, Writing Beans. Jdbc & Beans. Dynamic Ads and E-commerce concepts. Using Scopes from Servlets, Using Beans from servlets. JSP classes. JSPs and XML.

**Books :**

1. Dustin R Callaway : Inside Servlets Pearson Education (LPE)
2. XML Related Technologies and Programming in Java by IBM EEE (PHI).
3. Larne Pekowasky: Java Server Pages, Pearson Education (LPE)
4. Dietel & Dietel : WWW : How To Program , Pearson Education (LPE)
5. Deitel, Nieto, Lin, Sadhu : XML: How to Program, Pearson Education.
6. J. Wigglesworth & P McMillan “Java Programming: Advanced Topics” (Thomson).
7. J C Jackson “Web Technologies” Pearson Education (LPE).

**8SRN4****INTERNET TECHNOLOGIES LAB****LIST OF PROGRAMMES**

The sample list of program is given below. This list can be used as guide line for problem statements but the scope of the laboratory should not be limited to the same. Aim of the list is to inform about minimum expected outcomes.

- 1 To study concept of client-Server system, working of Client, working of Server and kinds of Client- Server
- 2 a) Introduction to Servlets that describe the servlet Life cycle with various Http methods, Advantages of Servlet user CGI  
b) Write a simple Servlet oriented program to print “Hello World” on a client machine
- 3 Write a program to create cookies that accepts Personal information in a Form from the user and whenever the user clicks “Submit” button cookie will be sent and when the user retrieves cookie from his site the values sent in the cookie should be display on the HTML page
- 4 Write a program to design and implement customer Registration system which allows you (Customers) to register themselves with your site. The data is captured by Servlet and stored in the database using JDBC
- 5 Write a program using Session that selects the programming language and when Submit button is clicked a page with Session information gets displayed along with the information for selecting another language and other to get recommended books which displays the requested page when clicked
- 6 Write a program to create a DTD for Library System.
- 7 Write a program to create a Bean that will create a Rectangle with color property in it and set its various properties like Height, width etc
- 8 Write a program to implement the program for Quiz using JSP
- 9 Implement one mini Project using Servlet, Cookies, JDBC, JSP

**8SR5****PROJECT & SEMINAR**

1. Students should use open source code for studying best programming practices and present those in seminars and projects  
Ex. Implementation of Memory management / Process scheduling in linux OS  
Implementation of HTTP protocol in Apache Web Server etc.
2. Students can use open source recent papers from [www.citeseer.org](http://www.citeseer.org) and google scholar for their projects.

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**SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI**  
**\* ORDINANCE NO. 42 OF 2005**

**Examination in Environmental Studies leading to Bachelor Degree, Ordinance, 2005**

Whereas it is expedient to frame an Ordinance relating to Examination in Environmental Studies leading to Bachelor Degree level, hereinafter appearing, the Management Council is hereby pleased to make the following Ordinance.

1. This Ordinance may be called “Examination in Environmental Studies leading to Bachelor Degree, Ordinance, 2005.”
2. This Ordinance shall come into force from the Academic session 2005-06.
3. In this Ordinance and in other ordinances relating to the examination, unless there is anything repugnant in the subject or context :-
  - (i) “Academic session” means a session commencing on such date and ending with such date of the year following as may be appointed by the Management Council.
  - (ii) “Admission to an examination” means the issuance of an admission card to a candidate in token of his having complied with all the conditions laid down in the relevant ordinance, by a competent officer of the University.
  - (iii) “Applicant” means a person who has submitted an application to the University in the form prescribed for admission to an examination.
  - (iv) “Candidate” means a person who has been admitted to an examination by the University.
  - (v) “Regular Candidate” means an applicant who has applied for admission to a University examination through an affiliated college, Department or Institute in which he/she has prosecuting a regular course of study.
  - (vi) “Examinee” means a person who present himself/herself for an examination to which he/she has been admitted.
  - (vii) “Examination” means an examination prescribed by the University under the relevant Ordinance.
  - (viii) “External Candidate” means a candidate who is allowed to take a University examination in accordance with the provision of Original Ordinance No. 151.
  - (ix) “ Non-Collegiate Candidate” means a candidate who is not a collegiate candidate.

- (x) An “Ex-student” is a person who having once been admitted to an examination of this University, is again required to take the same examination by reason of his failure or absence thereat and shall include a student who may have joined a college, Department or Institute again in the same class.
- (xi) “Bachelor Degree Examination” means a examination leading to Bachelor Degree of the University.
- (xii) “Previous Year” means a year following by final year of Bachelor Degree.
4. Save as otherwise specifically provided, the conditions prescribed for admission to the examination under this Ordinance shall apply to all persons who wish to take the examination to the Degrees of the University mentioned in para 5 below.
5. The conditions prescribed for admission to examination under this Ordinance shall apply to following degrees of the University :-
- 1) Bachelor of Arts
  - 2) Bachelor of Performing Arts
  - 3) Bachelor of Fine Arts
  - 4) Bachelor of Mass Communication
  - 5) Bachelor of Social Work
  - 6) Bachelor of Commerce
  - 7) Bachelor of Business Administration
  - 8) Bachelor of Science
  - 9) Bachelor of Computer Science
  - 10) Bachelor of Computer Applications
  - 11) Bachelor of Pharmacy
  - 12) Bachelor of Science (Home Science)
  - 13) Bachelor of Technology (Cosmetics)
  - 14) Bachelor of Engineering
  - 15) Bachelor of Engineering (Part Time) (Civil)
  - 16) Bachelor of Textile
  - 17) Bachelor of Technology (Chemical Technology)
  - 18) Bachelor of Technology (Chemical Engg.)
  - 19) Bachelor of Architecture, and
  - 20) Bachelor of Laws (Five Year Course)
- 6 i) Environmental Studies shall be a compulsory subject for a previous year examination of the following Bachelor Degrees of the University,
- 1) Bachelor of Arts
  - 2) Bachelor of Performing Arts
  - 3) Bachelor of Fine Arts
  - 4) Bachelor of Mass Communication

- 5) Bachelor of Social Work
  - 6) Bachelor of Commerce
  - 7) Bachelor of Business Administration
  - 8) Bachelor of Science
  - 9) Bachelor of Computer Science
  - 10) Bachelor of Computer Applications
  - 11) Bachelor of Pharmacy
  - 12) Bachelor of Science (Home Science)
  - 13) Bachelor of Technology (Cosmetics)
  - 14) Bachelor of Engineering (Part Time) (Civil)
- ii) Environmental Studies shall be a compulsory subject for IIIrd & IVth Semester of the following Bachelor Degrees of the University,
- 1) Bachelor of Engineering
  - 2) Bachelor of Textile
  - 3) Bachelor of Technology (Chemical Technology)
  - 4) Bachelor of Technology (Chemical Engineering)
  - 5) Bachelor of Architecture, and
- iii) Environmental Studies shall be a compulsory subject for Vth & VIth Semester of the Degree of Bachelor of Laws (Five Year Course)
- iv) Students admitted to Second Year/Third Year/IVth Semester/ VIth Semester of various degree examination courses in different Faculties in the academic session 2005-06 or thereafter shall have to appear for examination in the subject Environmental Studies.
7. The main examination leading to Environmental Studies shall be held in Summer and supplementary examination in Winter every year, at such places and on such dates as may be appointed by Board of Examinations.  
**Explanation:-** Examination shall be conducted on the basis of one common question paper for all Bachelor Degree Examination courses irrespective of annual or semester pattern.
8. Scope of the subject for annual pattern examination and or semester pattern examination shall be as provided under the syllabus.
9. Common question paper for all courses covered under this Ordinance alongwith answer books shall be supplied by the University to the Colleges, Departments and Institutes for conducting the examination of the subject.
10. Valuation of the answer books relating to this subject shall be done at College/Department/Institution level only. Remuneration for valuation of answer books shall not be paid by the University.

Provided that prescribed evaluation fee for evaluation of each answer book/s of an external examinee/s appeared from the examination centre shall be paid to each examination centre.

11. It shall be obligatory on the part of the College/Department/Institute to submit candidate wise following information to the University on or before the date as may be prescribed by the University :-

Sr. No.	Grade/Category	Marks secured
1.	“A”	- 60 and above
2.	“B”	- 45 to 59
3.	“C”	- 35 to 44
4.	“D”	- 25 to 34
5.	“Fail”	- 24 and below
6.	“Absent”	

12. For the purposes of teaching, learning and examination, the Committee consisting of three teachers shall be appointed by the Principal/ Head of the Department/Head of the Institution under his/her Chairmanship/ Chairpersonship. While appointing three teachers on the said committee, the Principal shall take care that the teachers to be appointed on the committee, if necessary, shall be from different faculty.

13. i) Duration of theory examination of this subject shall be three hour.  
 ii) For all Bachelor Degree examinations, common question paper of 100 marks shall be provided by the University.  
 iii) Distribution of these 100 marks shall be as follows :-
- |   |   |          |
|---|---|----------|
| a) Part-A, Short Answer Pattern           | - | 25 Marks |
| b) Part-B, Essay type with inbuilt choice | - | 50 Marks |
| c) Part-C, Essay on Field Work            | - | 25 Marks |

14. Medium of instruction shall be English or Marathi or Hindi. Question paper shall be supplied in English and Marathi and Hindi. A candidate shall have option to write answers in English or Marathi or Hindi.

15. Examination for the subject Environmental Studies shall be compulsory for external candidates appearing as a fresh candidate at Winter and/or summer examination.

16. For teaching of the subject, there shall be atleast two hour per week. For teaching the subject to the regular candidates, a full time approved teacher of the University and or a person having Postgraduate Degree in any faculty with second class shall be considered eligible.

17. For teaching of the subject, additional fee to be charged to regular candidate shall be as prescribed by the University.

18. Every College/ University Teaching Department shall charge additional fee of Rs. 100/- to every Student of the subject Environmental studies. Out of this Rs. 100/-, the College/University Teaching Department shall have to pay Rs. 25/- to the University as an examination fee of each candidate for the subject environmental studies.

19. The Grade secured by an examinee in the examination of this subject shall not be considered for providing the facility of A.T.K.T. in next higher class.

20. The provisions of Ordinance No. 18/2001 shall not be applicable for securing a grade or higher grade in the examination of this subject.

21. Result of the Final Year of the respective Degree shall not be declared of an examinee unless he/she secures any one of the grade in the examination of subject.

Provided an examinee admitted to Five Year LL.B. course desiring not to continue his/her education beyond Sixth Semester of the said course shall have to secure any one of the grade in the examination of the subject otherwise his/her result of Sixth Semester for awarding B.A. degree shall not be declared.

22. Certificate shall be issued, to the successful examinees in the subject Environmental Studies, after the examination.

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**@ REGULATION NO. 16 OF 2002**

**Examinations leading to the Degree of Bachelor of Engineering  
(Computer Science & Engineering) (Four Year Degree Course....  
Semester Pattern) Regulation, 2002.**

Whereas it is expedient to frame the Regulation in respect of Examinations leading to the Degree of Bachelor of Engineering (Computer Science & Engineering) (Four Year Degree Course.....Semester Pattern) for the purposes hereinafter appearing the Management Council is hereby pleased to make a following Regulation.

1. This regulation may be called “Examinations leading to the Degree of Bachelor of Engineering (Computer Science & Engineering) (Four Year Degree Course....Semester Pattern) Regulation, 2002.
2. This Regulation shall come into force w.e.f. from the Academic session-
  - i) 2000-01 for Ist & IInd Semester B.E.,
  - ii) 2001-02 for IIIrd & IVth Semester B.E.,
  - iii) 2002-03 for Vth & VIth Semester B.E., and
  - iv) 2003-04 for VIIth & VIIIth Semester B.E.
3. The Schemes of Teachings and Examinations for Ist & IInd, IIIrd & IVth, Vth & VIth, and VIIth & VIIIth Semester in respect of Bachelor of Engineering (Computer Science & Engineering) (Four Year Degree Course.... Semester Pattern) shall be as per Appendices A, B, C, and D appended with this Regulation respectively.

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@ As amended vide Regulation Nos. 35 of 2003, 30 of 2005, 2 of 2006 and 19 of 2007.