B.E. COMPUTER ENGINEERING SECOND YEAR SEMESTER III	
SUBJECT: : APPLIED MATHEMATICS III	
Lectures: **4 per week**	Theory: **100 Marks**
Objectives of the course: This course will prepare the Mathematics base for the students that they require for the rest of the curricula.	
Pre-requisites: NIL	
DETAILED SYLLABUS	

1. **Complex Variables:**
- Function of complex variable; Continuity (only statement), derivability of a function analytic, regular function; Necessary condition for f (z) to be analytic (statement of sufficient conditions); Cauchy Riemann equation in polar co-ordinates; Harmonic function, orthogonal trajectories; Analytical and Milne Thomson method to find f(z) from its real or imaginary parts.

Mapping: Conformal mapping, linear, bilinear mapping with geometrical interpretations.

2. **Fourier Series and Integrals:**
- Orthogonal and orthonormal functions expression for a function in a series of orthogonal functions; Sine and cosine function and their orthogonal properties; Fourier series, dirichlet's theorem (only statement); Periodic function with period 2 and 21; Even and odd function; Half range sine and cosine series; Parseval's relations.
- Complex form of Fourier series: Introduction to Fourier integral; Relation with Laplace transforms.

1. **Laplace Transforms:**
- Function of bounded variation (statement only), Laplace transform of I, $t^{n,}$, e^{at}, sin(at) , cos(at), sinh(at), cosh(at), crf(t), shifting properties; Expressions (with proofs) for
  i) L{ t^n f(t)} ii) L{ f(t)/ t} iii) L{∫ f(u) du} iv) L {f(t)}

  Unit step functions, Heaviside, Dirac functions and their Laplace transformation; Laplace Transform of periodic function.
- Evaluation of inverse Laplace transforms, partial fraction method Heaviside development, convolution theorem.
- Application to solve initial and boundary value problems involving ordinary differential equation with one dependent variable.

4. **Matrices:**
- Types of matrices; Adjoint of a matrix; Inverse of a matrix; Elementary transformations of a matrix; Linear dependent and independent of rows and columns of a matrix over a real field; Reduction to a normal form; Partitioning of a matrices.

  System of homogeneous and non homogeneous equations, their consistency and solution.

BOOKS

TEXT BOOKS

1. P. N. Wartikar and J. N. Wartikar, "Element of applied mathematic", Volume I and Volume II,

A. V. Griha, Pune.
2. S. S. Shastri, “Engineering Mathematics”, Vol-2, PHI, Second edition , 1994.
3. A. R. Vasistha, “Matrices”, Krishna Prakasan, Meerut, 1988-89.
4. Churchil , “Complex Variable”, McGraw Hill, Tokyo.

References:

1. Shanti narayan, “Matrices”, S. Chand Publishing House, Delhi.
2. Shanti narayan, “Theory of function of complex variable”, S. Chand Publishing House, Delhi.
3. “Laplace transforms”, Schaum's outline series, McGraw Hill.
4. T. Veerarajan, “Engineering mathematics”, TMH.

B.E. COMPUTER ENGINEERING

SECOND YEAR SEMESTER III

SUBJECT: : ELECTRONICS DEVICES AND CIRCUITS

Lectures: 3 per week **Practical:** 2 per week	**Theory:** 100 Marks **Term work:** 25 Marks

Objectives of the course: **The course intends to provide an overview of the principles, operation and application of the analog building blocks for performing various functions. This first course relies on elementary treatment and qualitative analysis and makes use of simple models and equations to illustrate the concepts involved. Detailed knowledge of the device structure and imperfections are not to be considered.**

Pre-requisites**: NIL**

DETAILED SYLLABUS

1. Review of transistors (BJT and FET):

- BJT principle, Biasing, Simple remodel, Voltage and Current amplification. CE, CB, CC amplifier configurations, FET principle, Biasing, FET amplifier configurations.

2. Differential Amplifier:

- Introduction, Circuit configurations, DC and AC analysis, FET differential amplifier, Current mirror circuit.

3. Operational Amplifier:

- Block diagram representation, Ideal op-amp, Equivalent circuit, Op-amp with negative feedback, Open-loop configurations, Frequency response, Compensating networks, Popular 741 op-amp specifications and performance characteristics.

4. Operational Amplifier Applications:

- Basic op-amp applications, Instrumentation amplifier, AC amplifier, Analysis of integrator and differentiator circuits.

5. Active Filters:

- First order and second order low pass, high pass Butterworth and band pass filter configurations.

6. Oscillators and Converters:

- Oscillation principle, Phase shift oscillator, Wein-bridge oscillator, Voltage controlled oscillator.

7. Comparators and Converters:

- Op-amp used as basic comparator; Zero crossing detector, Schmitt trigger comparator, Voltage limiter, Comparator specifications and performance characteristics. Analog to digital converter and Digital to analog converter principles, Practical A-D converter with binary weighted resistors, Successive approximation A-D converter, Monolithic A-D converters, AD808 and 809, A-D and D-A converter specifications and performance characteristics.

8. Voltage Regulators:

- Fixed voltage series regulators, Variable voltage regulator using IC 723, Principle of switching regulator. PWM IC voltage regulator specifications and performance characteristics. Practical power supply circuits.

9. Specialized IC applications:

- 555 timer IC and its use as monostable and astable multivibrator, Specifications and performance characteristics.

BOOKS

TEXT BOOKS

1. Ramakant A. Gayakwad, "OP-Amps and Linear Integrated Circuits", PHI Publishers.
2. D. Roy Choudhary and Shail Jain , "Linear Integrated Circuits", New Age International Publishers.
3. Robert L. Boylestad and Louis Nashelsky "Electronic Devices and Circuit Theory", Eighth Edition, Pearson Education Asia.
4. J. M. Fiore, "Op Amps and Linear Integrated Circuits", Thomson Learning.

References:

1. Sergio Franco, "Operational Amplifiers and Analog Integrated Circuits", McGraw Hill International Edition.

TERM WORK

1. Term work should consist of at least 10 experiments and two assignments covering all the topics of the syllabus.
2. A term work test must be conducted with a weightage of 10 marks.

B.E. COMPUTER ENGINEERING

SECOND YEAR SEMESTER III

SUBJECT : ELECTRICAL NETWORK

Lectures: 4 per week **Tutorials**: 2 per week	**One paper:** 100 marks. (3 Hrs.) **Term work:** 25 marks

Objectives of the course: Besides learning the specific problems, this course attempts at inculcating analytical insight of the students, which enhances their abilities to solve a large and complex problem.

Pre-requisites: NIL

DETAILED SYLLABUS

1. Solution of Network with Independent Sources.

2. Linear Graphs:

- Introductory definition; The incidence matrix A; The loop matrix B, Relationship between sub matrix of A and B cut sets and cutsets matrix, Fundamental cutsets and Fundamental Tiesets, Planner graphs, A & B matrices, Loop, Node, Node pair equations, Duality.

3. Network Equation in the Time Domain:

- First and second order differential equations initial conditions; Evaluation and analysis of transient and steady state response to step, ramp, impulse and sinusoidal input functions.

4. Laplace Transform:

- Laplace transform and it's application to analysis of network for different input functions described above.

5. Network Functions:

- Driving point and transfer functions; Two port network, Open circuit and short circuit parameter; Transmission parameter, Hybrid parameter, Chain parameter; Interconnection of two port network, Cascade connection, Series and parallel permissibility of connection.

6. Representation of Network Functions:

- Pole zeros and natural frequencies, Location of pole, Even and Odd pairs of a function;
  Magnitude and angle of function; The delay function; All pass and minimum phase function,
  Net change in angle, Azimuth polynomials, Ladder network, Constant resistance network,
  Maximally flat response Chebyshev response; Calculation of a network function form a
  given angle and real part Bode method.

7. Fundamentals of Network Synthesis:

- Energy function passive, reciprocal network; The impedance function; Condition on angle ,
  Positive real function; Necessary and sufficient conditions; The angle property of a positive
  real function; Bounded real function; The real part function; Reactance functions; Realization
  of reactance functions; Ladder form of network, Azimuth polynomials and reactance
  function ;Impedance and admittance of RC network under network realization; Resistance
  inductance networks.

BOOKS

TEXT BOOKS

1. Franklin F. Kuo, “Network analysis and synthesis”, PHI.
2. M. E. Venvalkenberg, “Network analysis”, Prentice Hall (I) Ltd, third edition.
3. Willam Hayt and Jack Kemmerly, “Engineering Circuit analysis”, TMH.

References:

1. Nolman Balbanian, T. A. Bickkart, Sundaram, “Electrical Networks”, John-Wiley & Sons.

Topics of Tutorial
The students should perform the following tutorials: a) One example indicating the concept of superloop and supermode concepts. b) One example indicating the application of Thevenin and Norton's theorem in presence of development sources. c) The incidence cutset, tieset, Fundamental cutset and fundamental tieset matrices should be written for one graph. d) Example of evaluating the transient and steady state condition for an R-L and R-C circuit for dc conditions. Example of evaluating the transient and steady state condition for R-C series of parallel connection for different values of resistance. The concept of overdamped critically damped, underdamped, oscillatory and unbounded response should become clear from this problem. Evaluating the above examples using Laplace transforms One example on interconnected two port network for any one or more type of parameter. Analysis of a transfer function using Bode plot along with gain and phase margin calculation. a. Necessary and sufficient condition for positive real functions and realizations of R- L, R-C, L-C functions.
TERM WORK
1. Term work should consist of at least 10 assignments covering all the topics of the syllabus A term work test must be conducted with a weightage of 10 marks.

B.E. COMPUTER ENGINEERING
SECOND YEAR SEMESTER III

SUBJECT : DATA STRUCTURES

Lectures : 3 per week **Practicals**: 3 per week	**One paper**:100 marks. (3 Hrs.) **Term work**: 25 marks;

Objectives of the course: Data structures are commonly used in all program designs. The study of data structures, therefore, rightly forms the central course of the curriculum in Computer Engineering. At the end of this course, students are expected to understand the various data structures, a knowledge they will use in every program they write for the rest of their lives.

Pre-requisites: Course in C.

DETAILED SYLLABUS

1. Introduction in C:

- Static and Dynamic Structures Unions ;Strings ; Files :Macros

2. Lists:

- Abstract Data Types; Stacks: ADT; Representation ; Operations ;Example ;Applications;Queues: ADT; Representation ;Operations ;Circular and Priority Queues; Examples; Applications; Other Lists and their Implementations.

3. Linked Lists:

- ADT; Dynamic Memory and Pointers ;Dynamic Representation; Insertion and Deletion of Nodes; Linked Stacks and Queue ;Linked Lists as Data Structures; Array Implementation of Linked List ; Comparison of Dynamic and Array Representations.

4. Recursion:

- Recursive Definition and Processes ;Recursion in C; Writing Recursive Programs; Efficiency in Recursion.

5. Binary Tree:

- Binary Tree Operations and Applications ;Binary Tree Representations ;Node Representation; Array Representation ;Binary Tree Traversals ;Threaded Binary Tree ;The Huffman Algorithm; Representing Lists as Binary Trees; Finding and Deleting Elements ;Tree-Represented Lists; Applications of Trees: Expression Trees;Game Trees.

Topics for Experiment

1. Strings and Files in C.
2. Implementation of Stack and its Operations.
3. Implementation of Queue and its Operations.
4. Implementation of Circular Queue and its Operations.
5. Array and Dynamic Implementation of Linked List and its Operations.
6. Binary Tree: Implementation, Creation of Binary Tree, Insertion and Deletion of Nodes in an Existing Tree.

Algorithms and Flowcharts are to be included for all programs.

BOOKS

TEXT BOOKS

1. Y. Langsam, M. J. Augenstein and A. M. Tannenbaum, “Data Structures Using C and C++", Prentice-Hall India, Second Edition.
2. R. Kruse, “Data Structures and Program Design", Prentice-Hall India, Third Edition.
3. R. F. Gilberg, “Data Structures: A Pseudocode Approach with C”, Thomson Learning

Reference Books:

1. Tremble and Sorenson, “Data Structures and Algorithms", Tata McGraw-Hill.
2. M. A. Weiss, “Data Structures and Algorithm Analysis in C++", Addison Wesley Longman, International Student Edition.
3. A. Aho, J. E. Hopcroft and J. D. Ullman, “Data Structures and Algorithms", Addison Wesley, Low Price Edition.

TERM WORK

1. Term work should consist of at least 12 practical experiments covering all the topics.
2. A term work test must be conducted with a weightage of 10 marks.

B.E. COMPUTER ENGINEERING

SECOND YEAR SEMESTER III

SUBJECT : DIGITAL LOGIC DESIGN AND APPLICATIONS

Lectures: 4 per week **Practical:** 2 per week	**One paper:** 100 marks. (3 Hrs.) **Term work:** 25 marks

Objectives of the course: The subject is the first course in Digital logic design and its applications. This subject covers classical topics of logic circuits theory, elementary analysis and its implementation in practical cases. This is followed by the popular logic families and their characteristics.

Pre-requisites: NIL

DETAILED SYLLABUS

1. **Number Systems:**
   - Decimal, Binary, Octal and Hexadecimal number system and conversion, Binary weighted codes, Signed number binary order, 1's and 2's complement codes, Binary arithmetic.

2. **Boolean Algebra:**
   - Binary logic functions, Boolean laws, Truth tables, Associative and distributive properties, DeMorgan's Theorems, Realization of switching functions using logic gates.

3. **Combinational Logic:**
   - Switching equations, Canonical logic forms, Sum of product & Product of sums, Karnaugh maps, Two, three and four variable Karnaugh maps, Simplification of expressions, Quine-McCluskey minimization techniques, Mixed logic combinational circuits, Multiple output functions.

4. **Analysis and Design of Combinational Logic:**
   - Introduction to combinational circuit, Code conversion, Decoder, Encoder, Priority encoder, Multiplexers as function generators, Binary address, Subtractor, BCD adder, Binary comparator, Arithmetic and logic units.

5. **Sequential Logic:**
   - Sequential circuits, Flip-flops, Clocked and edge triggered flip-flops timing

specifications
counters asynchronous and synchronous, Counter design with state equations registers,
Serial in serial out shift registers, Tristate register, Register transfer timing considerations.

6. **Sequential Circuits:**
- State diagrams and tables, Transition table, Excitation table and equations. Examples using flip-flops. Simple synchronous and asynchronous sequential circuit analysis, Construction of state diagram and counter design.

7. **Programmable Logic:**
- Programmable logic devices, Programmable logic arrays and programmable array logic, Design using PAL, Field programmable gate arrays.

8. **Digital Integrated Circuits:**
- Digital circuit logic levels, Propagation delay times, Power dissipation, Fan-out and fan- in, Noise margin for popular logic families, TTL, LSTTL, CMOS, and ECL integrated circuits and their performance comparison, Open collector and Tri-state gates and buffers.

BOOKS

TEXT BOOKS

1. John M. Yarbrough, “Digital logic”, Thomson Learning.
2. T. C. Bartee, “Digital Computer Fundamentals”, McGraw Hill.
3. D. P. Leach, A. P. Malvino, “Digital Principles and Applications”, TMH.

References:

1. John P. Uyemura, Brookes, “Digital Systems Design”, Cole publishing Co.
2. M. Morris Mano, “Digital Logic and Computer Design”, PHI.
3. A. B. Marcontz, “Introduction to Logic Design”, McGraw Hill.

TERM WORK

1. Term work should consist of at least 10 practical experiments and two assignments covering all the topics of the syllabus.
2. A term work test must be conducted with a weightage of 10 marks.

B.E. COMPUTER ENGINEERING

SECOND YEAR SEMESTER III

SUBJECT: DISCRETE STRUCTURES

Lectures: 3 per week; **Tutorials :** 2 per week;	**One paper:** 100 marks. (3 Hrs.) **Term work:** 25 marks.

Objectives Of The Course: This course aims to build fundamental logical concepts using mathematical tools. It develops an understanding of domains and relationships between elements of same and different domains. The basic understanding of Boolean elements, logical relations, recursion, coding and graphs is built.

Pre-requisites: NIL

DETAILED SYLLABUS

1. **Set Theory:**
   - Sets, Venn diagrams, Set membership of tables ;Laws of set theory; Partitions of sets ;Power set.

2. **Logic:**
   - Propositions and logical operations ;Truth tables, Equivalence, Implications; Laws of logic; Mathematical induction and Quantifiers.

3. **Relations, Digraphs and Lattice:**
   - Relations, paths and digraphs; Properties and types of binary relations ;Manipulation of relations, closures, Warshall's algorithm; Equivalence and Partial ordered relations; Posets and Hasse diagram; Lattice.

4. **Functions and Pigeon Hole Principle:**
   - Definition and types of functions : injective , surjective and bijective ; Composition, identity and inverse ; Pigeon-hole principle.

5. **Graphs:**
   - Definition ;Paths and circuits : Eulerian , Hamiltonian ;Planer graphs.

6. **Groups:**
   - Monoids, Semi groups, Groups ;Product and quotients of algebraic structures ; Isomorphism, homomorphism, automorphism ;Normal subgroup; Codes and group codes.

7. **Rings and Fields:**
   - Rings, integral domains and fields;Ring Homomorphism.

8. **Generating Functions and Recurrence Relations:**
   - Series and Sequences ; Generating functions ;Recurrence relations; Applications: Solving Differential equations, Fibonacci etc.