Shivaji University, Kolhapur.

Revised Syllabus And structure of
S.E. Part-I & II
(Information Technology Engineering)
Semester III and IV
(w.e.f. Academic Year 2014-15)

SHIVAJI UNIVERSITY, KOLHAPUR

(To be implemented from Academic Year 2014-15)

Class : SE Part I (Semester III) **Branch : Information Technology**

Name of Subject	Teaching Scheme Per Week				Examination Scheme					
	L	T	P	Total	Theory Paper		T/W	OE	POE	Total
					Written	Online				
1.Discrete Mathematical Structures	4	1	-	5	100	-	25	-	-	125
2. Digital System and Microprocessor*	3	1	2	6	50	50	25		50	175
3. Data Communication*	3	1	-	4	50	50	25	-	-	125
4. Fundamentals of Economics and Management	3	-	-	3	100	-	-	-	-	100
5. Statistics & Fuzzy Systems	4	1	-	5	100	-	25	-	-	125
6. Problem solving using C**	3	-	4	7	-	50	50	-	50	150
Total	20	4	6	30	400	150	150	-	100	800

Class : SE Part II (Semester IV)

Name of Subject	Teaching Scheme Per Week				Examination Scheme					
	L	T	P	Total	Theory Paper		T/W	OE	POE	Total
					Written	Online				
1. Computer Network*	4	-	2	6	50	50	25	-	50	175
2. Computer Organization and Architecture*	4	-	-	4	50	50	-	-	-	100
3. Data Structures*	4	-	4	8	50	50	50	-	50	200
4. Theory of computation	3	1	-	4	100	-	25	-	-	125
5.Software Engineering	3	1	-	4	100	-	25	-	-	125
6. Object Oriented Programming	2	-	2	4	-	-	25	-	50	75
Total	20	2	8	30	350	150	150	-	150	800

*** Note for Online Examinations -:**

1. The examination will be having two part viz. part A & part B.

    i. Part-A: 50 marks theory paper similar to the existing theory paper exam. The nature of the questions will be descriptive, analytical and problem solving.

    ii. Part-B: 50 marks computer based exam with multiple choice questions (MCQs) .

2. The marks obtained in the individual heads should be added and considered as marks of the respective theory paper out of 100 marks.

3. The questions of part-A and part-B will be based on the entire syllabus of the respective subjects.

4.The questions in part-B will be of 1 or 2 marks only.

6. Duration of part-A exam will of 2 hours and that of part-B will be of 1 hour.

7. No separate passing head for part-A and part-B.

8. The scheme of revaluation is not applicable for part-B, however is applicable for part-A

**** Theory paper is not applicable to the subject "Problem Solving using C" passing head will be marks obtained in online exam only i.e. minimum 20 marks. Other rules are same.**

SHIVAJI UNIVERSITY, KOLHAPUR

(To be implemented from Academic Year 2015-16)

Class : TE Part I (Semester V) **Branch : Information Technology**

Name of Subject	Teaching Scheme Per				Examination Scheme					
	L	T	P	Total	Theory Paper		T/W	OE	POE	Total
					Written	Online				
1. Operating System-I *	3	1	-	4	50	50	25	-	-	125
2. Database Engineering *	4	-	2	6	50	50	25	-	50	175
3. Computer Algorithms	4	-	-	4	100	-	-	-	-	100
4. System Programming	3	-	-	3	100	-	-	-	-	100
5.Object Oriented Modeling and Design	3	1	-	4	100	-	25	-	-	125
6. Application Development Tool I	2	-	4	6	-	-	50	-	50	100
7. Soft skill –I	-	-	2	2	-	-	25	50	-	75
Total	19	2	8	29	400	100	150	50	100	800

Class : TE Part II (Semester VI)

Name of Subject	Teaching Scheme Per				Examination Scheme					
	L	T	P	Total	Theory Paper		T/W	OE	POE	Total
					Written	Online				
1. Computer Graphics*	3	-	2	5	50	50	25	-	-	125
2. Information Security	3	1	-	4	100	-	25	-	-	125
3. Internet Technology*	3	-	2	5	50	50	25	-	50	175
4. Operating System II	3	-	2	5	100	-	25	-	-	125
5. Software Testing & Quality Assurance	3	-	-	3	100	-	-	-	-	100
6. Application Development Tool II	2	-	4	6	-	-	50	-	50	100
7. Seminar	-	1	-	1	-	-	50	-	-	50
Total	17	2	10	29	400	100	200	-	100	800

*** Note for Online Examinations -:**

1. The examination will be having two part viz. part A & part B.

    i. Part-A: 50 marks theory paper similar to the existing theory paper exam. The nature of the questions will be descriptive, analytical and problem solving.

    ii. Part-B: 50 marks computer based exam with multiple choice questions (MCQs) .

2. The marks obtained in the individual heads should be added and considered as marks of the respective theory paper out of 100 marks.

3. The questions of part-A and part-B will be based on the entire syllabus of the respective subjects.

4. The questions in part-B will be of 1 or 2 marks only.

6. Duration of part-A exam will of 2 hours and that of part-B will be of 1 hour.

7. No separate passing head for part-A and part-B.

8. The scheme of revaluation is not applicable for part-B, however is applicable for part-A

SHIVAJI UNIVERSITY, KOLHAPUR

(To be implemented from Academic Year 2016-17)

Class : BE Part I (Semester VII) **Branch : Information Technology**

Name of Subject	Teaching Scheme Per Week				Examination Scheme					
	L	T	P	Total	Theory Paper		T/W	OE	POE	Total
					Written	Online				
1. Project Management	3	1	-	4	100	-	25	-	-	125
2. Mobile Computing	3	1	-	4	100	-	25	-	-	125
3. Advance Database Systems	3	-	2	5	100	-	25	-	50	175
4. Elective I	3	-	-	3	100	-	-	-	-	100
5. Web Technology I	2	-	4	6	-	-	50	-	50	100
6. Network Engineering	2	-	2	4	-	-	50	-	-	50
7. Project I	-	-	2	2	-	-	50	75	-	125
Total	16	2	10	28	400	-	225	75	100	800

Class : BE Part II (Semester VIII)

Name of Subject	Teaching Scheme Per				Examination Scheme					
	L	T	P	Total	Theory Paper		T/W	OE	POE	Total
					Written	Online				
1.Storage Networks	3	1	-	4	100	-	25	-	-	125
2. Cloud Computing	3	1	-	4	100	-	25	-	-	125
3. Information Technology and Business Management	3	1	-	4	100	-	25	-	-	125
4. Elective II	3	-	-	3	100	-	-	-	-	100
5. Advanced Software Technologies	3	-	2	5	-	-	50	-	50	100
6. Web Technology II	2	-	4	6	-	-	50	-	50	100
7. Project II	-	-	4	4	-	-	50	-	75	125
Total	17	3	10	30	400	-	225	-	175	800

Elective I	Elective II
1) Business Intelligence Systems	**1)** Introduction To Mainframes
2) Cyber Forensics	**2)** Mobile Apps Development
3) Soft Computing	**3)** Information Retrieval
4) Advanced Computer Architectures	4) Parallel Programming

S.E. Information Technology Semester-III (Revised)

1. Discrete Mathematical Structures

Teaching Scheme	**Examination Scheme**
Lectures: 4 Hours/week	Theory: 100 marks
Tutorial: 1 Hour/Week	Term Work: 25 marks

Prerequisites : Basic knowledge of Set operations and probability theory.

Objectives

To provide knowledge on following topics,

1. Mathematical Logic and its applications
2. Sets, relations and functions
3. Graph theory and its applications
4. Algebraic systems and its applications.

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Unit 1.Mathematical Logic **(8)**

Propositions, logical connectives, Conditionals and Biconditionals, well formed formulas, tautologies, logical equivalences, Inference of Theory for statement Calculus, Predicate Calculus

Unit 2.Sets and Combinatory **(8)**

Set, finite and infinite sets, Principle of Inclusion and exclusion, Permutations, combinations, Discrete Probability

Unit 3.Relations and Functions **(9)**

Relations, Properties of binary relations, closure of relations, Equivalence Relations and partitioning, Partial ordering relations and lattices, Functions, composition of functions, invertible functions, recursive functions

Unit 4.Graph Theory **(8)**

Basic Terminology, Multi graph and weighted graphs, Diagraphs and relations, Representation of graphs, Paths and circuits, Eulerian and Hamiltonian Paths and Circuits, Graph coloring

Unit 5.Groups **(9)**

Algebraic Systems, Semi Groups, Groups, Monoid, Abelian Groups, subgroups, Isomorphism and Automorphisms, Homomorphism and Normal Subgroups

Unit 6. Lattices and Algebraic Systems **(10)**

Lattices and Algebraic Systems, Principle of duality, Properties of Algebraic system defined by Lattices, Boolean Lattices and Boolean Algebras, Boolean functions and Boolean Expressions, Normal Forms.

Text Books

1) Elements of Discrete Mathematics- C. L. Liu and D. P. Mohapatra,, 4Edition McGraw-Hill,

Reference Books

1) Discrete Mathematics - Semyour Lipschutz, Marc Lipson (MGH), Schaum's outline Series.
2) Discrete Mathematical Structures with Application to Computer Science - J. P. Tremblay & R. Manohar ,MGH International Edition.
3) Discrete mathematics and its applications - Kenneth H. Rosen (AT&T Bell Labs)
4) Discrete Mathematics With Proof, 2nd Ed, ERIC GOSSETT,Wiley India Ltd.

Term Work: It should consist of minimum 06-08 assignments based on above subjects and GATE papers.

S.E. Information Technology Semester-III (Revised)

2. Digital System and Microprocessor

Teaching Scheme	Examination Scheme
Lectures: 3 hrs / week	Theory:50 marks
Practical : 2 hrs / week	Online Exam:50
Tutorial : 1 hr/Week	Term work: 25 marks
	POE: 50 marks

Prerequisites: Fundamentals of Electronics and Computers, basic number system.

Objectives:

1) To provide knowledge of basic arithmetic and logical operations in digital systems.
2) To provide hands on knowledge about different sequential and combinational logic design.
3) To provide knowledge about construction & working of basic 8 bit microprocessor and peripheral.
4) To provide knowledge about assembly language programming.
5) To provide knowledge about working of different instructions using timing diagrams.

Unit 1.Fundamental Concepts:- (4)

Analog and digital systems, representation of signed numbers,2's complement arithmetic, BCD addition & subtraction, octal & Hexadecimal addition and subtraction, Derived gates.

Unit 2.Boolean algebra & combinational logic design: (7)

Reduction of Boolean expressions, Boolean function representation, expansion of Boolean expression (standard SOP & POS),simplification of boolean expressions using K-map (upto 5 variable), prime implicants , Adders & Subtractors design using gates, Multiplexer, implementation of expression using MUX, Demultiplexer, decoder(74138), BCD to 7 segment decoder.

Unit 3. Sequential Logic Design: (7)

Classification, Flip-Flops(S-R, J-K,T,D)using gates, Race around condition Master – Slave J-K Flip Flop, Counters (Asynchronous & Synchronous), Design examples, Shift registers , State transition diagram, excitation table.

Unit 4.8085 Microprocessor Architecture & Memory Interfacing: (6)

The 8085 MPU, Microprocessor communication and bus timing, De-multiplexing address and Data bus, Generating control signals, The 8085 Architecture, op-code fetch machine cycle, memory read and write machine cycle. Memory interfacing-memory structure, memory interfacing & address decoding.

Unit 5.8085 Programming techniques: (10)

8085 instruction groups, addressing modes Writing and execution assembly language program, counters & delays, Stack, Instruction related to stack execution of CALL and RET, The 8085 interrupt, RST instructions, vectored interrupts, RIM and SIM instructions .

Unit 6. Interfacing I/O devices: (6)

Basic interfacing concepts, peripherals i/o instructions - IN, OUT, I/O execution, memory mapped I/O, I/O mapped I/O. The 8255 programmable peripheral interface, operating modes (I/O, BSR).

Textbook:

1. Fundamental of Digital Circuits –A. Anand Kumar, 2nd Edition, PHI Private Limited.
2. Microprocessor architecture, programming & applications-Ramesh S. Gaonkar, New Age International publication.

Reference Books:

1. Digital fundamentals -Floyd & Jain, , Pearson education, eighth edition, 2007
2. Digital Design –Morris Mano, Pearson Education
3. Modern Digital Electronics, R.P.Jain, 3rd Edition, Tata McGraw-Hill, 2003
4. Digital systems, principles and applications – Ronald Tocci, Neal S. Widmer, Gregory Moss (Pearson Education) 9 th Edition.

Term work:

Term work should consist of minimum of 10-12 experiments based on following topics.

1. Study of Basic gates.

2. Study of Universal gates.

3. Study of Boolean algebra & De Morgan's theorem using gates.

4. Study of MUX/DEMUX.

5. Study of 74138.

6. Study of R-S and J-K flip-flops

7. Study of counters

8. Interfacing of counters to seven segment display

9. Realization of 4/5 variable K-maps

10. Study of 8085 processor data transfer instructions using timing diagrams.

11. Assembly language programming for 8085 (Arithmetic, Logical and data transfer, interrupts- Minimum 6 programs using kits)

S.E. Information Technology Semester-III (Revised)

3. Data Communication

Teaching Scheme	Examination Scheme
Lectures: 3 hrs / week	Theory: 50
Tutorial: 1hrs / week	Online: 50
	Term Work: 25

Prerequisites : Basic knowledge of Computer fundamentals.

Objectives

1) To provide knowledge about various types of networks, topologies.

2) To learn data encoding techniques

3) To understand concepts of OSI reference model and real world protocol suite TCP/IP

4) To provide students in-depth knowledge of multiplexing techniques.

5) To get familiar with hardware components required to build network.

Unit 1. Data Communication Fundamentals **[6]**

Data Communication – Definition, Components, Data representation, Data Flow
Networks – Definition, Uses, Topologies, Categories, Internet – History, ISP hierarchy,
Protocols & Standards – Protocols, Standards, Standards Organizations

Unit 2.Data & Signals **[5]**

Analog & Digital data, Analog & Digital signals, Transmission Impairments,
Data Rate Limits, Performance.

Unit 3. Data Encoding **[9]**

Digital-to-Digital conversion – Line coding, Block coding, scrambling ,Analog-to-Digital conversion – Pulse code modulation, delta modulation, Digital-to-Analog conversion – ASK, FSK, PSK, Analog-to-Analog conversion – AM, FM, PM

Unit 4. Multiplexing & Switching **[6]**

Parallel and serial transmission, Asynchronous and Synchronous transmission, Multiplexing – Frequency, Wavelength, Time-division, Switching – Circuit switched, Packet switched, Message switched, Structure of switches

Unit 5. Network Models **[6]**

Layered architecture, OSI reference model, TCP/IP reference model, ATM model, Network Addressing – Physical, Logical Port

Unit 6. Networking Components **[8]**

Guided Transmission Media – Twisted pair, Coaxial, OFC Unguided Transmission Media – Propagation Modes, Radio Waves, Microwave Infrared, Components – Cabling, Connectors, NIC, Repeaters, Hub, Switches, Bridges, Routers,Gateways.

Text Books:

1. Data Communications and Networking – Behrouz Forouzan ,4th Edition, TMGH.

Reference Books:

1. Data and Computer Communications –Williams Stallings ,5thEdition ,PHI.
2. Computer Networks – A. S. Tenebaum.,3rd Edition,PHI.
3. Data Communication & Networks: An Engineering Approach by Irvine, Wiley India Ltd.

Open Source Resources:

1. www.ietf.org
2. www.ietf.org/rfc.html

Term Work: It should consist of minimum 06-08 assignments based above syllabus

S.E. Information Technology Sem.-III (Revised)

4. Fundamentals of Economics and Management

Teaching Scheme **Examination Scheme**

Lectures: 3 Hours/Week **Theory: 100 marks**

Objectives: To provide knowledge of following,

1) The fundamentals of economics and its application
2) The basics of cost concepts
3) The importance of market
4) The principles of management
5) The basic financial concepts

Unit 1.Introduction to Economics **(8)**

Definitions, Scope of Economics (Macro, Micro, International Industrial, Environmental, Public Finance, Managerial economics etc.) Managerial Economics meaning definition and decision making process. **Basic terms in Economics:** Economic Resources, firm - type of firms, goods, services, utility, value & wealth.

Unit 2 Demand and Supply Analysis **(6)**

Meaning of Demand - types, determinants, demand function, law of Demand, and elasticity of demand supply - determinants, supply function and elasticity of supply.

Unit 3 Basic Cost Concepts **(6)**

Production function, Law of variable proportions, Returns to scale, production optimization and uses of production function. Cost Concepts -Types - Short run and long run costs -(total, fixed, variable, marginal Average and opportunity cost)

Unit 4 . Markets **(4)**

Meaning of market – Types of Market-Perfect competition, Monopoly, oligopoly and monopolistic competition

Unit 5. Principles of management **(8)**

Nature and importance of management, levels of management, fundamental managerial skills, functions of management, Henry Fayol's principles of management, motivation theory: X and Y

Unit 6. Basic Financial concepts **(8)**

Basic concept of :- Business, Capital, Assets, Liabilities, interest, Profit & Loss, Balance Sheet and related concept Profit & Loss Statement and related concepts.

Text Books:

1. Managerial Economics by Geetika, Payalii Ghosh, Puraba Roy Choudhury Publisher The Tata McGraw-Hill companies, New Delhi 2008 (units 1 to 4)
2. Essential of management by Harold koonez and Heinz, Weihrich- Tata McGraw Hill for Principles of management (unit-5)
3. "Basic Financial Accounting For Management" by Paresh Shah Publisher- Oxford University Press New Delhi-2007 (unit-6)

Reference Books:

1. Fundamentals of Engineering Economics by Pravin Kumar , Wiley India Ltd.

S.E. Information Technology Semester-III (Revised)

5. Statistics and Fuzzy Systems

Teaching Scheme	**Examination scheme**
Lectures: 4 Hours per Week	Theory: 100 Marks
Tutorial : 1 Hour per Week	Term Work: 25 Marks

Prerequisites: Knowledge of basics Probability theory & statistics.

Objective:
To provide knowledge on following topics

1) Curve fitting and Numerical Methods Techniques
2) Probability Distribution
3) Linear Programming Techniques
4) Fuzzy Logic and its applications
5) Transportation problems and its solutions

Unit 1.Curve Fitting and Numerical Methods **(12)**

Fitting of Curves by method of Least-squares,Fitting of Straight lines, Fitting of exponential curves., Fitting of Parabolic curves. Numerical Integration, Trapezoidal Rule,Simpson's 1/3 rd rule, Simpson's 3/8 th rule, Weddles Rule, Numerical solution of transcendental and algebraic equations, ,Newton Raphson Method,,Secant method.

Unit 2. Probability Distribution:

(8)

Random variable, Binomial Distribution, Poisson Distribution , Normal Distribution

Unit 3.Linear Programming Problem

(8)

Introduction and formulation of LPP,Simplex Method to solve maximization type LPPonly

Unit 4. Introduction to Fuzzy sets*:* **(6)**

Basic concepts of fuzzy sets,Crisp set and Fuzzy set., membership functions, Basic operations on fuzzy sets, Properties of fuzzy sets

Unit 5. Fuzzy Arithmetic: **(8)**

Fuzzy numbers,Fuzzy cardinality, Operations on Fuzzy numbers, Fuzzy equations of

type A + X = B and A.X = B

Unit 6. Transportation and Assignment Problems: **(10)**

Definition, Balanced and unbalanced transportation problem,Least cost and VAM methods of Initial solution, UV method of optimum solution, Definition, Balanced and Unbalanced assignment problems, Hungarian method of solving balancedand unbalanced assignment problems, Traveling salesmen problem.

Text Books:

1. A text book of Applied Mathematics: Vol. I, II and III by J. N. Wartikar& P. N. Wartikar VidyarthiGrihaPrakashan, Pune.
2. Higher Engineering Mathematics by Dr. B. S. Grewal.
3. Operations Research by S. D. Sharma
4. Fuzzy sets and Fuzzy Logic by George J. Klir, Bo Yuan.
5. Probability and Statistics for Computer science by James L. Johnon ,Wiley Student Edition.

Reference Books:

1..Fuzzy logic with Engineering Applications 3ed Ross,Wiley India .

General Instructions:

1. For the term work of 25 marks, batch wise tutorials are to be conducted. The number ofstudents per batch should be as per university pattern for practical batches.
2. Minimum number of assignments should be 8 which should cover all topics.

S.E. Information Technology Semester-III (Revised)

6. Problem Solving using C

Teaching Scheme	Examination Scheme
Lectures:3 Hours/week	Online Exam:50 marks
Practicals:4 Hours/Week	TermWork:50 marks
	POE: 50 marks

Prerequisites : Basic knowledge of Electronics and Computers.

Objectives

1. To understand C programming environment.
2. To develop problem solving skills amongst the students.
3. To write, compile and debug programs in *C* language.
4. Implement C programs for various problem statements.

Unit 1.Introduction to Programming and Problem Solving (6)

The meaning of algorithms, Flowcharts, Pseudo codes, Writing algorithms and drawing flowcharts for simple exercises, Memory concepts, C Program development environment, Types of problems, problems solving with computers, difficulties with problem solving, Problem Solving Aspects, Problem Solving Concepts for computer, Programming Concepts – communicating with computers, organizing the problem, using the tools, Top down design

Unit 2.Introduction to 'C' Language (6)

Importance of 'C' Language, Sample 'C' Program, Structure of 'C' Program, Constants, variables and data types. Operators and expressions, Managing input / output operations, Control statements.

Unit 3.Functions **(6)**

Need for user defined functions, elements of User defined functions, defining functions, return values and their types, function calls, function declaration, methods of parameter passing, user defined and library functions.

Unit 4.Arrays and Strings **(8)**

The meaning of an array, one dimensional and two dimensional arrays, declaration and initialization of arrays, reading , writing and manipulation of above types of arrays, multidimensional arrays. Declaring and initialing string variables, reading string from terminal, writing string to screen, arithmetic operations on characters, putting strings together, comparison of two strings, string handling functions.

Unit 5.Structures and Pointers **(8)**

Defining a structure, declaring structure variables, accessing structure members, structure initialization, copying and comparing structure variables, operations on individual members, array of structures, structures and functions, Unions.

Understanding pointers, accessing the address space of a variable, declaring and initialization pointer variables, accessing a variable through its pointer, pointer expressions, pointers and arrays, pointer and character strings.

Unit 6. File Management in C **(6)**

Defining and opening a file, closing a file, input/output operations on files, error handling during I/O operations, random access files, command line arguments.

Text Books

1. Programming And Problem Solving Using C Language, ISRD Group, McGraw-Hill Publications

2. How to Solve it by Computer, R G Dromey ISBN 978-81-317-0562-9,Pearson.

3. C How to Program, Harvey M. Deitel , Paul J. Deitel, Abbey Deitel, Pearson Publication.

Reference Books

1. The 'C' Programming Language, By B.W. Kernigghan and D. M. Ritchie, Pearson Education.
2. C Programming Laboratory : Handbook for Beginners by Sidnal, Wiley India Limited.
3. **http://www.spoken-tutorial.org/** NMEICT Project of Govt. Of India.

List for Practicals

Lab Work will consist of minimum 15 experiments to be completed by students in a batch on following topics. For programming student should use open source software.

Simple Programs using basic datatypes, scanf, printf, format specifiers

Programs using conditional control statements if-else, Switch-case

Programs using looping constructs while, do-while, for

Programs on following problem statements -:

Finding biggest of three numbers, to find roots of given quadratic equation, to find the biggest and smallest of given set of numbers, Exchanging values of two variables, Counting, summation of set of numbers , factorial computation, sine function computation, Fibonacci series, reverse of digit, BCD conversion , Char to number conversion, Factoring methods - Square root of number, smallest divisor, GCD of two number, prime number, prime factors of integer, pseudo random number generation, raising the number to a large power, Matrix operations (addition, multiplication, transpose etc.), String operations and manipulation (finding length, reverse, change case etc.), Demonstrate structures

S.E. Information Technology Semester-IV (Revised)

1. Computer Network

Teaching Scheme
Lectures: 4 Hours per Week
Practicals: 2 Hour per Week

Examination scheme
Term Work: 25 Marks
Theory : 50Marks
Online : 50 Marks
POE: 50 Marks

Prerequisites: Data Communication

Objectives:

1) To provide knowledge about local area networks, types of computer networks.
2) To understand computer network protocols and wireless protocols.
3) To understand functionalities of different layers
4) To provide knowledge about internet layer protocol.
5) To provide knowledge about routing protocol and functionality of application layer.

Unit 1: Introduction to Computer Network

Define Networking, Advantages & Use of networks, types of Networks, Addressing, Underlying technologies for LAN, WAN and switched WAN. [4]

Unit 2: Data Link Layer [10]

Framing, Error Control, Flow Control, Error detection & correction codes
Elementary data link protocols- Simplex, Stop & Wait, Simplex for noisy channel.
Sliding window protocols – 1-bit, go back n, selective repeat
Channel allocation- static, dynamic
Multiple access protocols: Aloha, CSMA, Collision Free Protocols
IEEE 802 Standards for LAN and MAN – 802.3, 802.4, 802.5

Unit 3: Network Layer

[10]

IPv4 Addresses: Introduction, Classful and Classless Addressing, Special Addresses, Network Layer Design Issues Routing Algorithms **:** Shortest Path, Flooding, Distance Vector, Link State, Broadcast Congestion control algorithms: Principles, Congestion prevention policies, Traffic Shaping, congestion control in datagram subnet, Choke Packet, Load Shedding, Jitter Control.

Unit 4: Internet Protocol [8]

IP Datagram format, Fragmentation and reassembly models, ARP and RARP, ICMP and IGMP

Unit 5: Transport Layer **[10]**

The Transport service primitives
UD**P**: Process to Process communication, User Datagram Format, Operation and uses of UDP.
TCP: TCP Services and Features, TCP segment format, TCP Connections, Flow and error control in TCP, TCP Timers
Berkeley Sockets: Socket Addresses, Elementary Socket system calls byte ordering and address conversion routines, connectionless iterative server, Connection Oriented concurrent server, TCP and UDP Client server Programs.

Unit 6: Routing Protocols and Application Layer [10]

Routing Protocols : Introduction and background, RIP, OSPF, BGP
Application Layer **:** DNS, Electronic Mail, Telnet, FTP, HTTP ,WWW, Multimedia.

Text Books:

1. Computer Networks , A. S. Tenebaum.,3rd Edition,PHI.
2. TCP/IP protocol suite , B A Forouzan ,TMGH.
3.Computer Networks: Principles ,Technologies and Protocols for Network Design by olifer, Wiley India Ltd.

Reference Books:

1. Unix Network Programming , W Richard Stevens, PHI.

Term Work: It should consist of 10-12 experiments based on the syllabus and should be implemented by using Socket Programming. The study experiments should consist of some practical work and observation

Set of assignments is listed below:

1. Study and demo of LAN, WAN and various connecting devices and components List out component and devices required for a std. LAN, WAN
2. Study, design and configuration of IEEE 802.3 Ethernet and IEEE 802.11 Wireless LANs (Referring RFCs)
3. Study of following connectivity test tools with all its options –
   - ifconfig, arp, route, traceroute
   - nmap, netstat, finger
4. Implementing Framing methods
5. Implementing Elementary data link protocol (Stop & wait protocol)
6. Implementation of Error correction and Error detection codes
7. Program to understand IP addressing, classful & classless addressing.
8. Implementation of sliding window protocol.
9. Implement shortest path routing algorithm
10. Programs for connection oriented (TCP) client-server using socket programming
11. Programs for connection less (UDP) client-server using socket programming
12. Study of network protocol analyzer (Wire-Shark) and understanding packet formats for UDP, TCP, ARP, ICMP protocols.

S.E. Information Technology Semester-IV (Revised)

2.Computer Organization and Architecture

Teaching Scheme
Lectures: 4 Hours per Week

Examination scheme
OnlineExam:50Marks
Theory: 50 Marks

Prerequisites: Fundamentals of Electronics and Computer**,**Digital System and Microprocessor

Objectives:
To provide knowledge of

1) Different components of CPU and their interaction
2) Different processor architectures
3) Overall CPU design and its memory organization.

Unit 1.Computing and Computers : (6)

Elements of computers: The brain versus the computer, Limitations of computers: unsolvable problems, speed limitations,
The Evolution of computers: IAS Computers, Stack Computers, IBM/360 computers, A typical personal computer system

Unit 2. Design Methodology (10)

System Design: System Representation, Design Process: The Gate level- Combinational logic—Full Adder, Four bit ripple carry adder, Sequential logic: serial adder, 4- bit stream serial adder, The Register level: Register level components- Word Gates, Multiplexers to implement a full adder, Decoders, Encoders Arithmetic Elements: Design of 4-bit magnitude comparator, Registers, Programmable Logic Devices: PLA implementation of adder, Register Level Design: 4-bit stream serial adder, Processor level design: prototype structure, performance measurement, Queuing models

Unit 3. Processor Basics : (8)

CPU Organization: Fundamentals, Study of design and architecture of a small accumulator based CPU, Architecture extensions, A typical CPU with general register

organization, pipelining, RISC Machines: Organization of ARM6, CISC Machines: Organization of 68020,
Data representation: Fixed- Point Numbers, Floating Point Number- The IEEE 754 floating pointing numbers,Instruction Set: Instruction Formats, Addressing Modes, Instruction Types.

Unit 4. Datapath Design (10)

Addition-subtraction-High speed adders-- A 4-bit carry-lookahead adder, Design of a complete twos-complement adder-subtractor,Multiplication: twos-complement multiplier, Robertson multiplication algorithm for twos –complement fractions, Booths multiplication algorithm,Division: Non-restoring division algorithm for unsigned integers.

Unit 5. Control Design (8)

Hardwired Control: Design of DMA controller, Design Examples: Multiplier Control, Implementing a multiplier control unit, CPU control unit: Control unit design: Implementing a program control unit.

Unit 6. Memory Organization (10)

Memory: Memory device Characteristics, Random access memories: A commercial 64Mb DRAM chip, Serial-Access Memories: A commercial magnetic hard-disk memory unit, Memory Systems: Multilevel memories, Address translation, Memory allocation, Caches: Cache organization, Cache operation, Address Mapping.

Text Books:

1) Computer Architecture & Organization, J. P. Hayes. McGrawHill.

Reference Books:

1) Computer Organization- Hamacher Zaky. McGrawHill.
2) Computer Architecture & Organization An Integrated Approach , Miles Murdocca, Vincent Heuring Wiley India Edition
3) Computer Architecture and organization : An integrated Approach by Murdacca,Wiley India Limited.

S.E. Information Technology Semester-IV(Revised)

3.Data Structures

Teaching Scheme
Lectures: 4 Hours per Week
Practical: 4 Hours per Week

Examination scheme
Term Work: 50 Marks
POE: 50 Marks
OnlineExam:50Marks
Theory: 50 Marks

Prerequisites: Fundamentals of Electronics and Computer**,** Problem solving using C

Objectives:
To provide knowledge on following topics ,
1).The concept of Algorithms, its Pseudo code representation and Analysis

2)The concept of abstract Data type and its application in implementing linear and Non Linear Data Structures

3)Various operations on Data Structures like searching , sorting and their complexities

4)Techniques to analyze a problem, select and Design the appropriate Data structure and Algorithms for the problem

Unit 1. Algorithm Basics and Recursion (7)

Algorithms, Its Pseudocode Representaion , Abstract Datatype, Data Structures, Algorithm Efficiency, Recursion, Designing Recursive Algorithms, Recursive Examples

Unit 2. Sequential Representation of Linear Data Structures (7)

Stack, Operations on Stack, Applications of Stack, Queue, Operations on Queue, Applications of Queue, Priority Queues

Unit 3.Linked Representation of Linear Data Structures (8)

Limitations of static memory allocation. Dynamic memory allocation, Singly, doubly and circular linked list, stack using linked list, Linear and circular queue using linked list, Operations like insertion, deletion, traversal & other operations on these data structures.

Unit 4. Nonlinear Data Structures : (TREES) (10)

Basic Concept and Terminology, Data structure for binary trees. Algorithms for tree traversals, Heaps, Binary search trees (BST), algorithms on BST and applications, AVL tree. B and B++ trees (Theoretical aspects only).

Unit 5. Non Linear Data Structures (Graphs) (8)

Concepts and terminology of graph, Representation of graph using adjacency matrix and adjacency list, Graph traversal Techniques (Depth first and Breath first search), Applications of Graphs as Minimum spanning Tree and shortest path algorithm.

Unit 6. Searching and Sorting Techniques: (12)

Need of sorting and searching, Sequential Search, Binary Search, Analysis of Searching Techniques (Best, Average and worst case)., Hashing Techniques, Types of Hash Functions, Collision resolution techniques, open and closed hashing, Bubble sort, insertion sort, selection sort, heap sort, Merge sort, quick sort, Analysis of sorting Techniques (Best, Average and worst case).

Text Books:

1) Data structures A pseudocode Approach with C. Richard Gilberg & Behrouz Forouzan Cengage Learning **(For Unit:1,2,3,4,5)**
2) Data structures with C by Semour Lipschutz, Schaum Series (TMH) **(For Unit:6)**

Reference Books:

1) Fundamentals of Data Structures in C E. Horowitz , S.Sahani, S. Anderson-Freed
2) Data Structures through C Yashwant Kanetkar BPB Publication

List of Practical

Lab Work should consist of minimum 15 experiments to be completed by students in a batch on following topics. For programming student should use open source software such as Code – Block, GCC on Linux/Ubuntu platform and for debugging GDB tool can be used.

Suggested List of Experiments:

1. Implement Sorting Methods using functions- Bubble Sort, Selection Sort,Insertion Sort.
2. Implement Sorting Methods using recursion- Quick Sort and Merge Sort.
3. Implement Searching Methods-Sequential Search, Binary Search
4. Implement Stack as an ADT using Array. Use this ADT to perform expression

Conversion and evaluation (infix to postfix, infix to prefix, prefix to infix, prefix to Postfix, postfix to infix and postfix to prefix).

5. Represent Circular Queue using Linked List and write a program to perform Operations like Insert, Delete, Finding front and rear element, Display.
6. Write a menu driven program to perform following operations on singly linked list/Circular linked list/ Doubly linked list:Create, Insert – Start, end, In Between, Search & delete, Display etc.
7. Create two Singly Linked lists, sort them and Merge these two lists into one list without creating a new node or swapping of the data.
8. Represent a polynomial using Circular Linked List and write a menu driven

program to perform Addition.

9. Creation of binary search tree and perform recursive and non recursive in order, preorder and post order Traversals .
10. Write a program to represent a given graph using adjacency list and perform DFS and BFS.
11. Implementation of Heap sort
12. Implementation of Hashing

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4. Theory of Computation

Teaching Scheme
Lectures: 3 Hours per Week
Tutorial: 1 Hours per Week

Examination scheme
Term Work: 25Marks
Theory: 100 Marks

Prerequisites: Discrete Mathematical Structures

Objectives:
To provide knowledge on following topics,

1)Formal languages like Regular Language and Context free Language

2)Representation of Regular language as Regular Expression and Context free languages as context free grammar

3)Model of Language acceptors like Finite Automata for Regular Language and Push Down Automata for Context free Language

4)Turing Machines and its types

5)Turing Machine as model of computation

Unit 1.Regular Expressions **(6)**

Recursive Definitions ,Definition and types of grammars and languages, Regular expressions and corresponding regular languages , examples and applications, unions, intersection & complements of regular languages, Applications of regular expressions

Unit 2.Finite Automata **(8)**

Finite automata definition and representation, Nondeterministic F.A. , NFA with null transitions, Equivalence of FA's , NFA's and NFA's with null transitions. Equivalence of

regular expressions and finite automata, Minimization of Finite Automata, Application of Finite Automata

Unit 3.Context Free Grammars (6)

Context Free Grammar- Definition, derivations, languages of a grammar,
BNF and CNF notations, derivation and parse tree, Ambiguity in grammars and languages: removal of ambiguity, Union, Concatenation and *'s of CFLs,
Normal forms, Eliminating unit productions, and Null-productions, Regular Grammar, Application of Context free grammar

Unit 4. Push Down Automata (6)

Definition, The Language of PDA, Deterministic PDA and Non Deterministic PDA, Acceptance by Final state and empty stack, Equivalence of PDA's and CFG- CFG to PDA, PDA to CFG

Unit 5.Parsing and Properties of Context Free Language (6)

Parsing – Top-Down, Recursive Descent and Bottom-Up Parsing,
Pumping lemma for Context free language, intersection and complement of Context free language

Unit 6. Turing Machine (8)

Turing Machines-models of computation, definition of TM as Language acceptors, combining Turing machines, computing a function with a TM, Variations in TM- TMs with doubly-infinite tapes, more than one tape, Non-deterministic TM and Universal TM.

Text Books:

1) Introduction to languages & Theory of computations – John C. Martin (MGH)

Reference Books:

1) Introduction to Automata Theory , Languages and computation – John E. Hopcraft , Rajeev Motwani , Jeffrey D. Ullman (Pearson Edition).
2) Introduction to Theory of Computations – Michael Sipser (Thomson Brooks / Cole)
3) Theory of Computation : A problem solving Approach by Mahesh , Wiley India Ltd.

Term work: It should consist of minimum 10 to 12 assignments based on above topics

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5.Software Engineering

Teaching Scheme
Lectures: 3 Hours per Week
Tutorial: 1 Hour per Week

Examination scheme
Term Work: 25 Marks
Theory: 100 Marks

Prerequisites: Problem solving using C

Objectives:
To provide knowledge on following topics,

1) A general understanding of software process models such as the waterfall and evolutionary models.
2) An understanding of software requirements and the SRS document.
3) An understanding of design and implementation issues such as modularity and coding standards.
4) An understanding of approaches to verification and validation including static analysis, and reviews
5) An understanding of software testing approaches such as unit testing and integration testing

Unit 1.Introduction and Software Process (6)

The Problem Domain, SE Challenges, SE Approaches, Software Process, Desired Characteristics of a Software Process, Software Development Process Models, Other Software Processes

Unit 2. Software Requirement Analysis and Specifications (6)

Software Requirements, Problem Analysis, Requirements Specification, Functional Specifications with use cases, Validation, Metrics

Unit 3. Function Oriented Design (6)

Design Principles, Module-Level Concepts, Design Notation and Specification, Structured Design Methodology, Verification, Metrics

Unit 4.Object Oriented Design & Detailed Design (8)

OO Analysis and OO Design, OO Concepts, Design Concepts, UML, A design Methodology, Metrics, Detailed Design and PDL, Verification, Metrics

Unit 5. Coding (6)

Programming Principles and Guidelines, Coding Process, Refactoring, Verification, Metrics

Unit 6. Testing (8)

Testing Fundamentals, Black-Box Testing, White-Box Testing, Testing Process, Defect Analysis and Prevention, Metrics—Reliability Estimation

Text Books:

1) An Integrated approach to Software Engineering' 3rd edition ,Narosa publication,.

Reference Books:

1) Software Engineering- A Practitioner's Approach – Roger S. Pressman (TMH)
2) Software Engineering- Ian Sommerville – Pearson

3) Software Engineering by Kogent Wiley India Limited.

Guidelines for conducting tutorials:

Students in a batch shall be divided in a group of 3-4 students for the purpose of tutorial.

Case studies shall be based on the text books and reference book given in the syllabus.

For tutorials brainstorming sessions, group discussions and presentations shall be used as assessment tools. Some case studies from industries may be considered.

The focus will on creating the software engineering documents for a sample project for the whole SDLC. Templates for the case studies are currently available at the link

http://www.iiitd.edu.in/~jalote/jalotesebook/JaloteSEbook/. Please use the same templates

The performance of a student in a batch shall be periodically assessed by the concerned batch teacher. The assessment will be considered for determining term work marks

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6.Object Oriented Programming

Teaching Scheme
Lectures: 2 Hours per Week
Practicall: 2 Hours per Week

Examination scheme
Term Work: 25Marks
POE: 50 Marks

Prerequisites: Problem solving using C

Objectives:
To provide knowledge on following topics,

1)Limitations of Procedural programming and Benefits of Object Oriented Programming

2)OOPs concepts like Class, Objects, Data hiding, Data Encapsulation, Data Abstraction, Inheritance and polymorphism and their implementation using C++

3)File handing using object oriented concepts

4)Advanced features like Generic programming using Templates, STL and Exception Handling

Unit1. Introduction to Object Oriented Programming: (3)
Introduction to procedural, object-oriented programming, Limitations of procedural programming, Need of object-oriented programming, fundamentals of object-oriented programming: objects, classes, data members, methods, messages, data encapsulation, data abstraction and information hiding, inheritance, polymorphism.

Unit 2. Basics of C++ programming: (6)
Variable declarations, global scope, const variables, reference variables, function prototypes, functions with default arguments, call by value, call by reference, returning by reference, call by pointer, inline functions, constant arguments, 'cin', 'cout', formatting and I/O manipulators, Classes and Objects defining Class, data members, member functions, Access specifiers – public, private, protected, constructor, destructor, array of objects, passing objects to functions, returning object.

Unit 3. Inheritance: (4)
Need of Inheritance, Concept, public, private, protected inheritance, Single inheritance, Multiple and multilevel inheritance, Hybrid Inheritance, Virtual base class, overriding of member functions, static variable, static function, friend function, friend class

Unit 4. Polymorphism: **(5)**

Pointers basics of memory management, New and delete operators, Pointer to object, Pointer to data members, this pointer. Need of Polymorphism, concept, Compile time polymorphism or early binding: function over loading and operator overloading, operator overloading using member function and friend function, overloading - unary, binary, arithmetic operators, relational operators, Overloading new and delete operators, insertion and extraction operators, Run time polymorphism or late binding using Virtual function, pure virtual function, Abstract class, Type conversion

Unit 5. Files and Streams: **(4)**

Concept of Streams, concept of File, opening and closing a file, detecting end-of-file, file modes, file pointer, reading and writing characters, strings and objects to the file, operations to move file pointers i.e seekg, seekp, tellg, tellp.

Unit 6. Advanced C++ features: **(4)**

Introduction to Generic Programming using Templates: Function template and class template, Introduction to Standard Template Library (STL), containers, iterators and algorithms, study of container template classes for vectors and stacks and related algorithms
Exception handling: Introduction, syntax for exception handling code: try-catch-throw, Multiple Exceptions, Exceptions with arguments

Text Books:

2) C++: The Complete Reference Fourth Edition - Herbert Schildt (**McGraw-Hill)**
3) C++ programming: From Problem Analysis to Program Design Fifth Edition -D.S. Malik (Cengage Learning)
4) C++ Programming with language –Bjarne Stroustrup (AT & T)

Reference Books:

1) Object Oriented Programming with C++ Fourth Edition-E Balguruswamy (**McGraw-Hill)**
2) Object oriented Programming in C++ 3rd Edition-R.Lafore (Galgotia Publications)
3) C++ programming –John Thomas Berry(PHI)
4) Object –Oriented Analysis & Design: Understanding System Development with UML 2.0 , Docherty, Wiley India Ltd.
5) **http://www.spoken-tutorial.org/** NMEICT Project of Govt. Of India.

Laboratory Work:

Minimum 10-12 Experiments are to be performed in batches, on above topics.

Term work

It should comprise detailed documentation on the below 10-12 experiments. Students in batches should implement programs based on the following topics preferably on Linux platform.

1. Implementation of Inline functions, functions with default arguments, reference parameters
2. Implementation of Class Objects, Constructor, destructor, constructor overloading
3. Implementation of Functions overloading
4. Implementation of Operator overloading
5. Implementation of Multiple and multilevel inheritance using virtual base class
6. Implementation of Virtual function
7. Implementation of Static variable, Static functions
8. Demonstration of Pointers- new, delete operators
9. Implementation of Friend function, friend class
10. Implementation of class and function Templates
11. Implementation of Exception Handling
12. Implementation of File Handling using OOP concepts
13. Demonstration of STL in C++

S.E.(Information Technology) SEM III and IV(Revised)

Equivalent Subjects for 2014 -15 onwards syllabus

Sr. No.	Subject as per old syllabus	Equivalent New Subject
1	Applied Mathematics - I	Discrete Mathematical Structures
2.	Data Structure and Algorithms	Data Structures
3.	Digital System and Microprocessor	Digital System and Microprocessor
4.	Theory of Computer Science	Theory of Computation
5.	Multimedia Techniques	Fundamentals of Economics and Management
6.	Applied Mathematics - II	Statistics & Fuzzy Systems
7.	Advanced Microprocessors	Computer Network
8.	Data Communication	Data Communication
9.	Computer Organization and Architecture	Computer Organization & Architecture
10.	Software Engineering	Software Engineering