EN010401 Engineering Mathematics III

(Common to all branches)

Teaching scheme **Credits: 4**

2 hours lecture and 2 hour tutorial per week

Objectives: *Apply standard methods of mathematical &statistical analysis*

MODULE 1 Fourier series (12 hours)

Dirichlet conditions – Fourier series with period 2 π and 2l – Half range sine and cosine series – Harmonic Analysis – r.m.s Value

MODULE 2 Fourier Transform (12 hours)

Statement of Fourier integral theorem – Fourier transforms – derivative of transforms- convolution theorem (no proof) – Parsevals identity

MODULE 3 Partial differential equations (12 hours)

Formation by eliminating arbitrary constants and arbitrary functions – solution of Lagrange's equation – Charpits method –solution of Homogeneous partical differential equations with constant coefficients

MODULE 4 Probability distribution (12 hours)

Concept of random variable , probability distribution – Bernoulli's trial – Discrete distribution – Binomial distribution – its mean and variance- fitting of Binominal distribution – Poisson distribution as a limiting case of Binominal distribution – its mean and variance – fitting of Poisson distribution – continuous distribution- Uniform distribution – exponential distribution – its mean and variance – Normal distribution – Standard normal curve- its properties

MODULE 5 Testing of hypothesis (12 hours)

Populations and Samples – Hypothesis – level of significance – type I and type II error – Large samples tests – test of significance for single proportion, difference of proportion, single mean, difference of mean – chi –square test for variance- F test for equality of variances for small samples

References

1. Bali& Iyengar – A text books of Engg. Mathematics – Laxmi Publications Ltd.
2. M.K. Venkataraman – Engg. Mathematics vol II 3rd year part A & B – National Publishing Co.
3. I.N. Sneddon – Elements of partial differential equations – Mc Graw Hill
4. B.V. Ramana – Higher Engg. Mathematics – Mc Graw Hill
5. Richard A Johnson – Miller Fread's probability & Statistics for Engineers- Pearson/ PHI

6. T. Veerarajan – Engg. Mathematics – Mc Graw Hill
7. G. Haribaskaran – Probability, Queueing theory and reliability Engg. – Laxmi Publications
8. V. Sundarapandian - probability ,Statistics and Queueing theory – PHI
9. H.C.Taneja – Advanced Engg. Mathematics Vol II – I.K.International
10. A.K.Mukhopadhyay-Mathematical Methods For Engineers and Physicists-I.K.International

CS010 402: Object Oriented Programming

Teaching scheme **Credits:** 4

3 hours lecture and 1 hour tutorial per week

Objectives

- *To impart the basic concepts of object oriented programming in C++.*
- *To provide sufficient knowledge about developing real world projects with object oriented concepts.*

Module I (8 hours)

Introduction to OOP - Evolution of object oriented languages - Need of Objects - Definition of Object-Oriented Language – Classes and Objects – Creating and Using Classes and objects – Member functions and variables – Constructors –multiple and parameterized constructors- copy constructors –constructors with default arguments- Destructors.

Module II (13 hours)

Inheritance and Access Control - Member access control in classes – Friend functions and classes – Extending classes - Public Private and Protected Inheritance – Classification of Inheritance – Single – Multiple – Multilevel – Hierarchical – Hybrid.

Module III (14 hours)

Polymorphism – Runtime and compile time polymorphism – overloading functions and operators – selecting friend member function for operator overloading - Virtual methods – pure virtual methods – Abstract classes - applications of abstract classes.

Module IV (13 hours)

Virtual Destructors – Virtual Base Classes - Template- class templates and function templates- Creating and using templates – Namespaces-Dynamic Objects - Dynamic object allocation - Inline functions. Exception Handling-basics of exception handling-exception handling mechanism- Throwing and Catching Mechanism-Rethrowing and Specifying exceptions.

Module V (12 hours)

Data file operations –opening and closing files-reading and writing from file-Classes and file operations-Other object oriented languages – Java – Object oriented features in Java – Comparison with C++-Object oriented system development-object oriented notations and graphs-object oriented analysis-object oriented design.

Reference Books

1.. Robert Lafore :*Object Oriented Programming in C ++*, 3rd Edition, Galgotia Pub, New Delhi
2. E. Balaguruswamy : *Object oriented Programming with C++*,2nd Edition, Tata McGraw Hill, New Delhi, 2004
3. Dilkeshwar Pandey,Upendra K Tiwari, *Object Oriented Programming with Java*, Acme Learning (Module V), New Delhi ,2010
4. D Ravichandran: *Programming with C++* , 3rd Edition ,Tata McGraw Hill, New Delhi
5. Bjarne Stroustrup , *The C++ Programming Language*, 3rd Edition..,
6. Randal Albert, Todd Breedlove: *C++ ,An Active Learning Approach*, Jones And Bartlett Publishers, New Delhi ,2010
7. Deitel & Deitel, *C++ How To Program, Introducing Object-Oriented Design with the UML*, 3rd Edition Pearson
8. Matt Weisfeld: *The Object Oriented Thought Process* ,3rd Edition,Pearson Education, New Delhi ,2009
9. Jyoti Singh: *Object Oriented Systems & Concepts of C++;* Acme Learning, New Delhi,2010
10. Poornachandra Sarang: *Object Oriented Programming with C++*, 2nd Edition, PHI, New Delhi,2009
11. R. Rajaram, *Object Oriented Programming and C++*,2nd Edition,,New Age International Publishers, New Delhi,2007
12. E. Balaguruswamy, *Programming with Java*, 2nd Edition, Tata McGraw Hill, New Delhi
13. Bhushan Trivedi, *Programming with Ansi C++* ,Oxford Higher Education, New Delhi,2007

CS010 403: Data Structures and Algorithms

Teaching scheme **Credits:** 4
2 hours lecture and 2 hour tutorial per week

Objectives

- *To impart the basic concepts of data structures and algorithms*
- *To develop understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures.*

Module I (10 hours)

Principles of programming – System Life Cycle - Performance Analysis and Measurements- Time and Space complexity-Complexity calculation of simple algorithms. Hashing:- Static Hashing-Hash Tables-Different Hash Functions-Mid Square-Division-Folding-Digit Analysis, Collision-Collision Resolution Techniques.

Module II (12hours)

Study of basic data structures – Arrays- Structures-Sparse matrix – Stacks – Queues-Circular queues- Priority queues - Dqueues. Evaluation of expressions – Polynomial representation using arrays.

Module III (12hours)

Linked Lists - Linked stacks and queues - Doubly linked lists – Polynomial representation using linked lists, Garbage collection and Compaction.

Module IV (14 hours)

Trees - Binary Trees – Tree Traversal – Inorder - Preorder and Postorder,
Search trees - AVL Trees, height balanced trees, Multiway search Trees- B Trees-B+ Trees. Graphs – Depth first and breadth first search.

Module V (12 hours)

Sorting methods: Selection sort, Bubble sort, Insertion sort, Merge sort, Quick sort, Heap sort, Radix sort, External sorting methods.

Reference Books

1. Horowitz ,Sahni & Anderson Freed, Fundamentals of Data Structures in C, 2nd ed., Universities Press, Hyderabad, 2009
2. Rajesh K Shukla, *Data Structures Using C & C++* ,Wiley India, New Delhi, 2009
3. Yedidyah Langsam, Moshe J Augenstein, Aron M Tenenbaum, Data Stuctures using C and C++, 2nd ed., PHI Learning Private Limited, New Delhi, 1996
4. G. A. V Pai, *Data Structures and Algorithms Concepts, Techniques and Applications*, Tata McGraw Hill , New Delhi, 2008
5. G. S Baluja, *Data Structures Through C*, Dhanpat Rai & Co. , New Delhi, 2009
6. Sartaj Sahni , *Data Structures, Algorithms and Applications in C++* , 2nd ed., Universities Press, Hyderabad, 2009
7. Michael T Goodrich, Roberto Tamassia, David Mount, *Data Structures and Algorithms in C++*, Wiley India Edition, New Delhi, 2009
8. B.M. Harwani, *Data Structures and Algorithms in C++*, Dreamtech Press, New Delhi, 2010
9. Brijendra Kumar Joshi, *Data Structures and Algorithms in C*, McGraw Hill , New Delhi, 2010
10. K R Venugopal, K G Srinivasa, P M Krishnaraj, *File Structures using C++*, McGraw Hill , New Delhi, 2009
11. ISRD Group, *Data Structures using C*, McGraw Hill , New Delhi, 2010
12. Sudipta Mukherjee, , *Data Structures using C 1000 Problems and Solutions*, Tata McGraw Hill , New Delhi, 2010
13. Seymour Lipschutz, *Data Structures with C*, Schaum's Outlines, McGraw Hill , New Delhi, 2010
14. R Krishnamoorthy & G Indirani Kumaravel, *Data Structures using C*, McGraw Hill , New Delhi, 2008
15. John R Hubbard, *Data Structures with C++*, Schaum's Outlines, Tata McGraw Hill , New Delhi, 2010
16. Jean Paul Tremblay & Paul G Sorenson, *An Introduction to Data Structures with Applications*, 2nd ed., Tata McGraw Hill , New Delhi, 2010
17. Seymour Lipschutz, *Data Structures* , Schaum's Outlines, Tata McGraw Hill , New Delhi, 2006

CS010 404 SIGNALS AND COMMUNICATION SYSTEMS

Teaching scheme	**Credits:** 4
3 hours lecture and 1 hour tutorial per week	

Objectives:-

To introduce the fundamentals of Analog and Digital Signals ,their properties and introduce the relevant transforms used in Communication.

To familiarize the core ideas of Communication Engineering which in turn adds to the study of Computer Communication.

Module 1 (15 hrs):-

Introduction to Signals:- Continuous Time Signals- Discrete Time Signals- Signal Operations- Properties of Signals(Periodicity and Symmetry), Frequency Domain Representation of Continuous Time Signals-Continuous Time Fourier Series(CTFS)- Definition- properties- Examples, Continuous Time Fourier Transform(CTFT)- Definition- Properties – Examples- Concept of Frequency Spectrum, Sampling- The Sampling Theorem(proof not required)- Quantisation

Module 2 (12 hrs):-

Communication Systems:- Architecture of a Typical Communication System – Basic problems in Signal Transmission - Noise – Types of Noise- Internal and External Noise, Cross Talk- Typical parameters of Communication Systems- Signal propagation Delay, Signal to Noise Ratio, Attenuation, Bandwidth

Communication Channels:- Twisted Pairs- Coaxial Cables- Fiber Optic Cables- Capacity of a Noisy Channel- Shannon Hartley Theorem

Module 3: (15 Hrs)

Modulation- Need for Modulation

Analog Modulation- Types of analog modulation- Amplitude Modulation, Frequency modulation, Phase modulation, Pulse Modulation Schemes- Pulse Amplitude modulation(PAM), Pulse Width Modulation(PWM), Pulse Position Modulation(PPM), Pulse Code Modulation(PCM),Delta modulation, Sample problems based on different modulation methods.

Digital modulation;- Amplitude Shift Keying(ASK), Frequency Shift keying(FSK),Phase Shift Keying(PSK), Quadrature Amplitude modulation (QAM), Differential Phase Shift Keying(DPSK)

Module 4: (8 Hrs)

Multiplexing:-Time Division Multiplexing(TDM)- Frequency Division Multiplexing(FDM)- Wavelength Division multiplexing(WDM)

Switching:- Circuit, Packet and Message Switching Schemes, Case Study:- SONET(Basic ideas only)- Datagrams and virtual Circuits

Digital Transmission:- Analog to Digital Converter(ADC), Serial and parallel Transmission- Simplex, Half Duplex and Full Duplex Transmissions.

Module 5: (10 Hrs)

Error Correction and Detection;- Line Coding Schemes- Block Coding- Convolution Coding- Hamming Codes

Transmission Codes:- Different Character Codes- ASCII, EBCDIC, Baudot Code, Bar Coding, Parity Coding

Reference Books

1. S.Haykin and B. V. Veen, *Signals and Systems*, John Wiley & Sons, N. Y., 2002
2. George Kennedy, Bernard Davis - *Electronic Communication Systems*-Tata McGraw Hill
3. Behrouz Forouzan- *Data Communication and Networking*- Tata McGraw Hill
4. Michael J Roberts, Govind Sharma- *Fundamentals of Signals and Systems*-Tata McGraw Hill
5. William Stallings- *Data and Computer Communications*- Prentice Hall of India
6. Fred Halsall- Digital Communication, *Computer Networks and Open Systems* Pearson Education
7. Taub and Schilling – *Principles of Communication Systems*- Tata McGraw Hill
8. Kolimbiris H.- *Digital Communication Systems*- Pearson Education

CS010405: Microprocessor Systems

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objectives

- *To impart the basic concepts of microprocessors and interfacing concepts.*
- *To develop an understanding about the assembly level programming.*

Module I (10 hours)

Architecture of 8085 – Registers. Instruction set of 8085 - Instruction Types – Arithmetic – Logic data transfer, Branch, Stack, I/O and Machine Control instructions - Addressing Modes - Direct and Indirect Addressing - Immediate Addressing - Implicit Addressing.

Module II (12 hours)

Subroutines - Stack Operations - Call Return sequence- Programming Examples. Timing and control unit – The fetch operation – Machine cycle and T- State instruction and data flow. Address space partitioning - Memory mapped I/O - I/O mapped I/O.

Module III (14 hours)

Interrupts of 8085 - Hardware & Software Interrupts – Enabling, Disabling and masking of interrupts – Polling – HALT & HOLD states – Programmable interrupt controller – 8259.

Module IV (12 hours)

Data transfer schemes - Programmed data transfer - synchronous and asynchronous transfer - interrupt driven data transfer – DMA data transfer. Study of Interfacing ICs **– 8257,8255** programmable peripheral interface (compare it with 8155).

Module V (12 hours)

Programmable interval timer 8253, 8251 **-,**Interfacing Keyboard and display devices, Hardware and Software approach – USART 8251. (interfacing chips functions and internal block diagram only).

Reference Books

1. Gaonkar -Microprocessor Architecture, *Programming and Applications with the 8085* - New Age International
2. Renu Singh, B. P. Singh -*Microprocessors, interfacing and Applications* New Age International-Third Edition
3. N K Srinath -*8085 Microprocessors programming and interfacing* - PHI
4. Adithya P. Mathur -*Introduction to Microprocessors Systems* - PHI
5. KK Tripathi, Rajesh K Gangwar -*Microprocessorand its Applications* -Acme learning
6. R.Theagarajan,S.Dhanasekaran,S.Dhanapal –*Microprocessor and ITS Applications* New Age International
7. N Senthil Kumar,M saravanan,s.jeevananthan-*Microprocessor and microcontrollers* -Oxford higher education

CS 010 406: Theory of Computation

(Common with IT010 404)

Teaching scheme **Credits:** 4

3 hours lecture and 1 hour tutorial per week

Objectives

- *To impart the basic concepts of theory of automata ,languages and computation.*
- *To develop understanding about machines for sequential computation, formal languages and grammars , and classification of feasible and intractable problems.*

Module I (10 hours)

Proving techniques-Mathematical induction -Diagonalization principle –Pigeonhole principle-Functions – Primitive recursive and partial recursive functions – Computable and non computable functions—-Formal representation of languages – Chomsky Classification.

Module II (13 hours)

Introduction to Automata theory – Definition of Automation – Finite Automata –Language acceptability by Finite Automata –Deterministic and Nondeterministic finite automation-Regular Expressions – Finite Automation with $\in$-Transitions –Conversion of NFA to DFA - Minimisation of DFA-DFA to Regular Expressions conversion-pumping lemma for regular languages – Applications of finite automata-NFA with o/p (moore /mealy)

Module III (12 hours)

Context Free Grammar –Simplification of CFG-Normal forms-Chomsky Normal form and Greibach Normal form- pumping lemma for Context free languages- Applications of PDA - Pushdown Automata – Formal definition – Language acceptability by PDA through empty stack and final state – Deterministic and nondeterministic PDA – designing of PDA-

Module IV (13 hours)

Turing Machines – Formal definition – Language acceptability by TM –TM as acceptors, Transducers - designing of TM- Two way infinite TM- Multi tape TM - Universal Turing Machines- Church's Thesis-Godelization.- - Time complexity of TM - Halting Problem - Rice theorem - Post correspondence problem-Linear Bounded Automata.

Module V (12 hours)

Complexity classes- Tractable problems– Class P –P Complete-Reduction problem-Context grammar nonempty-Intractable problems- Class NP – NP Complete- Cooks theorem-Reduction problems-SAT-Clique-Hamiltonian-TSP-Vertex Cover-NP Hard problems.

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Reference Books

1. K.L.P. Mishra, N. Chandrashekharan , *Theory of Computer Science* , Prentice Hall of India
2. Michael Sipser, *Introduction to the Theory of Computation,* Cengage Learning,New Delhi,2007
3. Harry R Lewis, Christos H Papadimitriou, *Elements of the theory of computation*, Pearson Education Asia,
4. Rajendra Kumar,*Theory of Automata Language & Computation,*Tata McGraw Hill,New Delhi,2010
5. Wayne Goddard, *Introducing Theory of Computation*, Jones & Bartlett India,New Delhi2010
6. Bernard M Moret: *The Theory of Computation*, Pearson Education
7. John Hopcroft, Rajeev Motwani & Jeffry Ullman: *Introduction to Automata Theory Languages & Computation* , Pearson Edn
8. Raymond Greenlaw,H. James Hoover, *Fundamentals of Theory of Computation*,Elsevier,Gurgaon,Haryana,2009
9. John C Martin, *Introducing to languages and The Theory of Computation*, 3rd Edition, Tata McGraw Hill,New Delhi,2010
10. Kamala Krithivasan, Rama R, *Introduction to Formal Languages,Automata Theory and Computation*, Pearson Education Asia,2009
11. Rajesh K. Shukla, *Theory of Computation*, Cengage Learning, New Delhi,2009
12. K V N Sunitha, N Kalyani: *Formal Languages and Automata Theory*, Tata McGraw Hill,New Delhi,2010
13. S. P. Eugene Xavier, *Theory of Automata Formal Language & Computation,*New Age International, New Delhi ,2004

CS010 407: Data Structures Lab

Teaching scheme **Credits:** 2
3 hours practical per week

Objectives

- *To provide experience on design, testing, and analysis of Algorithms and Data Structures.*
- *To acquaint the students with the Data Structures used in the Computer Science field.*

1) Representation of Polynomials using Arrays and Linked List and the different operations that can be performed on Polynomials
2) Representation of Sparse Matrix using Arrays and Linked List and the different operations that can be performed on Sparse Matrices
3) Representation of Stacks using Arrays and Linked List and the different operations that can be performed on Stacks
4) Representation of Queues using Arrays and Linked List and the different operations that can be performed on Queues
5) Representation of Double Ended Queue using Arrays and Linked List and the different operations that can be performed on Double Ended Queue
6) Representation of Priority Queues using Arrays and Linked List and the different operations that can be performed on Priority Queues
7) Representation of Binary Trees using Arrays and Linked List and the different operations that can be performed on Binary Trees
8) Representation of Graphs using Arrays and Linked List and the different operations that can be performed on Graphs
9) Infix, Postfix and Prefix conversions.
10) Different Sorting and Searching methods.
11) String representation using Arrays and Linked List and different pattern matching algorithms
12) Implementation and operations on B-Tree and B+Tree

Any experiment according to the syllabus of CS010 403 can be substituted.

CS010 408(EC) ELECTRONIC CIRCUITS AND COMMUNICATION LAB

Teaching scheme **Credits:** 2

3 hours Practical per week

Objectives:-

To provide an introduction to Electronic Circuits Design thereby giving a hands on experience on working with various Electronic Components, and Devices

PART 1 (Electronic Circuits):-

1. Design of Two Stage RC Coupled Amplifiers
2. Design of FET Amplifiers
3. Design of Bootstrap Sweep Generators
4. Design of Astable, Monostable, and Bistable Multivibrators (3 experiments)
5. Design of Oscillators(RC Phase Shift Oscillator, Hartley Oscillator, Colpitt's Oscillator – 3 experiments)

PART 2 (Communication Engineering):-

1. Amplitude Modulation
2. Frequency Modulation
3. Delta Modulation
4. Pulse Amplitude Modulation (PAM)
5. Pulse Width Modulation (PWM)
6. Amplitude Shift Keying (ASK)
7. Phase Shift Keying (PSK)

Note: - A minimum of 5 experiments from each part must be done.

Reference Books:-

1. Boylestead and Nashelky- Electronic Devices and Circuits- Prentice Hall of India
2. George Kennedy - Electronic Communication Systems - TMH