SEMESTER III

S.No.	CODE	COURSE OF STUDY	L	T	P	C
1.	MA201	Mathematics – III	3	0	0	3
2.	EE201	Digital Logic Circuits	3	1	0	4
3.	EE203	Electric and Magnetic Circuit Theory	3	1	0	4
4.	EE205	Electromagnetic Theory	3	0	0	3
5.	CS231	Data Structures and C++	3	0	0	3
6.	ME231	Applied Thermodynamics	3	0	0	3
7.	CS237	Computer Software Laboratory	0	0	3	2
8.	EE207	Circuits Theory and Digital Electronics Laboratory	0	0	3	2
		Total	**18**	**2**	**6**	**24**

SEMESTER III

MA201 MATHEMATICS – III

Course Objective:
The objective of this subject is to expose student to understand the importance of transform techniques and complex variables to solve real world problems. It also focuses on the partial differential equations and its applications in science and engineering.

Unit I: Fourier Series: Expansion of a function in Fourier series for a given range - Half range sine and cosine expansions.

Unit II: Fourier Transforms: Complex form of Fourier series- Fourier transformation sine and cosine transformations - simple illustrations.

Unit III: Partial Differential Equations: Solutions of Wave equation, Heat equation and Laplace's equation by the method of separation of variables and their use in problems of vibrating string, one dimensional unsteady heat flow and two dimensional steady state heat flow.

Unit IV: Complex Variables: Analytic function - Cauchy Riemann equations - Harmonic functions -Conjugate functions - complex integration - line integrals in complex plane - Cauchy's theorem (without proof), Cauchy's integral formula.

Unit V: Taylor's and Laurent's series expansions - zeros and singularities - Residues - residue theorem, evaluation of real integrals using residue theorem, Bilinear

transformations, conformal mapping.

Text Book

1. Erwyn Kreyszig, "Advanced Engineering Mathematics", John Wiley and Sons, 8th Edition, 2010.

Reference Book

1. Grewal.B.S, "Higher Engineering Mathematics", Khanna Publications, 42nd Edition, 2013.

Course Outcomes

Students will be able to apply mathematics for solving Electrical and Electronics Engineering problems.

EE201 DIGITAL LOGIC CIRCUITS

Course Objectives

The objective of this subject is to study

- Various number systems and to simplify the mathematical Expressions using Boolean
- Functions – simple problems.
- Implementation of combinational circuits
- Design of various synchronous and asynchronous circuits.
- Digital simulation techniques for development of application oriented logic circuit.

Unit I: Review of Number systems - Radix conversion - Complements – Subtraction using complements - Binary codes - Theorems of Boolean algebra – Canonical forms - Logic gates - Digital Logic Families - Introduction to RTL, DTL, TTL, ECL and MOSL families - Details of digital logic family -Wired and operation, characteristics of digital logic family - comparison of different logic families.

Unit II: Combinational logic - representation of logic functions-SOP and POS forms K-map representations - minimization using K maps - simplification and implementation of combinational logic - multiplexers and demultiplexers - code converters, adders, subtractors.

Unit III: Sequential Logic-Flip flops - SR, JK, D and T flip flops - Level triggering and edge triggering - Excitation tables - Counters - Asynchronous and synchronous type - Modulo counters - Shift registers - Ring counters.

Unit IV: Design of Synchronous sequential circuits: Model Selection – State transition diagram –State synthesis table – Design equations and circuit diagram – State reduction technique.

UNIT V : Asynchronous sequential circuits – Analysis – Problems with asynchronous sequential circuits – Design of Asynchronous sequential circuits State transition diagram, Primitive table, State reduction, state assignment and design equations; programmable logic array and devices; finite state machine - FPGA.

Text Books

1. Morris Mano,M .'Digital logic and computer design', Prentice Hall of India, Ist Edition, 2008.
2. Donald D. Givone, "Digital Principles and Design", Tata McGraw Hill, 2002.
3. Tocci R.J.,Neal S. Widmer, 'Digital Systems: Principles and Applications', Pearson Education Asia, 9th Edition, 2013.

Reference Books

1. Floyd and Jain, "Digital Fundamentals", Pearson Education, 10th Edition 2013, 2007.
2. Donald P. Leach , Albert Paul Malvino, Goutam Sha, "Digital Principles and Applications", Tata McGraw Hill, 6th Edition, 2007.

Course Outcome

The students will be able to design and carry out experiments with systems and instruments of various complexities and analyze their findings.

EE203 ELECTRIC AND MAGNETIC CIRCUITS

Course Objectives

The objective of this course is

- To provide basic knowledge of AC and DC circuits
- To familiarize the concepts and terminologies of series & parallel resonance circuits and tuned circuits among the students
- To motivate the students for analyzing three phase 3 wire, three phase 4 wire circuits and the concept of power measurement.
- To impart knowledge on finding the transient response of series and parallel AC and DC circuits.

Unit I: Independent and dependent voltage and current sources – R, L, C components – self and mutual inductances - Series and Parallel connection – mesh, node and loop analysis – network theorems – source transformation- star-delta transformation.

Unit II: AC – Peak, rms and average values – active and reactive power- phasor analysis – Resonance in series and parallel circuits.

Unit III: - Time response of RL, RC and RLC circuits for step input - coefficient of coupling - dot convention- analysis of coupled circuits.

Unit IV: three phase systems – symmetrical components – measurement of power in three phase systems -Three - phase star and delta circuits with balanced and unbalanced loads - power measurements-power factor calculations.

Unit V: Magnetic circuits – BH curve – BH loop - hysterisis and iron loss – iterative method of solving.

Text Books

1. Hayt.W.H and Kemmerly.J.E, "Engineering Circuit Analysis", Tata McGraw Hill, New York, 7th Edition, 2007.
2. Joseph. A. Edminister, "Electric Circuits - Schaum's outline series", Tata McGraw Hill International, 5th Edition, 2003.
3. Arumugam.M and Premkumar.N, "Electric Circuit Theory", Khanna Publishers, 9th Reprint, 1997.

Reference Book

1. Charles K. Alexander and Matthew N. O. Sadiku, "Fundamentals of Electric Circuits", Tata McGraw Hill Companies, 5th Edition, 2013.

Course Outcome

Students will be able to

1. Understand the basic laws, mesh current, nodal voltage, voltage and current division, source transformation and star/delta transformation methods for solving circuit problems.
2. Understand the basic network theorems used for solving networks with both DC and AC inputs.
3. Understand the concepts and terminologies behind series & parallel resonance circuits and tuned circuits.
4. Understand the analysis of three phase 3 wire and 4 wire circuits with star and delta connected loads and the concept of power and power factor measurement in three phase circuits.
5. Understand the transient response of series and parallel RL, RC and RLC circuits using Laplace transforms for both DC & AC inputs.

EE205 ELECTROMAGNETIC THEORY

Course Objectives

The objective of this course is to

- Understand the basic concepts of electric and magnetic fields.
- Understand the concept of conductors, dielectrics, inductance and capacitance
- Gain knowledge on the nature of magnetic materials.
- Understand the concept of static and time varying fields.

Unit I: Sources and effects of electromagnetic fields – Vector fields – Different co-ordinate systems – Vector calculus – Gradient, Divergence and Curl – Divergence theorem – Stoke's theorem.

Unit II: Coulomb's Law – electric field intensity – Field due to point and continuous charges – Gauss's law and its applications – electrical potential – Electric field and equipotential plots – electric field in free space, conductors, dielectric – dielectric polarization. Electric field in multiple dielectrics – boundary conditions, Poisson's and Laplace's equations –Capacitance – Energy density – Dielectric strength – Applications.

Unit III: Lorentz Law of force, magnetic field intensity – Biot – Savart Law – Ampere's Law – Magnetic field due to straight conductors, circular loop, infinite sheet of current – Magnetic flux density (B) – B in free space, conductor, magnetic materials. Magnetization - Magnetic field in multiple media – Boundary conditions – Scalar and vector potential – Magnetic force – Torque – Inductance – Energy density – Magnetic circuits – Applications.

Unit IV: Faraday's law, induced emf – transformer and motional EMF, Maxwell's equations (differential and integral forms)- Displacement current – Applications - Relation between field theory and circuit theory.

Unit V: Generation – electromagnetic wave equations – Wave parameters; velocity, intrinsic impedance, propagation constant – Waves in free space, lossy and lossless dielectrics, conductors – skin depth, Poynting vector – Plane wave reflection and refraction – Applications.

Text Books:

1. Matthew. N.O. Sadiku, "Elements of Electromagnetics", Fourth Edition, Oxford University Press, Fifth Edition 2010.
2. Ashutosh Pramanik, "Electromagnetism – theory and application," Prentice Hall of India Private Ltd., New Delhi, 2nd edition, 2008.
3. K.A.Gangadhar, "Field theory", Khanna publishers, New Delhi,15th edition,2004.

Reference Books

1. William H.Hayt and John A Buck "Engineering Electromagnetics", 7th

Edition, Tata McGraw Hill Publishing Company Limited, New Delhi, 2006.
2. Edminister.J.A, Schaum's Outlines "Theory and problems of Electromagnetics", Tata Mc Graw Hill, 2nd Edition, Special Indian Edition 2006.
3. Guru and Hiziroghu "Electromagnetic field theory fundamentals", Thomson Asia Pvt. Limited, 2010.
4. John D Kraus, Daniel A Fleisch "Electromagenetics with Applications", Tata McGraw Hill 5th Edition, 2010.

Course Outcomes

1. An ability to apply knowledge of mathematics, science, and engineering.
2. An ability to identify, formulate, and solve engineering problems

CS231 DATA STRUCTURES AND C++

Course Objectives

The objective of this course is

- To understand object-oriented design principles and gain knowledge of C++.
- To study specific data structures such as linear lists, stacks, queues, hash tables, binary trees, heaps,, binary search trees, and graphs
- To gain knowledge about various sorting techniques.

Unit I: Introduction – Tokens – expressions – structures - functions in C++, classes and objects, constructors and destructors.

Unit II: Operator overloading and type conversions, Inheritance, Extending classes, Pointers, Virtual functions and polymorphism

Unit III: File Handling Templates, Exception handling, Manipulating strings.

Unit IV: Algorithm Analysis, Sorting – Insertion, Shell, Heap, Merge, Quick, Indirect, Bucket, Lists, Stacks and queues, Priority queues - Application, Heaps – hashing - hash tables.

Unit V: Trees - Binary trees, Binary Tree Traversal - pre-order, post - order, In order, search tree ADT, AVL trees, Graph - Mathematical properties, Degree, Connectedness, Representation using Matrix, Directed Graphs, Directed Acyclic Graphs, Graph Algorithms - Topological sort, shortest path algorithm - minimum spanning tree.

Text Books

1. Robert Lafore, "Object oriented programming in C++", Galgotia

Publication, 4th Edition, 2010.
2. Balagurusamy.E, "Object Oriented Programming with C++", Tata McGraw Hill Company Limited, 5th Edition, 2011.
3. Mark Allen Weiss, "Data Structures and Problem solving using C++", Addison Wesley Longman, 2nd Edition, 2000.
4. Michael T. Goodrich, "Data Structures and Algorithm Analysis in C++",2nd edition, 2011.

Reference Books

1. Sahni, "Data Structures Using C++", Tata McGraw Hill, 3rd Edition, 2006.
2. Jean Paul Tremblay and Paul G.Sorenson, "An Introduction to Data structures with applications", Tata McGraw Hill edition, 2nd Edition, 2002.
3. John R.Hubbard, "Schaum's Outline of Theory and Problem of Data structure with C++", Tata McGraw-Hill, New Delhi, 2000.

Course Outcomes

1. Students will gain knowledge about the fundamentals of object-oriented design principles , C++ and data structures.
2. Students will learn to develop C++ classes for simple applications.
3. Students will be able to make data structure choices for real world problems.

ME231 APPLIED THERMODYNAMICS

Course Objectives

The objective of this course is to expose the students Thermodynamic first and second law analysis of vapor and gas cycles, property relations for simple pure substances, properties of ideal gas mixtures, psychrometry, fundamentals of combustion thermodynamics, application of thermodynamics in the design of thermal engineering systems.

Unit I: Definitions of system - system boundary, property, process, cycle, state, Thermal equilibrium, temperature, Zeroth law of thermodynamics, heat, work, reversible and quasistatic processes - Heat and work transfer during different types of processes.

Unit II: First law of Thermodynamics - Closed system application - internal energy - heat transfer calculations - open system applications - non flow and flow System applications - Second Law of Thermodynamics - Heat engine, Refrigerators, Kelvin – Planck statement – Clausius statement – their equivalence – Carnot cycle – Clausius Inequality – Entropy. Air standard cycles: Air standard Carnot cycle - Air standard Otto cycle, diesel cycle, dual cycle and Brayton cycles and their efficiencies.

Unit III: Modes of heat transfer – conduction, convection, radiation – Thermal and electrical insulation and its critical thickness - design of fins for cooling of electrical and electronics components – Known fin width, Known fin thickness, Natural convection cooling, forced convection cooling - Liquid cooling, cooling of heat generating board inside a parallel – plate channel.

Unit IV: Gas power cycle - Vapour power cycle - Rankine cycle - reheat cycle - regenerative cycle - calculations for efficiency and power output using steam tables and mollier chart.

Unit V: Reciprocating air compressors – optimum pressure ratio in multistage compression - inter cooling - effect of clearance volume - Performance and testing of IC engines.

Text Books

1. Nag.P.K , "Engineering Thermodynamics", Tata McGraw Hill, 5th Edition, 2013.
2. Arora.C.P, "Thermodynamics", Tata McGraw Hill Publishing Co. Limited., New Delhi, twelfth reprint, 2007.
3. Cengel.Y.A. and Boles.M.A., "Thermodynamics - An Engineering Approach", 5th Edition, Tata McGraw Hill, 2006.
4. Wark.K, "Thermodynamics", 4th Edition , Tata McGraw Hill, New York,1985.

Reference Books

1. Gordan Van Wylen and Richard Sonntag., "Fundamentals of Classical Thermodynamics", John Wiley and Sons,4th Edition, 1994.
2. Kothandaraman.C.P, "A Course in Thermodynamics and Heat Engines", Dhanpat, Rai and Sons, 1992.
3. Huang.F.F, "Engineering Thermodynamics", 2nd Edition , Macmillan Publishing Co. Ltd., New York, 1988.

Course Outcomes

1. Students will be able to understand the second law limitation of thermodynamic efficiencies and will be ableto sort out realistic and unrealistic thermodynamic system claims.
2. Students will be able to analyze and determine cycle efficiency, work output and required heat input for a spark-ignition IC engine with a given set of operating parameters.
3. Students will be able to analyze and determine cycle efficiency, work output and required heat input for a diesel engine with a given set of operating parameters.

4. Students will be able to analyze and determine cycle efficiency, work output, and required heat input for a gas turbine cycle, and determine thrust of a turbojet, for a given set of operating parameters.

CS237 COMPUTER SOFTWARE LABORATORY

1. Structures
2. Arrays, Stacks and Queues
3. Classes and objects
4. Functions
5. Operator Overloading
6. Pointers
7. Inheritance
8. Virtual Functions
9. Input-Output File handling

EE207 CIRCUITS THEORY AND DIGITAL ELECTRONICS LABORATORY

1. Verification of Circuit theorems
2. Study of flip flops
3. Study of encoders and decoders
4. Binary counter
5. Decade counter with decoder/driver and seven segment LED display
6. Ring counter
7. Design of sequential logic circuit
8. Design of combinational logic circuits
9. Electronic gain using bi-directional shift registers