Solapur University, Solapur
Structure of S.E.(Information Technology) Part I & II w.e.f.
Academic Year 2008-09.

S.E.(Information Technology) **Part -I**

Sr. No.	**Name Of the Subject**	**L**	**T**	**P**	**Total**	**Paper**	**T/W**	**OE**	**POE**	**Total**
1	Applied Mathematics - I	4	1	-	5	100	25	-	-	125
2	Discrete Mathematical Structure	3	1	-	4	100	25	-	-	125
3	Data Structures- I	4	-	4	8	100	25	-	50	175
4	Switching Theory & Logic Design	4	-	-	4	100	-	-	-	100
5	Computer Graphics	3	-	2	5	100	25	-	-	125
6	Visual Basic	2	-	2	4	-	-	-	50	50
	Total	**20**	**2**	**8**	**30**	**500**	**100**	**-**	**100**	**700**

7	Environmental Science	2	-	-	2	-	-	-	-	-

S.E.(Information Technology) **Part -II**

Sr. No.	**Name Of the Subject**	**L**	**T**	**P**	**Total**	**Paper**	**T/W**	**OE**	**POE**	**Total**
1	Applied Mathematics – II	4	1	-	5	100	25	-	-	125
2	Formal Systems & Automata	3	1	-	4	100	25	-	-	125
3	Microprocessor	4	-	2	6	100	25	-	50	175
4	Computer Networks – I	4	-	2	6	100	25	-	50	175
5	Data Structures-II	3	-	2	5	100	25	-	-	125
6	Object Oriented Design & Programming (C++)	2	-	2	4	--	25	-	50	75
	Total	**20**	**2**	**8**	**30**	**500**	**150**	**-**	**150**	**800**

7	Environmental Science	2	-	-	2	-	-	-	-	-

Note:-

1. Vacational Training (be evaluated at B.E. Part-I) of minimum 15 days should be completed in any vacation after S.E.Part-II but before B.E. Part-I & the report should be submitted in B.E. Part-I.

2. The batch size for the practical/tutorials be of 20 students. On forming the batches, if the strength of remaining students exceeds 9 students, then a new batch be formed .

Solapur University, Solapur
Structure of T.E.(Information Technology) Part I & II w.e.f.
Academic Year 2009-10.

T.E.(Information Technology) **Part -I**

Sr. No.	**Name Of the Subject**	**L**	**T**	**P**	**Total**	**Paper**	**T/W**	**OE**	**POE**	**Total**
1	Computer Networks - II	4	-	2	6	100	25	-	-	125
2	Computer Organization	4	-	-	4	100	-	-	-	100
3	System Programming	3	-	2	5	100	25	-	50	175
4	Operating System – I	3	-	2	5	100	25	-	-	125
5	Design & Analysis of Algorithm	4	-	-	4	100	-	-	-	100
6	Java Programming	2	-	4	6	-	25	-	50	75
	Total	**20**	**-**	**10**	**30**	**500**	**100**	**-**	**100**	**700**

T.E.(Information Technology) **Part -I**

Sr. No.	**Name Of the Subject**	**L**	**T**	**P**	**Total**	**Paper**	**T/W**	**OE**	**POE**	**Total**
1	Data Base Engineering	4	-	2	6	100	25	-	50	175
2	Compiler Construction	3	-	2	5	100	25	-	-	125
3	Operating System – II	4	-	2	6	100	25	-	50	175
4	Software Engineering	4	-	-	4	100	-	-	-	100
5	Artificial Intelligence	3	-	-	3	100	-	-	-	100
6	Advanced Java	2	-	2	4	-	25	-	50	75
7	Seminar	-	-	2	2	-	50	-	-	50
	Total	**20**	**-**	**10**	**30**	**500**	**150**	**-**	**150**	**800**

Note:-

1.Vacational Training (be evaluated at B.E. Part-I) of minimum 15 days should be completed in any vacation after S.E.Part-II but before B.E. Part-I & the report should be submitted in B.E. Part-I.

2.The batch size for the practical/tutorials be of 15 students. On forming the batches, if the strength of remaining students exceeds 7 students, then a new batch be formed .

Structure of B.E.(Information Technology) Part I & II w.e.f.
Academic Year 2010-11.

B.E.(Information Technology) **Part -I**

Sr. No.	**Name Of the Subject**	**L**	**T**	**P**	**Total**	**Paper**	**T/W**	**OE**	**POE**	**Total**
1	Advanced Computer Architecture	4	-	-	4	100	-	-	-	100
2	Management Information System	4	-	2	6	100	25	-	-	125
3	Advanced Data Base System	4	-	2	6	100	25	-	50	175
4	Elective - I	4	-	-	4	100	-	-	-	100
5	VC ++	2	-	4	6	-	25	-	50	75
6	Project - I	-	-	4	4	-	25	75	-	100
7	Industry Institute Interaction	-	-	-	-	-	25	-	-	25
	Total	**18**	**-**	**12**	**30**	**400**	**125**	**75**	**100**	**700**

B.E.(Information Technology) **Part -II**

Sr. No.	**Name Of the Subject**	**L**	**T**	**P**	**Total**	**Paper**	**T/W**	**OE**	**POE**	**Total**
1	Information Retrieval	3	-	2	5	100	25	-	50	175
2	Mobile Computing	4	-	-	4	100	-	-	-	100
3	Network Security	4	-	-	4	100	-	-	-	100
4	Elective - II	4	-	-	4	100	-	-	-	100
5	Web Technology	3	-	4	7	-	25	-	50	75
6	Project - II	-	-	6	6	-	50	-	100	150
	Total	**18**	**-**	**12**	**30**	**400**	**100**	**-**	**200**	**700**

Elective – I

1. Artificial Neural Network
2. Object Oriented Modeling & Design
3. Microcontroller
4. Digital Signal Processing

Elective – II

1. Pattern Recognition
2. Software Testing & Quality Assurance
3. Embedded systems
4. Image processing

Note :

1.Minimum strength of the Students for Electives be 15.

2.The batch size for the practical/tutorials be of 15 students. On forming the batches, if the strength of remaining students exceeds 7 students, then a new batch be formed.

3. For Project the group shall be about 4 students.

Solapur University, Solapur
Structure & Syllabi of S.E.(Information Technology) Part I & II w.e.f.
Academic Year 2008-09.

S.E.(Information Technology) **Part -I**

Sr. No.	Name Of the Subject	L	T	P	Total	Paper	T/W	OE	POE	Total
1	Applied Mathematics - I	4	1	-	5	100	25	-	-	125
2	Discrete Mathematical Structure	3	1	-	4	100	25	-	-	125
3	Data Structures- I	4	-	4	8	100	25	-	50	175
4	Switching Theory & Logic Design	4	-	-	4	100	-	-	-	100
5	Computer Graphics	3	-	2	5	100	25	-	-	125
6	Visual Basic	2	-	2	4	-	-	-	50	50
	Total	**20**	**2**	**8**	**30**	**500**	**100**	**-**	**100**	**700**

7	Environmental Science	2	-	-	2	-	-	-	-	-

S.E.(Information Technology) **Part -II**

Sr. No.	Name Of the Subject	L	T	P	Total	Paper	T/W	OE	POE	Total
1	Applied Mathematics – II	4	1	-	5	100	25	-	-	125
2	Formal Systems & Automata	3	1	-	4	100	25	-	-	125
3	Microprocessor	4	-	2	6	100	25	-	50	175
4	Computer Networks – I	4	-	2	6	100	25	-	50	175
5	Data Structures-II	3	-	2	5	100	25	-	-	125
6	Object Oriented Design & Programming (C++)	2	-	2	4	--	25	-	50	75
	Total	**20**	**2**	**8**	**30**	**500**	**150**	**-**	**150**	**800**

7	Environmental Science	2	-	-	2	-	-	-	-	-

Note:-

1. Vacational Training (be evaluated at B.E. Part-I) of minimum 15 days should be completed in any vacation after S.E.Part-II but before B.E. Part-I & the report should be submitted in B.E. Part-I.

2. The batch size for the practical/tutorials be of 20 students. On forming the batches, if the strength of remaining students exceeds 9 students, then a new batch be formed .

Solapur University, Solapur
S.E.(INFORMATION TECHNOLOGY) Part-I
1. Applied Mathematics - I

Teaching Scheme : 4 Lectures / week **Examination Scheme**: Theory 100 marks

Tutorial : 1 hour/ week T**erm work** : 25 Marks.

SECTION – I

Unit 1 : Linear Differential equations – Linear Differential equations with constant coefficients and method of variation of parameters 6

Unit 2 : Homogeneous Linear Differential equations – Legendre's Linear equations, Electrical Engg. Applications. 5

Unit 3: Partial Differential equations – Four standard forms of Partial Differential equations of first order. Solution of partial differential equations by method of separation of variables. 5

Unit 4: Laplace Transform: Definition, Transform of standard function, Properties, Transform of derivative and integral. Inverse Laplace Transform, Convolution Theorem. Applications to solve linear Differential Equations with constant Coefficients. 6

SECTION-II

Unit 5: Fourier series: Definition, Euler's formula, Expansions of function, Change of interval, even and odd functions, half range Fourier series. 6

Unit 6:Statistics: Coefficient of correlation and lines of Regression of bivariate data, fitting of curves-Least square principle. 6

Unit 7: Z-Transform: Z-Transform of elementary Functions, Properties of Z-Transform and Inverse Z-Transform. 5

Unit 8: Vector Calculus: Differentiation of vectors, tangent line to the curve, velocity and acceleration, Gradient, Divergence and Curl of vector field, Solenoid, irrotational and conservative vector field.

List of recommended books:

1. A textbook of Applied Mathematics Vol. I and Vol. II by J.N. and P.N. Wartikar – Vidyarthi Grah Prakashan, Pune.
2. Higher Engineering Mathematics by B.S.Grewal – Khanna Publications, Delhi.
3. Advanced Engineering Mathematics by Jaggi and Mathur-Dhapatrai and Sons, Bhopal.
4. A textbook of Applied Mathematics by N.P. Bali, Ashok Saxena and N.Ch. S.N. Iyengar – Laxmi Publications , Delhi.
   Advanced Engineering Mathematics by Kreyzig-John Wiley & SMS, Newyork.

Solapur University, Solapur
S.E.(INFORMATION TECHNOLOGY) Part-I
2. Discrete Mathematical Structure

Lectures :3 Hrs/week **Theory :100 Marks**
Tutorials :1 Hrs/week **Term Work : 25 Marks**

Section - I

1. Mathematical logic : (9)

Introduction, statements and Notation, Connectives - negation, conjunction, disjunction, conditional, biconditional, statement formulas and truth tables, well formed formulas, Tautologies, Equivalence of formulas, Duality law, Tautological implications, functionally complete sets of connectives, other connectives, Normal & Principle normal forms; Completely parenthesized infix & polish notations, Theory of inference for statement calculus.

2. Set theory : (6)

Basic concepts of set theory , types of operations on sets, Ordered pairs, Cartesian product, Representation of discrete structures, Relations, Properties of binary relations, Matrix and graph representation, Partition and covering of set, Equivalence relation, Composition, POSET and Hasse diagram.

3. Functions : (4)

Function -types, Composition of functions, Inverse functions, Natural numbers.

Section - II

4. Algebraic systems, semi groups and monoids, properties and examples. (5)

5. Polish expressions and their compilation, Groups, group codes. (8)

6. Lattices and Boolean algebra : (5)

Lattice as POSETs, definition, examples and Properties, Lattice as algebraic systems, Special lattices, Boolean algebra definition and examples, Boolean functions.

Text book:

1. Discrete mathematical structures with applications to computer science
-- J. P. Tremblay & R. Manohar (MGH International)

Note: Scope of the articles mentioned in the syllabus is as per the text book.

References:

1. Discrete mathematics -- Liu (MGH)
2. Foundations of discrete mathematics - K.D.Joshi (WILEY EASTERN)
3. Theory and problems in Abstract algebra -- Schaums outline series (MGH)

Term work :

In tutorial session, students of different batches be assigned different exercise problems and be guided for the solution of the problems.

Solapur University, Solapur
S.E.(INFORMATION TECHNOLOGY) Part-I
3. Data Structures -I

Lectures : 4 Hrs/week **Theory :100 Marks**
Practical : 4 Hrs/week **Term Work : 25 Marks**
POE : 50 Marks

Section - I

1. **Recursion :** **(5)**
   Definition and Processes, Recursion in C, How recursion works, Factorial, Fibonacci sequence, Towers of Hanoi, Advantages and Disadvantages of recursive techniques, Guideline and conclusion.
2. **String Processing :** **(5)**
   Declaration and initialization of strings , Display of strings with different formats, string library function.
3. **Pointers :** **(7)**
   Introduction, Pointers of Arrays, Array of Pointer , Pointer to Pointer , Pointer and String, Pointer and Structures, Pointer to Functions in C, Pointers and Dynamic memory.
4. **Files :** **(8)**
   Introduction, Streams and file types, File operations, File I/O, Structures of read and write, other file functions, command file arguments.

Section - II

5. **Stack :** **(5)**
   Definition representation, Operations, Implementation and their application.
6. **Queues :** **(5)**
   Definition , representation, Operations, Implementation, Circular Queue, Priority Queue and applications of Queue .
7. **Lists :** **(10)**
   Definition , representation, operations, Types of lists : Singly Linked list , Doubly Linked list Circular Linked List, Stack using Linked List, Queue using Linked List, Applications of Linked List.

Text Books :

1. Data Structures using C by Yedidyah Langsam, Moshe J. Augensteen, Aaron . M. Tanenbaum
2. Data Structure by Seymores Lipschutz

Reference Books:

1. Pointers in C by Yashwant Kanetkar
2. Data Structure and Programming Design by Robert Kruse / C.L. Tondo / Bruce Leung.

Assignment List :

Students should implement minimum of 12 experiments based on the following guidelines and preferably conducted on unix / linux platform

1. Represent Sparse Matrix using arrays and perform Matrix Operations such as Addition and Multiplication .
2. Write a program to implement Magic Square by taking the size from user.
3. Implement Fibonnoci Sequence , Tower of Hanoi using recursion.
4. Concatenate two strings into a third string using pointers.
5. Implement Stack operations using Arrays.
6. Use Stack to convert Polish Notations.
7. Represent circular Queue using Arrays and implement its operations.
8. Implement Singly Linked List and Stack using Singly Linked List.
9. Implement Doubly Linked List.
10. Implement Singly Circular and Doubly Circular Linked List.
11. Implement Priority Queue using Linked List .
12. Implement File commands using command Line Arguments.
13. Write a Menu Driven Program for Performing the following Operations on Files : Insert, Delete , Modify and Display.
14. Represent a Polynomial by Singly Linked List and Perform the following operations. Addition, Subtraction and Multiplication.

Solapur University, Solapur
S.E.(INFORMATION TECHNOLOGY) Part-I
4. Switching Theory & Logic Design

Lectures : 4 Hr./Wk **Theory : 100 Marks**

Section I

1. **Combinational Logic Circuit**
   Introduction to Standard representation of Logical function, K-map representation, Simplification using k-map up to 4 variables, Minimization of logical function specified in minterm / maxterms, Don't care condition, AND / OR/ XOR function using NOR / NAND gates, Implementation of SOP & POS expression using NAND & NOR gate respectively. **(7)**

2. **Flip flops & Counters**
   Introduction to flip-flops, S-R, J-K, D-Flip-flop & T-flip-flop, Excitation Tables for Flip-flops, Basic register, Shift register, Asynchronous counters, Up-down counter, MOD counter, Introduction to synchronous counter **(7)**

3. **Arithmetic Circuits**
   Binary addition, subtraction, One's & Two's complement arithmetic, Carry look ahead (CLA) adder, Arithmetic Logic Unit, Basic concept, Half adder, Full adder, Full substractor, Comparator. **(7)**

Section II

4. **Digital Design with MSI**
   Data selector / multi-plexer, MUX as logic function, Decoder / Demultiplexes, application of MUX/ DEMUX using IC – 74151, 74154, 74148, problems based on MSI circuits, decoder / driver for 7 segment display using 7447. **(6)**

5. **Introduction to Memory**
   Memory organization & operation, Expanding memory size, Classification of memories RAM, ROM (**6)**
6. **Design Methodology**
   Introduction to 3 level design, components used in 3 levels, sequential circuit design, PLA **(7)**

Books :

1. Modern Digital Electronics – R.P. Jain, Third Edition
2. Digital Logic Design – B. Holdsworth Second Edition.
3. Computer Architecture and Organisation - John P. Hayee, Third Edition

Ref. Books :

1. Computer Organization : V. Cael Hamacher, Zvonki G., Vranosic, Safwat G. Zaky, Third Edition

Solapur University, Solapur
S.E.(INFORMATION TECHNOLOGY) Part-I
5. Computer Graphics

Lecture: 3 Hours/week **Theory: 100 marks**
Practical: 2 Hours/week **Term Work: 25 marks**

Section – I

1. **Introduction:** Application of Computer Graphics, Video display devices: Refresh CRT, Raster scan display, Random scan display, color CRT monitors, Raster Scan system, Input devices. **(4)**

2. **Raster scan Graphics:** Line drawing algorithms: DDA, Bresenham's algorithm, Bresenhams Circle generation algorithm, RLE, Area image compression, Polygon filling: Scan converting polygon, Edge fill, Edge flag, Seed fill. **(7)**

3. **Transformation:** 2D Transformation: Translation, Rotation, Reflection, Scaling, Shearing, Combined transformation, Rotation about an arbitrary point, Reflection through an arbitrary line. 3D Transformation: Scaling, Shearing, Rotation, Reflection, Translation, Multiple Transformation. Rotation about axis parallel to coordinate axis, Rotation about an arbitrary axis in space. **(8)**

Section – II

4. **Clipping & Display File Compilation:** Sutherland-Cohen line clipping algorithm, Midpoint subdivision algorithm, Viewing transformation, Window transformation, Segmented display file, Display file compilation. **(6)**

5. **Visible Lines & Visible Surfaces:** Back-face removal algorithm, Z-buffer algorithm, Warnock Algorithm, Antialiasing & Half toning. **(5)**

6. **Plane curves & Space curves:** Curve representation, Non parametric & parametric curves, Bezier curves, Bspline curves, Cubic spline curves. **(6)**

Text Books:

1. Computer Graphics (Chapter 1,7)
   - Donald Hearn, Baker (second edition) PHI publications.
2. Procedural elements for Computer Graphics (Chapter 2,4,5)
   - David F. Rogers (second edition) Tata McGraw Hill publications.
3. Mathematical elements for Computer Graphics (Chapter 3,6)
   - Rogers, Adams (second edition) McGraw Hill Publishing Company.
4. Principals of Interactive Computer Graphics (chapter 4)
   - William Newman, Sproull (second edition) McGraw-Hill Publication.

List of Practicals:

1. Implementation of DDA line drawing algorithm.
2. Implementation of Bresenham's line drawing algorithm.
3. Implementation of Bresenham's Circle generation algorithm.
4. Implement Polygon filling algorithms.
5. Implement 2D transformation.
6. Implementation of 3D transformation.
7. Implement Sutherland – Cohen line clipping algorithm.
8. Implementation of Warnock algorithm.
9. Implement Curves.
10. Implement a small animation package.

Solapur University, Solapur
S.E.(INFORMATION TECHNOLOGY) Part-I
6. Visual Basic

Lectures: 2 hrs/week **POE : 50 Marks**
Practical: 2 hrs/week

1. **Introduction** **(2hrs)**
   What is a programming language? (Variables, types, control structures, and input/output). What are the basic steps in developing a program?
   (Design, implementation and validation).
1. **Structure of VB application** **(2 hrs)**
   Projects, Forms, Property Window, menus, tool bars
2. **Introduction to the Integrated development environment.** **(4 hrs)**
   What is a ActiveX control? How to use ActiveX controls? What are the properties, methods and events of basic controls? Expressions (logical, relational and arithmetic). Control structures and arrays, Error handling
3. **Procedures, Modules and Strings** **(2 hrs)**
   What and how to use procedure and module? String manipulation and matching.
4. **Database Management** **(5 hrs)**
   Data Control, DAO, ADO, RDO.
5. **File Processing** **(2 hrs)**
   Sequential file processing with file system controls. Random access files.
6. **Creating user defined ActiveX Controls, DLLS** **(3hrs)**
7. **Reports (Crystal Reports)** **(2 hrs)**

TextBooks:

1. The Complete Reference Visual Basic 6.0 by Noel Jerke
2. Mastering Visual Basic by Evangelos Petroutsos

Reference Books:

1. Database Developers' Guide with Visual Basic 6.0 by Rojer Jennings
2. Visual Basic 2005 for Beginners by Ivan Bayross, Sharanam Shah

Assignment List

1. Introduction of VB Editor
2. Implementation of Project, Forms, Menus
3. Design various forms using various activex controls
4. Assignment covering string manipulations
5. Assignment on file handling
6. Create user defined activex control
7. Create your own dynamic linked library defining few functions (e.g. addition, subtraction & multiplication of numbers)
8. Design small software which will cover all database functionality
10. **I**nsert, update, delete records with DAO,ADO RDO

Solapur University, Solapur
S.E.(INFORMATION TECHNOLOGY) Part-II
1. Applied Mathematics -II

Teaching Scheme: 4 Lectures / week **Examination Scheme**: Theory 100 marks

Tutorial : 1 hour/ week T**erm work** : 25 Marks.

SECTION – I

1. Statistics & Probability: Lines of regression, Curve fitting - Least square principle, Random variable, Binomial, Poisson, Normal distribution, Stochastic process (Random process), Markov process, Markov chain. (9)

2. Queueing Theory: Introduction, Queueing system, Distributions in Queueing systems, M/M/1 models. (6)

3. Linear Programming Problem: Introduction, formulation of L.P. problems, Simplex Method for solution of L.P.P.
   Assignment Problem: Introduction, Mathematical formulation of Assignment problem, Method for solving Assignment problem. (7)

4. Transportation Problems: Mathematical formulation. Methods for obtaining initial basic feasible solution: North-west corner method, Lowest cost entry method, Vogel's approximation method. Method to obtain optimal solution. (5)

SECTION - II

1. Classical (Crisp) sets to Fuzzy sets: Crisp sets, Basic types of Fuzzy sets, Basic concepts of Fuzzy sets. Fuzzy sets versus Crisp sets: Additional properties of α-cuts, representation of Fuzzy sets, Extension principle of Fuzzy sets. (11)

2. Fuzzy Arithmetic: Fuzzy numbers, Arithmetic operations on intervals, Arithmetic operations on Fuzzy numbers, Lattice of Fuzzy numbers, Fuzzy equations. (8)

3. Constructing fuzzy sets and operations on Fuzzy sets, Fuzzy systems. (6)

Recommended Books:

1. A Text Book of Applied Mathematics Vol. I and Vol. II by J. N. and P. N. Wartikar- Vidyarthi Griha Prakashan, Pune.
2. Higher Engineering mathematics by B. S. Grewal – Khanna Publication, Delhi.
3. Operation research by S. D Sharma
4. Probability, Queueing Theory & Reliability Engineering by G. Haribaskaran
5. Operation Research by Kanti Swaroop, P. k. Gupta, Man Mohan.
6. Fuzzy Sets And Fuzzy Logic by George J. Klir, Bo Yuan.

Solapur University, Solapur
S.E.(INFORMATION TECHNOLOGY) Part-II
2. Formal Systems & Automata

Lectures: 3 hrs/week **Theory :100 Marks**
Tutorials : 1 hr/week **Term work : 25 Marks**

Section -I

1. Mathematical induction and recursive definitions with examples (2)

2. Regular expressions & corresponding regular languages, examples and applications, unions, intersection & complements of regular languages, Finite automata definition and representation, Non-deterministic F.A., NFA with ^ transitions, Equivalence of FAs, NFAs and NFA-^s. (6)

3. Kleene's theorem - part I & II statements & proofs, minimum state FA for a regular language, minimizing number of states in an FA. (4)

4. Grammars & Languages - Definition and types of grammars and languages, derivation trees and ambiguity, BNF and CNF notations, Union, Concatenation and *'s of CFLs, Eliminating ^ production and unit productions from a CFG, Eliminating useless variables from a Context Free Grammar. (6)

Section – II

5. Push down Automata - Definition, deterministic PDA & types of acceptance, equivalence of CFGs & PDAs. (6)

6. CFL's & Non CFL's - Pumping Lemma & examples, intersection and complements. (3)

7. Turing machines - models of computation, definition of TM as language Acceptors, Combining Turing machines, computing a function with a TM. (5)

8. Variations in TM - TMs with doubly infinite tapes, more than one tape, Non-deterministic TM and universal TM. (4)

Books :

1. Introduction to languages & theory of computation -- John C. Martin (MGH)
2. Discrete mathematical structures with applications to Computer science
   -- J.P.Tremblay & R.Manohar (MGH)

References :

1. Introduction to Automata theory, languages and computations – John E. Hopcraft, Rajeev Motwani, Jeffrey D. Ullman (Pearson Edition).
2. Introduction to theory of computations – Michael Sipser (Thomson Brooks/Cole).

Term work :

Students of different batches be assigned problems of different types and exercise problems of the books mentioned above and be guided for the solution of the problems during the tutorial session.

Solapur University, Solapur
S.E.(INFORMATION TECHNOLOGY) Part-II
3. Microprocessor

Lectures :4 hrs/week **Theory :100 Marks**
Practical: 2 hrs/week **T.W. : 25 Marks**
P.O.E. : 50 Marks

Section - I

1. **8085 Architecture** : (6)
   Introduction to microprocessor, Features of 8085, 8085 CPU architecture, Demultiplexing of address and data bus, 8085 clock circuit, Instruction fetching and execution operations of microprocessors.

2. **8085 Instruction Set** (8)
   Instruction formats, Addressing modes, Opcode formats, Classification of instruction set, Programming techniques, Instruction timings, Introducing WAIT state, Single step and single cycle execution.

3. **Semiconductor Memory and I/O Operations :** (5)
   Memory organizations, Mapping of I/O devices, IN & OUT instructions with timing diagrams, Interfacing Keyboards, Interfacing Thumbwheel switches.

Section - II

4. **Interrupt and DMA Transfer** : (9)
   8085 interrupts, RST 5.5, 6.5, 7.5, TRAP & INTR, Designing hardware for INTR, Interrupt priorities, Study of 8259 Programmable Interrupt controller ,Use of SIM and RIM instructions, DMA transfer, Use of HOLD and HLDA pins for DMA transfer.

5. **Programmable Peripheral Devices :** (6)
   8255 Programmable peripheral interface - Use of 8255 for interfacing four digit MUXed display and four digit multiplexed thumbwheel switches. 8253 Programmable interval timer.

6. **Data Converters and Interfacing :** (3)
   DAC weighted resistor and resistor ladder DAC, ADC successive approximation and Dual slope ADC, ADC and DAC interfacing using 0808 and 0809.

7. **Serial Data Communication :** (3)
   Concepts in serial I/O, RIM and SIM instructions for serial interface, Study of 8251, Asynchronous and synchronous transmitter and receiver.

Text Books:

1.Microprocessor architecture programming and applications -- Gaonkar (WILEY EASTERN)

Reference :

1.Digital systems and microprocessors -- Douglas Hall (MGH)

Term work:

It should consist of minimum 8-10 experiments based on following guidelines :

1. Addition & Subtraction of 32 bit nos. (Numbers should be placed in memory)
2. Subtraction of signed 16 bit nos.
3. Multiplication and Division of 8 bit nos. using add and shift method.
4. Arranging 10 nos. in ascending & descending order.
5. Write a Assembly language program to handle RST 7.5 interrupt.
6. Writing subroutine to perform delay operation of 10 ms.
7. Bit manipulation and testing e.g. check status of D4 bit for 1.
8. Implement a 4 digit BCD Up & Down counter.
9. 4*4 keyboard interface using 8255
10. 7-segment display using 8255
11. Block transfer overlapping / overlapping

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S.E. (INFORMATION TECHNOLOGY) part II

4. Computer Networks – I

LECTURE:4 Hours/week **Theory: 100 mark**
PRACTICAL: 2 Hours/week **Term Work: 25 marks**
POE: 50 marks

Section – I

1.Data Communication Fundamentals: (6)
Concepts & Terminology, Analog & Digital data transmission, Transmission impairments, Channel capacity, guided transmission media, Digital data to digital signal encoding.

2.Reference Models: (7)
Uses of Computer network, Network hardware, Network software, OSI reference model, TCP/IP protocol, ATM reference model.

3.Data Link Layer: (8)
DLL design issues, Error detection & correction, Elementary DLL protocols, Sliding window protocols.

Section – II

4.Medium Access Control: (10)
Channel allocation problems, Multiple access protocol: ALOHA, CSMA, CSMA/CD, Collision free protocols, Limited contention protocols, IEEE standards 802.3,802.4,802.5 & 802.6(DQDB), Bridges.

5.Network Layer: (8)
Network layer design issues, Routing algorithms: shortest path routing, flooding, flow-based routing, distance vector routing, link state routing, hierarchical routing, Congestion control algorithms, Internetwork

6.Network layer in the Internet: (7)
IP protocol, IP addresses, Subnet, Internet Control protocols, ARP, RARP, OSPF, BGP.

Text Books:

1. Data & Computer Communication
   William Stallings. (seventh edition) PHI publications.
2. Computer Networks
   Andrew S. Tanenbaum (third edition) PHI publications.

Term Work :

List of Experiments :-

It should consist of 8-10 experiments based on the following guidelines.

1. Implementation of simplex, half duplex and full-duplex using RS 232 C std. and bioscom function.
2. File transfer using RS 232C std. and bioscom function.
3. Simulation of different framing methods.
4. Implement error detection method –CRC
5. Implement error detection and correction method of hamming code.
6. Implementation and conversion of frame- sliding window protocol..
7. Implementation and conversion of frame formats from one form to another IEEE std. 802.3, 802.4 and 802.5
8. Implement shortest path routing algorithm.
9. Given the IP address find out class , subnetsmask, netid and hosted.
10. Implement simulation of IP protocol (program to find class subnet mask from given IP address netid, hostid.)

Solapur University, Solapur
S.E.(INFORMATION TECHNOLOGY) Part-II
5. Data Structures -II

Lectures : 3 Hrs/week **Theory :100 Marks**
Practical : 2 Hrs/week **Term Work : 25 Marks**

Section - I

1. **Algorithm Analysis :** Introduction Asymptotics, Big –O notation, Omega Notation, Time complexity space complexity. (3)

2. **Searching and Sorting:**
   Searching: Sequential search , Binary search, Analysis and comparison of these methods.
   Sorting: Insertion sort, Deletion sort, Shell sort, Bubble sort, Merge sort, Quick sort, Heap sort analysis of all these sorting techniques. (8)

3. **Hashing :** Sparse tables, choosing a hash function , Collision Resolution with Open Addressing, Collision Resolution by Chaining , Comparison of Methods. (5)

4. **Trees :** Definition ,Transversal of Binary Trees , Linked Implementation of Binary Trees , Binary Search Trees, Threaded Binary Trees, Insertion in a Threaded Tree and Transversal Techniques in a Threaded Tree. (5)

Section - II

5. **Multiway Trees** : Multiway Search Trees, Balanced Multiway Trees, Traversing a Multiway Tree, Insertion in Multiway Tree, B - Trees, B^+ Trees (5)

6. **Height Balance**: AVL Trees. Definition Insertion and Deletion of Node in AVL Trees, Single and Double Rotation of AVL Trees, Height of an AVL Tree. (5)

7. **Graphs:** Definition and Examples, Undirected and Directed Graphs, Computer Representation of Graphs, Graphs Traversal Methods: - Depth First and Breadth first Algorithms.
   Topological sort: Depth First and Breadth First.
   Applications: Shortest path using Dijkstra's Algorithm (7)

Text Books :

1. Data Structure and Program design in C
   By Robert Kruse / C.L. Tondo / Bruce Leung Second edition on Chapters 1,2,3,4,5,6.
2. Data Structure using C and C++ second edition by Yedidyah Langram , Moshe J, Augensteen, Aason M. Tanenbaum

Reference Books :

1. Data Structure and Algorithms by Alfred V. Aho, John . E. Hopcroft, J.D. Ullman
2. Theory and Problems of Data Structures – Lipschutz(MaH international)
3. Data Structure and Algorithm Analysis – Mark Allah Weiss (Chapter 5)

Assignment List:

Students are expected to implement a minimum of 8 experiments with following guidelines:

1. Implement Binary Search
2. Implement Merge Sort
3. Implement Quick Sort
4. Implement Heap Sort
5. Insertion Sort
6. Implement Hashing using Open Addressing and Chaining method for Collision Resolution
7. Create Binary Search Tree and Implement Insertion and Deletion of a node , Traversal Techniques
8. Implement B-Tree and its Operation
9. Represent Graph and Traverse it using DFS and BFS
10. Find Shortest Path in Graph using Digkstra's Algorithm

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S.E.(INFORMATION TECHNOLOGY) Part-II
6. Object Oriented Design & Programming (C++)

Lectures : 2 hrs/week **Term Work : 25 Marks**
Practicals: 2 hrs/week **P.O.E. : 50 Marks**

1. OOP Concepts, C++ Programming basics, objects and classes, Array of objects, constructors & destructors, types of constructors (2)
2. Functions : Reference arguments, overloaded functions, inline functions, default arguments, returning by reference, friend functions and static functions (3)
3. Operator Overloading : Overloading unary and binary operators, Overloading extraction and insertion operators, data Conversion. (3)
4. Inheritance : Derived class and base class, derived class constructors, over riding member functions, public and private inheritance, multiple inheritance (3)
5. Pointers : Memory management - new and delete operators, pointers to objects, pointers to pointers, this pointer (2)
6. Virtual Functions : Accessing Normal and Virtual member functions, late binding, Pure virtual functions, Abstract classes, Virtual base classes. (3)
7. File & Streams : Streams, string I/O, character I/O, object I/O, I/O with multiple objects, file pointers and redirection. (3)
8. Advanced C++ features : Templates, Exception handling, Library organisation and containers.(3)

Books :

1. Object oriented programming in Turbo C++ -- Robert Lafore (Galgotia)
2. Object Oriented Programming with C++ - - E. Balgurusamy (McGrawHill)

References:

1. C++ programming language – Bjarne Stroustrup (AT & T)
2. Programming with C++ -- D. Ravichandran (TMGH)

Term Work : It should comprise of minimum 12 experiments. Students of different batches should implement different programs based on the following guidelines preferably in Unix/Linux platform.

(A) 8-10 assignments should consist of implementing ALL following concepts –

Constructor, Destructor, Function overloading, Constructor overloading, Operator overloading, Multiple inheritance, Multilevel inheritance, Static variables, Function in class, Virtual function, Virtual class, Virtual destructor, Function template, Class template, Friend class and function, File handling.

(B) 4-5 assignments on implementing object oriented programs for the following

1. Evaluating polynomial expressions(PE) using linked list and performing operations on PE like – Multiplication, addition, subtraction, etc.
3. Implementing sorting/searching algorithms using function template and virtual function.
4. Implementing stack/queue using class template.
5. Create a linked list as a object. Perform merging of two objects (linked lists) and splitting of object. (Use operator overloading).
   Implementing hashing and rehashing (considering occurrence of overflow).