

West Bengal University of Technology

B.E/B.Tech in Information Technology

Fourth Semester

INFORMATION TECHNOLOGY

Mathematics

M 401

Contact: 3L + IT

Credit: 4

Sets and functions : Groups, Semigroups and monoids, Cyclic semigroups and submonoids, Subgroups and Cosets, Congruence relations on Semigroups. Morphisms, Normal subgroups. Structure of cyclic groups, permutation groups, dihedral groups. Elementary applications in coding theory.

Rings and Boolean Algebra : Rings, Subrings, morphism of rings, ideals and quotient rings. Euclidean domains. Integral domains and fields. Boolean Algebra - direct product, Morphisms. Boolean sub-algebra. Boolean Rings. Applications of Boolean algebra in logic circuits and switching functions.

Recursion and Recurrence Relation : Basic idea, Sequence and discrete function. Generating functions and applications.

Graph Theory :Graphs, Digraphs, Isomorphism, Walks, Paths, Circuits, Shortest Path Problem, Dijkstra's Algorithm, Trees, Properties of Trees, Cotrees and Fundamental Circuits, Shortest Spanning Trees - Kruskal's Algorithm,Prims Algorithm, DFS, BFS, Cut Sets, Fundamental Cut Sets and Cut Vertices, Planar and Dual Graphs, Metric Representation of Graphs, Networks, Flow Augmenting Path, Ford-Fulkerson Algorithm for Maximum Flow.

Text :

1. Liu C. L., "Introduction to combinatorial mathematics", McGraw Hill, 1968.
2. Mott J. L., Kandel A. and Baker T. P., "Discrete mathematics for Computer Scientists and Mathematicians", PH, 1986.
3. Rosen—Discrete Mathematics, 2/e, TMH
4. S.K. Mapa—Higher Algebra (Abstract & Modern)
5. Robert J. McElice , Robert B. Ash & Carol Ash, "Introduction to discrete Mathematics", Tata McGraw Hill
6. Deo N., "Graph Theory with Applications to Engineering and Computer Science", PHI, 1980
7. Tremblay and Manohar, "Discrete mathematical structures with applications to computer science", McGraw Hill, 1975
8. Kolamn, Busby and Ross, "Discrete mathematical structures", 3/ed, PHI, 1996.
9. Fraleigh J. B., "A first course in abstract algebra Narosa", 1990
10. Smullyan R. M., "First Order Logic Springer Verlag", 1968

Reference:

- 1.Lipschutz—2000 Solved Problems in Discrete Mathematics, TMH
- 2.Balakrishnan—Graph Theory (Schaum),MH
- 3.Hararay—Graph Theory

Analysis and Design of Information System

IT 401

Contact: 3L

Credit: 3

Information System-Systems development life cycle, Structured Systems Analysis and Design, Physical and Logical Data Flow Diagrams, Requirements Analysis, Design of New Systems. Data Modeling, data dictionary, entity relationship diagram, structure charts, Transform and Transaction Analysis. Coupling and Cohesion, process specification, Structured English, Decision tables, CASE tools, Structured programming, System implementation, Chief programmer Teams, Planning for coding and Testing, verification and validation, changeover phase, Project review and walk through, Alternate Life cycles, evolutionary Design and Prototyping.

Feasibility Study - Cost estimation, cost benefit analysis, input-output design, forms design, Dialogue design, File design, security and control, Codification and Classifications, Documentation.

Text Book :

1. Senn J., "Analysis and Design of Information Systems", McGraw Hill
2. P. Jalote—Software Engineering
3. Naik Kishore—System Analysis & Design
4. Rogers G Pressman—Software Engineering

References :

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1. Whitten—System Analysis & Design Methods, 5/e, TMH
2. Rajaraman V., “Systems Analysis and Design”, PHI
3. Murdic R.G., Rose J. and Claggett JR., “Information Systems for Modern Management”, PHI,
4. Wigardes K., Svensson A., Sehong L. A., Dahlgren G., “Structured Analysis and Design of Information Systems”,
5. Thomas R. and Prince, “Information Systems for Planning and Control”,

Computer Organization & Architecture

CS-404

Contacts: 3L

Credits: 3

Concepts & Terminology: Digital computer concepts; Von-Neumann concept ; Hardware & Software and their nature ; structure & functions of a computer system , Role of operating system.

Memory Unit : Memory classification , characteristics ; Organization of RAM , address decoding ROM/PROM/EEPROM ; Magnetic memories , recording formats & methods , Disk & tape units; Concept of memory map , memory hierarchy , Associative memory organization ; Cache introduction , techniques to reduce cache misses , concept of virtual memory & paging.

CPU Design: The ALU – ALU organization , Integer representation , 1s and 2s complement arithmetic ; Serial & Parallel Address; implementation of high speed Address Carry Look Ahead & carry Save Address; Multiplication of signed binary numbers-Booth’s algorithm ; Divide algorithms- Restoring & Non-Restoring ; Floating point number arithmetic; Overflow detection , status flags.

Instruction Set Architecture- Choice of instruction set ; Instruction word formats ; Addressing modes.

Control Design – Timing diagrams; T-States , Controlling arithmetic & logic instruction , control structures ; Hardwired & Micro programmed, CISC & RISC characteristics.

Pipelining-general concept , speed up , instruction & arithmetic pipeline; Examples of some pipeline in modern processors , pipeline hazards; Flynn’s classification –SISD ,SIMD , MISD , MIMD architectures-Vector and Array processors & their comparison , Concept of Multiprocessor; Centralized & distributed architectures.

Input/output Organization : Introduction to Bus architecture , effect of bus widths , Programmed & Interrupt I/O , DMA.

Text:

1. Hayes-- Computer Architecture & Organization, 3/e ,MH
2. Carter—Computer Architecture (Schaum Series), TMH
3. Mano M.M—“Computer System Architecture”
4. Chaudhury P. Pal—“ Computer Organization & Design” , PHI

Reference:

1. Hamacher—Computer Organization, 5/e, MH
2. Stallings W—“ Computer Organization & Architecture” , MH

Principles of Communication Engineering

Code: EC 411

Contact: 3L

Credit: 3

Amplitude and Frequency Modulation – their generation and detection Bandwidth requirements Low Power and High Modulators and Modulated amplifiers. Superheterodyne detection. Signal to Noise ratio of A.M. and P.M. transmission.

A/D, D/A Converters. Shannon’s sampling Theorem. PAM, PWM, PPM and PCM. Their generation and detection.

Digital Modulation : ASK, FSK, PSK performance evaluation. Time Division Multiplexing and Demultiplexing. Modems, Error control and coding, Channel capacity.

Data Transmission Synchronization, Data protection, error detection and correlation.

Elements of Satellite Communication tracking and control.

Text :

1. Taub H. and Shilling D. L., “Principles of Communication Systems”, 2/e, TMH
2. Carlson R. B., “Communication Systems ,4/e, Mc.Graw Hill
3. Haykin S. S., “An Introduction to Analog and Digital Communication Systems”, Wiley Eastern.
4. Lathi B. P., “Communication Systems”, John Wiley.

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Reference:

1. Kennedy—Electronic Communication Systems, 4/e , TMH

Control System

EE 411

Contact: 3L + IT

Credit: 4

Elementary control concepts. Open loop and close loop control

Transfer function of simple electrical and electromechanical systems. Poles and zeros.

Transient response of 1st and second order systems. Modeling Position Control and Velocity control systems. Case studies positional control systems: Servo Motor, Tacho, Potentiometer Characteristics.

Frequency response. Bode & Nyquist Diagram. Root Locus, Stability analysis. Routh Hurwitz Criteria, Nyquist Criteria. Gain margin & phase margin. Signal flow Graph, Masson's Gain formula .

Control Actions : P, PD, PI & PID Control.

Introduction to state variable modeling. Z transforms and discrete data systems.

Text books :

1. Madan Gopal—Control Systems , Principles & Application , 2/e ,TMH
2. Nagrath I. J. and Gopal M., "Control Systems Engineering", 3rd Edn., New Age International (P) Ltd.
3. Ogata K, "Modern Control Systems", 2nd Edn., Prentice Hall, Englewood Cliffs.
4. Benjamin C. Kuo, "Automatic Control Systems", 7th Edn., PHI

References :

1. Ogata K., "Discrete - Time Control Systems", Prentice Hall, Englewood Cliffs, N. J.
2. Dasgupta S. K., "Control Systems"

Communication Engg. Lab

EC 481

Contacts: 3 P

Credits:2

1. Study of Amplitude modulation & Demodulation technique.
2. Study of Double Side Band Suppressed Carrier (DSB-SC) & Demodulation technique.
3. Study of Single Side Band Suppressed Carrier (SSB-SC) & Demodulation technique.
4. Study of Frequency Modulation & Demodulation.
5. Study of Time Division Multiplexing (TDM) & Demultiplexing.
6. Study of Frequency Shift Keying (FSK).
7. Study of Pulse Amplitude Modulation (PAM).
8. Study of Pulse Width Modulation (PWM).
9. Study of VCO (Voltage controlled oscillator) & PLL (Phase Locked Loop).

Control System Lab

EE 481

Contacts: 3 P

Credits: 2

1. Familiarization with MATLAB- Control system tool box , MATLAB-SIMULINK tool box & PSPICE.
2. Determination of step response for First order & Second order System with unity feedback on CRO & calculation of control system specifications for variation of system design.
3. Simulation of step response & impulse response, for Type-0 , Type-1 & Type-2 system with unity feedback using MATLAB & PSPICE.
4. Determination of root-locus, Bode-plot, Nyquist plot, using MATLAB-Control system toolbox for a given 2nd order transfers function & determination of different control system specifications.
5. Determination of PI, PD, PID controller action on 1st order simulated process.
6. Determination of approximate transfer function experimentally using from Bode Plot.
7. Evaluation of steady-state error, setting time, percentage peak overshoots, gain margin, phase margin with addition of lead compensator & lag compensator in forward path transfer functions using MATLAB & PSPICE.
8. Study of position control system using servomotor.

Information System Design Lab

IT 491

Contacts: 3 P

Credit: 2

Case studies using any of the following items including relevant form design with the help of visual programming aids.

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- a) Payroll accounting system.
- b) Library circulation management system.
- c) Inventory control system.
- d) University examination & grading system.
- e) Patient information system.
- f) Tourist information system.
- g) Judiciary information system.
- h) Flight reservation system.
- i) Bookshop automation software.
- j) Time management software.

Computer Organization & Architecture Lab CS 494

Contacts: 3 P

Credit: 2

1. Review of the different logic design ckts., e.g.
 - a) Flip/Flop(RS, JK, D, T), b) Register, (4/8 bit Synchronized Data Transfer),
 - c) Tri-state logic Gates
2. Familiarity with state of art IC-chips, e.g.
 - a. Multiplexer , b) Decoder, c) Encoder, d) Counter, e) Shift-Register, f) adderTruth Table verification and clarification from Data-book.
3. Design a BCD adder.
4. Design an Adder/Subtractor composite unit .
5. Design a carry-look ahead Adder.
6. Design a ripple counter and carry-look ahead counter and assess the complexity of both the ckts.
7. Use a multiplexer unit to design a composite ALU .
8. Design a multiplex display unit using counter, multiplexer, decoder etc.
9. Design a keyboard Encoder unit in 2 Dimension.
10. Test a RAM chip and cascade two chips for vertical and horizontal expansion. Use wired OR tri-state output interconnection.
11. Use ALU chip for multibit arithmetic operation.

TECHNICAL REPORT WRITING & / LANGUAGE PRACTICE LABORATORY

Code: HU 481

Contact: 3

Credits: 2

Topics to be covered and number of hours required for it:

1. Introductory lecture is to be given to the students so that they get a clear idea of the syllabus and understand the need for having such a practice lab in the first place(3 hours)
2. Conversion practice is done on given situation topics. The students are also made to listen to pre-recorded cassettes produced by British Council and also by the Universities of Oxford and Cambridge (6 hours)
3. Group Discussions:- The students are made to understand the difference between the language of conversion and group discussion. Strategies of such discussions are to teach to them. It is also helpful to use videocassettes produced by the U.G.C. on topics like group-discussion. After wards the class is divided into groups and the students have to discuss on given topics on current socio-economic-political-educational importance(12 hours)
4. Interview sessions-students are taught the do's and don'ts of facing a successful interview. They then have to face rigorous practices of mock-interviews. There simulations of real life interview sessions where students have to face an interview panel(12 hours)
5. Presentations: The secrets of an effective presentation are taught to the students. Then each and every student has to make lab presentations with the help of the Overhead projector/ using power point presentation and other audio-visual aids in the laboratory. They also have to face the question answer sessions at the end of their presentation (12 hours)
6. Classes are also allotted to prepare the students for competitive examinations like the T.O.E.F.L. by making the students listen to specially produced C.D. cassettes of such examinations (3 hours)

The overall aim of this course is to inculcate a sense of confidence in the students and help them to become good communicators in their social as well as professional lives.

Text:

1. Sharma—Business Correspondence & Report Writing, TMH
2. Prasad—Group Discussion & Interview (With Audio Cassette) , TMH