EB/EC/EE/EI/CE/CS/IT/ME/SE 401 ENGINEERING MATHEMATICS III

Module 1

Complex Analytic functions and conformal mapping: curves and regions in the complex plane, complex functions, limit, derivative, analytic function, Cauchy - Riemann equations, Elementary complex functions such as powers, exponential function, logarithmic, trigonometric and hyperbolic functions. *Conformal mapping*: Linear fractional transformations, mapping by elementary functions like Z^2, e^z, sin z, cos z, sin hz, and Cos hz, Z+1/Z.

Module 2

Complex integration: Line integral, Cauchy's integral theorem, Cauchy's integral formula, Taylor's series, Laurent's series, residue theorem, evaluation of real integrals using integration around unit circle, around the semi circle, integrating contours having poles, on the real axis.

Module 3

*Partial differential equations:*Formation of partial differential equations. Solutions of equations of the form F(p, q) = 0, F(x,p,q)=0, F(y,p,q)=0, F(z,p,q)=0, F1(x,p) = F2 (y,q), Lagrange's form Pp+Qq = R. Linear homogeneous partial differential equations with constant co-effients.

Module 4

Vibrating string : one dimensional wave equation, D'Alembert's solution, solution by the method of separation of variables. *One dimensional heat equation,* solution of the equation by the method of separation of variables, *Solutions of Laplace's equation* over a rectangular region and a circular region by the method of separation of variables.

Text Books:

1. R.K.Jain, S.R.K.Iyengar: Advanced Engineering Mathematics, Narosa Publishers.1991
2. C.R.Wilie & L.C.Barrett: Advanced Engineering Mathematics, MGH Co.

References:

1. Ervin Kreyszig, Wiley Eastern - Advanced Engineering Mathematics
2. Churchill R.V- Complex Variables & Applications: MGH Publishers.
3. M.C.Potter - Advanced Engineering Mathematics, , J.L.Goldberg Oxford University Press

Type of questions for University Examination
Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

CS/EB/EC/EI 402 MICROPROCESSORS

Module 1

Introduction to 8 bit microprocessor: Microcomputers and microprocessors, 8/ 16/ 32/ 64-bit microprocessor families; Internal architecture of Intel 8085 microprocessor: Block diagram, Registers, Internal Bus Organization, Functional details of pins, Control signals, External Address / Data bus multiplexing, Demultiplexing, I/ O mapped I/ O, and memory mapped I/ O techniques.Interrupts, Serial communication and DMA features

Module 2

Assembly Language Programming: 8085 instruction set: Instructions, Classifications, Addressing modes, Stack and Subroutines, Delay routines, Counters etc. Programming examples.

Module 3

Instruction Timing and Interrupts: Timing Diagrams (of various instructions): T- state, Machine cycle (Opcode fetch, Read / Write, Interrupt Acknowledge, Bus Idle, etc), Interrupts: -types (h/ w and s/ w), Maskable / Non maskable, their organization.

Module 4

Interfacing concepts and devices:

Memory interface: Concept of memory chip/ chips interface to 8085 with appropriate examples

Programmable interfacing devices: - Programmable peripheral interface (Intel 8255), Programmable timer interface (Intel 8253/ 54), Programmable display / Keyboard interface (Intel 8279), Programmable serial communication interface (Intel 8251)-(their architecture, register orga nization, initialization, hard ware and software inter face to 8085.

Text Books:

1. Ghosh and Sridhar: 0000 to 8085 Microprocessors for Engineers and Scientists
2. Gaonkar: Microprocesors, Architecture, Programming and Applications.

References:

1. Nagoor Kani, Microprocessors, architecture and programming, RBA Publications, 2004
2. Douglas V. Hall , Microprocessors, Interfacing and Peripherals, Tata McGraw Hill,2nd ed.
3. S. P. Chowdhuray, Sunetra Chowdhuray, Microprocessors and Peripherals, SCITECH, 2004

Type of questions for University Examination

Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module

Question 2-5 – There will be two choices from each module .Answer one question from each module of 15 marks

CS 403 COMPUTER ARCHITECTURE & ORGANISATION

Module 1

Basic structure of computers – Functional units – Basic operational concepts – Bus structures – Instructions & instruction sequencing. Hardware and software - Addressing modes – Assembly language – Stacks &Subroutines

Module 2

Processing Unit – Fundamental concepts – Execution of a complete instruction - Hardwired control unit- micro programmed control - control signals - microinstructions- micro program sequencing- Branch address modification- Pre-fetching of micro instructions- Emulation.

Computer arithmetic - logic design for fast adders - multiplication - Booth's algorithm - Fast multiplication - integer division - floating point numbers and operations.

Module 3

Memory organization-Semiconductor RAM memories- internal organization of memory chips- Static and Dynamic memories - cache memories - mapping functions- replacement algorithms - virtual memory - address translations – performance considerations – interleaving - Secondary storage.

Module 4

Input-output organizations - interrupts – Enabling & Disabling interrupts - handling multiple devices - device identification - vectored interrupts - interrupt nesting – Simultaneous requests – DMA - Buses - I/O interface circuits –Standard I/O interfaces.

Text Books:

1. Hamacher C. V., "Computer Organisation – International Edition -5th Edition", Mc.Graw Hill, NewYork
2. Stallings William, "Computer Organization and Architecture",6th Edition, Pearson Education ,2003

References:

1. Pal Chaudhary P, "Computer Organisation and Design " , Prentice Hall, New Delhi,
2. Hayes J P , "Computer Organisation and Architecture - 2nd Edition ", Mc Graw Hill,
3. Tanenbaum A S , "Structured Computer Organisation - 3rd Edition", Prentice Hall,
4. Behrooz Parhami, Computer Architecture from Microprocessors to Supercomputers Oxford Indian Edition
5. Kai Hwang & Faye A Briggs "Computer Archtecture and Parallel Processing "Mc.Graw Hill.,NewYork –1985
6. D.A Pattersen and J.L Hennesy ,"Computer Organization and Design: The hardware/software Interface 2nd Edition", Harcourt Asia private Ltd. (Morgan Kaufman),Singapore 1998

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CS/IT 404 AUTOMATA LANGUAGES AND COMPUTATION

Module 1

Finite state systems NFA DFA, Equivalence of NFA and DFA, Equivalence of NFA and NFA with epsilon moves, regular expression, Equivalence of regular expression and finite automata, Finite automata with output associated with state, Finite automata with output associated with transition, Equivalence of finite automata with output, applications of Finite automata, Pumping Lemma , closure properties of Regular sets, Decision algorithms , My Hill Nerode theorem ,minimization of DFA

Module 2

Context Free grammars derivations parse Trees, ambiguity Simplification CNF,GNF,PDA DPDA, equivalence of PDA and CFL, pumping lemma for CFL, Closure Properties, decision algorithms, CYK algorithm

Module 3

Turing machine, Techniques for construction of TM , storage in finite control, multiple tracks ,shifting over ,checking of symbols ,subroutines, NDTM , undecidability, universal TM

Module 4

Recursive and recursively enumerable languages, Properties, halting problem of TM Chomsky Hierarchy ,equivalence of regular grammar and FA , equivalence of unrestricted grammar and TM , equivalence of LBA and CSL relation between languages

Text Books:

1. J E Hopcroft and J D Ullman Introduction to Automata Theory and Languages and Computation, Addison Wesley
2. Michael Sipser, Introduction to the Theory of Computation, Thomson Learning

References:

1. Misra and Chandrasekharan, Theory of Computation, Prentice Hall
2. H R Lewis Papadimitrou, Elements of Theory of Computation PHI
3. John Martin, Introduction to Language and Theory of Computation, TMH
4. Peter Linz, An Introduction to Formal Languages and Automata Narosa Publucation

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Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module
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CS/IT 405 DATA STRUCTURES & ALGORITHMS

Module 1

Introduction to Data structures - Arrays & sparse matrices – representation, Searching - linear, binary, Fibonacci – Sorting – selection, bubble, insertion, quick, merge, heap, Introduction to external sorting, Hash tables – Hashing functions

Module 2

Linked lists – singly, doubly and circular lists, Application of linked lists – Polynomial manipulation, Stacks – Implementation of stacks using arrays and lists – Typical problems – Conversion of infix to postfix – Evaluation of postfix expression . Queues & Deques – implementation., priority queues

Module 3

Trees, Definition and mathematical properties. Representation – sequential, lists - Binary trees – Binary tree traversals – pre-order, in-order & post-order, Expression trees . Threaded binary trees . Binary Search trees . AVL trees

Module 4

Graphs – Graph representation using adjacency matrices and lists – Graph traversals – DFS, BFS - shortest path – Dijkstra's algorithm, Minimum spanning tree – Kruskal Algorithm, prims algorithm – Binary search, B trees and B+ trees.

Text Book:

1. Michael Waite and Robert Lafore, "Data Structures and Algorithms in Java" , Techmedia, NewDelhi, 1998.
2. Adam drozdek," Data Structures and Algorithms in Java" ,Thomson Publications, 2nd Edition.
3. Sartaj Sahni, 'Data Structures, Algorithms, and Applications in Java", McGraw-Hill

References:

1. Aaron M.Tanenbaum, Moshe J.Augenstein, "Data Structures using C", Prentice Hall InternationalInc., Englewood Cliffs, NJ, 1986
2. Ellis Horowitz and Sartaj Sahni, " An introduction to Data Structures", Computer Science Press,Rockville, MA, 1984
3. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Benjamin/CummingsPublishing Company Inc., Redwood City, CA, 1991
4. Jean Paul Tremblay and Paul G Sorenson, "An introduction to Data Structures with Applications",McGraw-Hill, Singapore, 1984

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CS/IT 406 DATA COMMUNICATION

Module 1

Data transmission: Communication model-Data Transmission: Concepts and Terminology- Analog and Digital Data Transmission- Transmission Impairments- Guided transmission media- Wireless Transmission- Line-of-sight Transmission. Channel Capacity-Band width and Shannon's capacity equation

Module 2

Signal Encoding Techniques: *Digital Data,Digital Signals*:-Unipolar. Polar: NRZ-RZ-Biphase-Manchester-Differential Manchester. Bipolar: AMI-B8ZS-HDB3.

Digital Data, Analog Signals:-Aspects of Digital to Analog Conversion: Bit rate and Baud rate-Constellation pattern. ASK-FSK-PSK-QPSK-QAM-Bandwidth of ASK,FSK,PSK and QAM.

Modems-Types of modem-Modem standards

Analog Data, Digital Signals:- Sampling principles-Quantization-Nyquist Theorem. PAM-PCM-Delta Modulation

Analog Data, Analog Signals:-AM-FM-PM-Bandwidth of AM,FM and PM.

Data Compression:- Frequency dependent coding-Huffman coding-LZW Coding

Module 3

Digital Data Communication Techniques: Asynchronous and Synchronous Transmission-Types of Errors-single bit and burst errors-Error Detection: Redundancy- LRC-VRC-CRC-Capabilities and performance of CRC-Error Correction: single bit error correction – Hamming code- Burst error correction-convolution code.

Data Link Control: Line discipline-Flow control-Error control: ARQ-stop and wait ARQ-Continuous ARQ-Line utilization of different ARQs-Link management-HDLC

Module 4

Multiplexing: Frequency-Division Multiplexing-Synchronous Time-Division Multiplexing-Statistical Time-Division Multiplexing-Asymmetric Digital Subscriber Line-xDSL

Spread Spectrum: The Concept of Spread Spectrum-Frequency Hopping Spread Spectrum-Direct Sequence Spread Spectrum-Code-Division Multiple Access

Text Books:

William Stallings, *Data and Computer Communication*, 8/e ,Pearson education,2006.

References:

1. Behrouz A. Forouzan, *Data Communication and Networking* 4/e, TMH,2006.
2. Fred Halsal, *Data Communication Computer Network and Open Systems, 4/e*, Person education ,2005.
3. William A. Shay, *Understanding Data Communication & Networks*, 2/e, Thomson Learning,2003
4. James Irvin & David Harle, *Data communication and Networks: an Engineering approach*, Wiley,2006.

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Question 1 - 8 short answer questions of 5 marks each. 2 questions from each module

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CS/EB/EC/EE/EI 407 DIGITAL ELECTRONICS LABORATORY

1. Half adder and full adder using NAND gates.
2. Code converters - Binary to Gray and gray to Binary using mode control
3. Binary addition and subtraction (a) 1's complement (b) 2's complement(using 7483)
4. BCD adder using 7483.
5. Study of MUX, DeMUX &Decoder Circuits and ICs
6. Set up R-S & JK flip flops using NAND Gates
7. Asynchronous UP / DOWN counter using JK Flip flops
8. Design and realization of sequence generators.
9. Study of shift registers and Implementation of Johnson and Ring counter using it.
10. Study of IC counters 7490, 7492, 7493 and 74192 or the CMOS equivalent.
11. Astable and monostable multi- vibrators using TTL gates.
12. Transfer characteristics and specifications of TTL gates

Note: 50% Marks is earmarked for continuous evaluation and 50% marks for end semester examination to be assessed by two examiners. A candidate shall secure a minimum of 50% marks separately for the two components to be eligible for a pass in that subject.

CS/IT 408 DATA STRUCTURES LABORATORY

1. Simple programming exercises in Java
2 Study of algorithms and implementation in Java programming language for the following:
    - Searching and Sorting
    - Linked Lists- Singly and doubly
    - Stacks – various applications
    - Queues
    - Trees
    - Graphs

Note: 50% Marks is earmarked for continuous evaluation and 50% marks for end semester examination to be assessed by two examiners. A candidate shall secure a minimum of 50% marks separately for the two components to be eligible for a pass in that subject.