Sub Code : MA220T **Sub Name :** Mathematics-III **4 Credits**

Unit-1

Fourier Series: Fourier Series for Continuous & Discontinuous Functions, Expansion of odd and even periodic functions, Half-range Fourier series, Complex form of Fourier Series.

Unit-2

Integral Transforms: Fourier Transform**:** Complex Fourier Transform, Fourier Sine and Cosine Transforms, Applications of Fourier Transform in Solving the Ordinary Differential Equation.

Unit-3

Laplace Transform: Introduction of Laplace Transform, Laplace Transform of elementary Functions, Properties of Laplace Transform, Change of Scale Property, First and Second Shifting Properties, Laplace Transform of Derivatives and Integrals.Inverse Laplace Transform & its Properties, Convolution theorem, Applications of Laplace Transform in solving the Ordinary Differential Equations.

Unit-4

Random Variables: Discrete and Continuous Random Variables, Probability Function, Distribution Function, Density Function,Probability Distributions, Mean and Variance of Random Variables.

Unit-5

Distribution: Discrete Distributions- Binomial & Poisson Distributions with their Constants, Moment Generating Functions, Continuous Distribution- Normal Distribution, Properties, Constants, Moments. Curve Fitting using Least Square Method.

References

[1] Probability & Statistics by G Shanker Rao, University Press.

[2] Mathematical Statistics by George R., Springer.

[3] Erwin Kreyszig: Advanced Engineering Mathematics, Wiley India..

[4] H C Taneja: Advanced Engineering Mathematics, I.K. International Publishing House Pvt. Ltd.

[5] S S Sastri: Engineering Mathematics, PHI.

[6] Ramana, B.V.: Advance Engg. Mathematics, TMH New Delhi.

[7] Engineering Mathematics By Samnta Pal and Bhutia, Oxford Publication.

[8] Probability and Statistics in Engineering, W.W. Hines et. al., Wiley India PVT Ltd.

Sub Code: CS222 /IT 222T **Sub Name:** Digital circuits & Design **3 Credits**

Unit-1

Review of Logic gates and binary operations- AND, OR, NOT, NAND, NOR, Exclusive–OR and Exclusive–NOR Implementations of Logic Functions using gates, NAND–NOR implementations – Multi level gate implementations- Multi output gate implementations. Introduction to number systems and binary operations. **Boolean postulates and laws** – De-Morgan's Theorem - Principle of Duality, Boolean function, Canonical and standard forms,Minimization of Boolean functions, Minterm,Maxterm, Sum of Products (SOP), Product of Sums (POS),Karnaugh map Minimization, Don't care conditions, Quine-McCluskey method of minimization.

Unit-2

Combinational logic circuits: Half adder – Full Adder – Half subtractor - Full subtractor– Parallel binary adder, parallel binary Subtractor – Fast Adder - Carry Look Ahead adder– Serial. Adder/Subtractor - BCD adder – Binary Multiplier – Binary Divider - Multiplexer/De-multiplexer – decoder - encoder – parity checker – parity generators –code converters - Magnitude Comparator.

Unit-3

Sequential logic circuits: Latches, Flip-flops - SR, JK, D, T, and Master-Slave, Characteristic table and equation–Application table – Edge triggering – Level Triggering – Realization of one flip flop using other flip flops – serial adder/subtractor.

Unit-4

Registers and Counters: Asynchronous Ripple or serial counter. Asynchronous Up/Down counter – Synchronous counters – Synchronous Up/Down counters – Programmable counters – Design of Synchronous counters: state diagram-State table –State minimization –State assignment - Excitation table and maps-Circuit. Implementation -Modulo–n counter, Registers – shift registers - Universal shift registers. Shift register counters – Ring counter – Shift counters - Sequence generators.

Unit-5

Logic Families: Introduction to different logic families and their characteristics ,RTL,DTL,TTL, ECL, IIL,TTL inverter – circuit description and operation, CMOS inverter – circuit description and operation, other TTL and CMOS gates, **Memories** – ROM - ROM organization - PROM – EPROM – EEPROM –EAPROM, RAM – RAM organization Static RAM, Dynamic RAM, Programmable Logic Array (PLA) - Programmable Array Logic (PAL).

References

1. M. Morris Mano, Digital Design, 3rd Edition, Prentice Hall of India Pvt. Ltd., 2003 Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003.
2. Donald P.Leach and Albert Paul Malvino, Digital Principles and Applications, 6thEdition,TMH, 2003.
3. Anil K. Maini, Digital electronics Principles and Integrated circuits Wiley India Pvt. Ltd.
4. Anand kumar- fundamental of digital circuit. 3rd edition.PHI.
5. John. F. Wakerly, Digital Design, Principles and Practices, Pearson Prentice Hall

Sub Code-CS-221 Sub Name: Electronic Devices & Circuits 3 Credits

Unit-1

Introduction to semiconductor physics: insulator, conductor, semiconductor and semiconductor types. Drift and diffusion carries, Hall Effects. **Review of PN junction diode**: PN junction diode in forward and reverse bias, temperature dependence of V-I characteristics, diode resistances, diode junction capacitance. Types of diodes: Zener Diode, Varactor Diode, Tunnel Diode, PIN Diode, Schottky Diode, LED and Photo Diodes, Switching characteristics of diode.

Unit-2

Bipolar junction transistor - Construction, basic operation, current components and equations, CB, CE and CC configuration, input and output characteristics, Early effect, Region of operations: active, cut-off and saturation region. BJT as an amplifier. Ebers-Moll model, Power dissipation in transistor ($P_{d,max}$ rating), Photo transistor. **Transistor biasing circuits and analysis:** Introduction, various biasing methods:Fixed bias,Self bias, Voltage Divider bias, Collector to base bias, Load-line analysis: DC and AC analysis, Operating Point and Bias Stabilization and Thermal Runaway. Transistor as a switch.

Unit-3

Small Signal analysis: Small signal Amplifier,Amplifier Bandwidth, Hybrid model, analysis of transistor amplifier using h-parameter, Multistage Amplifier: Cascading amplifier, Boot-strapping Technique, Darlington amplifier and cas-code amplifier, Coupling methods in multistage amplifier, Low and high frequency response, Hybrid π model, Current Mirror circuits. **Large Signal analysis and Power Amplifiers:** Class A,Class B,Class AB,Class C,Class D, Transformer coupled and Push-Pull amplifier.

Unit-4

FET construction- JFET: Construction, n-channel and p-channel, transfer and drain characteristics, parameters, Equivalent model and voltage gain, analysis of FET in CG, CS and CD configuration. Enhancement and Depletion MOSFET drain and transfer Characteristics.

Unit-5

Uni-junction Transistor (UJT) and Thyristors:UJT: Principle of operation, characteristics, UJT relaxation oscillator, PNPN Diode and its characteristics, Silicon controlled rectifier: V-I characteristics, DIAC and TRIAC, Thyristors parameters and applications.

References

1. Millman and Halkias: Integrated electronics, TMH.
2. Boylestad and Nashelsky: Electronic Devices and Circuit Theory, Pearson Education.
3. Sedra and Smith: Microelectronics, Oxford Press.
4. Anil K. Maini, VarshaAgarwal: Electronic Devices and Circuits, Wiley Publications.
5. Rashid: Electronic Devices and Circuits, Cengage learning.
6. Salivahanan: Electronic Circuits Analysis and Design, TMH.
7. Kumar and Jain: Electronic Devices and Circuits, PHI.
8. David A. Bell Electronic Devices and Circuits Oxford University press.

Sub Code CS-221P Sub Name: Electronic Devices & Circuits 1 Credits

EXPERIMENTS LIST:

1. To determine and analyzethe V-I characteristics of PN Junction diode and Zener diode.
2. To determine input and output characteristics of transistor amplifiers in CE, CB &CC configurations.
3. To determine the frequency response of transistor CE amplifier, direct coupled and RC coupled amplifier.
4. To determinecharacteristics ofUJT as relaxation Oscillator.
5. To determineDrain and Transfer Characteristicsof JFET Amplifier.
6. To determineDrain and Transfer Characteristicsof MOSFET Amplifier.
7. To determinecharacteristics of class A and Bpower amplifiers.
8. To determine characteristics of classC and AB power amplifiers.

Sub Code HU220T Sub Name: Communication Skills 4 Credits

Unit-1
Introduction: Communication, definition and role of communication, Process of communication.

Unit-2
Importance of professional communication, Levels of communication, Types of communication, Challenges in communication.

Unit-3
Non –verbal communication – Body language, personal appearance, posture, gesture and hand movement, eye contact, facial expressions,

Unit-4
Paralinguistic features - proxemics, haptics, chronemics. Oral presentations.

Unit-5
Case studies on different case or topic.

References

1. Business Communication, Mc Graw Hill Education, Matthukutty M. Monippally.
2. Effective Business Communication , Mc Graw Hill Education, Neera Jain, Shoma Mukherji.
3. Technical Communication , Cengage , P. Subba Rao, B. Anita Kumar, C. Hima Bindu.
4. Business Correspondence & Report Writing , Mc graw Hills. , R.C. Sharma & Krishna Mohan .
5. Technical Communication – Principles & Practice , Oxford , Meenakshi Raman.
6. Business Communication- Mc graw Hills , Peter Cordom.
7. Communication Skills , Oxford , Sanjay Kumar & Pushpa TMH.
8. Effective Technical Communication, M. Ashraf Rizvi ,Mc Graw Hill Education.

EXPERIMENTS LIST:

Language Lab II

Module 1 : Reading comprehension

Module 2 : Role plays

Module 3 : Debate

Module 4 : Group discussion

Module 5 : Resume writing

Module 6 : Interview skills

Module 7 : Body language

Module 8 : Oral presentations

Sub Code HU221P	Sub Name: Idea Generation	2 Credits

The purpose of the subject Idea Generation student design business ideas and involve in coming up with many ideas in a group discussion, selecting the best idea or ideas, working to create a plan to implement the idea, and then actually taking that idea and putting it into practice. The idea can be tangible, something you can touch or see, or intangible, something symbolic or cultural. In this subject students figure out solutions to any number of difficult challenges faces by the industries or companies.

Sub Code HU222P	Sub Name: Learning Through Experts	2 Credits

The purpose of the subject is students learn through subject expert in different areas and fields. Expert understands how student learn. Experts are skilled instructional designers and are able to create interaction-rich learning experiences that support a given outcome. In the corporate world, a learning expert should also have an understanding of the business needs of a given learning experience and design it in a way that supports those needs. Students benefit from the expert to create a good critical thinking related to the subjects as well as business needs.

Sub Code ES220T	Sub Name: Material Science	4 Credits

Unit-1
Atomic structure, molecules and general bonding principles, crystal system and structure, Miller indices, Bravais lattice, Bragg's law, crystal structure for metallic elements, structural imperfections, dielectric parameters, polarsation, static dielectric constant of solids, ferroelectric materials, piezoelectricity, compex dielectric constant, dipolar relaxation, Debye equation , dielectric loss, insulating materials and their properties, composite materials

Unit-2
Magnetism: fundamental concepts pertaining to magnetic fields, magnetic dipole movement of current loops, orbital magnetic dipole movement and angular momentum of simple atomic model, classification of magnetic materials, spin magnetic moment, paramagnetism, ferromagnetism, spontaneous magnetization and Curie-Weiss law, ferromagnetic domains, magnetic anisotropy, magnetostriction, antiferromagnetism, ferrites and its applications, magnetic resonance

Unit-3
Conductors: introduction, atomic interpretation of Ohm's law, relaxation time, collision time, mean free path , electron scattering, resistivity of metals, Linde's rule, Joule's law, thermal conductivity of metals, high conductivity materials, high resistivity materials, solder and electrical contact materials, carbon brushes, fuses, superconductivity-The free electron model, thermodynamics and properties of superconductors, meissner effect, classification of superconductors

Unit-4
Semiconductors: chemical bonds in Ge and Si, carrier density, extrinsic semiconductor, n-type , p-type semiconductor, Hall effect, mechanism of current flow, drift current, diffusion current, Einstein relation, materials for fabrication of semiconductor devices, fabrication technology, continuity equation, capacitance of junction barrier, junction transistors, thermistor, variastors

Unit-5
Optical properties of materials: introduction, electromagnetic radiation spectrum, refractive index, reflection, Birefringence, Translucency, colour centres, dispersion, absorption, excitons, photoelectric emission, electroluminescence , photoconductivity, photoelectric cells, lasers, ruby lasers, Nd-YAG laser, carbon dioxide laser, optical fibres, fibre materials, mechanism of refractive index variations, fabrication of fibre, fibre cables, solar cell, fuel cell, MHD generators.

References

1. Banerjee-Electrical & Electronics Material,PHI.
2. S. O. Kasap-Priniciple of Electronics Material &Device,TMH.
3. Jones- Material Science for Electrical & Electronics Enginnering,Oxford.
4. V.Raghvan Material science&engineering,PHI.
5. J.Allison ElectronicsEnginnering, Material &Device,TMH.
6. Gilmore: Material Science, Cengage Learnings.
7. Gupta & Gupta Advance Electrical & Electronics Material,Wieley India.
8. James F.Shackelford-Introduction Material Science for Enginnering Pearson.
9. V.Rajendran - Material science,TMH.

Sub Code ES221T	Sub Name: System Engineering	4 Credits

Unit-1
What is System Engineering, Origin, Examples of Systems requiring systems engineering, Systems Engineer Career Development Model, Perspectives of Systems Engineering, Systems Domains, Systems Engineering Fields, System Engineering Approaches.

Unit-2
Structure of Complex Systems, System Building Blocks and Interfaces, Hierarchy of Complex Systems, System Building Blocks, The System Environment, Interfaces and Interactions, Complexity in Modern Systems.

Unit-3
Concept Development and Exploration, Originating a New System, Operations Analysis, Functional Analysis, Feasibility, System Operational Requirements, Implementation of Concept Exploration.

Unit-4
Engineering Development, Reducing Program Risks, Requirements Analysis, Functional Analysis and Design, Prototype Development as a Risk Mitigation Technique, Development Testing, Risk Reduction.

Unit-5
Integration and Evaluation, Integrating, Testing, And Evaluating The Total System, Test Planning And Preparation, System Integration, Developmental System Testing, Operational Test And Evaluation, Engineering For Production, Transition From Development To Production, Production Operations.

References

1. Alexander Kossiakoff, William N Sweet, "System Engineering Principles and Practice, Wiley India
2. Blanchard Fabrycky, Systems engineering and analysis, Pearson
3. Dennis M. Buede, William D.Miller, "The Engineering Design of Systems: Models & Methods" Wiley India
4. Jeffrey L Whitten, Lonnie D Bentley, "System Analysis and Design Methods"
5. Richard Stevens, Peter Brook," System Engineering – Coping with complexity, Prentice Hall

Sub Code CS 226T Sub Name: Analog and Digital Communication 4 Credits

Unit-1: signal analysis .The students familiarize with various techniques for amplitude modulation and demodulation of analog signals Signal Analysis: Time domain and frequency domain representation of signal, Fourier Transform and its properties, Transform of Gate, Periodic gate, Impulse periodic impulse sine and cosine wave, Concept of energy density and power, Power density of periodic.

Unit 2: Amplitude Modulation: Introduction of modulations techniques and its applications, Amplitude modulation, Equation and its frequency domain representation, Bandwidth, Power distribution. AM suppressed carrier waveform equation and frequency domain representation Generation (Balance/Chopper modulator) and synchronous detection technique, errors in synchronous detection. Introduction to SSB and VSB.

Unit 3:Angle Modulation Modulation equation and their relative phase and frequency deviations, modulation index frequency spectrum, NBFM and WBFM, Bandwidth comparison of modulation techniques.

Unit 4:Signal Sampling & Analog Pulse Communication Sampling of signal, sampling theorem for low pass and Band pass signal, PAM, TDM. Channel Bandwidth for PAM-TDM signal, Type of sampling instantaneous (Natural and Flat Top), Aperture effect, PPM, PDM.

Unit 5:Digital Communication Digital signal Quantization, Quantization error, PCM, S/N Ratio, Companding, Data Rate, Baud Rate, Bit Rate, Multiplexed PCM signal, DPCM), DM, ADM). Digital modulations techniques, ASK, BPSK, DPSK, offset and non-offset QPSK, M-Ary PSK, BFSK, M-Ary FSK, QAM).

References:

1. Singh & Sapre, Communication System, TMH

2. B.P. Lathi & Zhi Ding, Modern Digital and Analog Communication System, 4rth Edition, Oxford University Press.

3. Taub & Shilling, Communication System, TMH

4. George Kennedy & Davis, Electronic Communication System, 4rth Edition, TMH.

5. Abhay Gandhi, Analog & Digital Communication: Theory & Lab Work, Cengage Learning, India.
List of

Experiments (Expandable)

1. Study of sampling process and signal reconstruction and aliasing.

2. Study of PAM PPM and PDM

3. Study of PCM transmitter and receiver.

4. Time division multiplexing (TDM) and De multiplexing

5. Study of ASK PSK and FSK transmitter and receiver.

Sub Code CS/IT 224T Sub Name: Discrete Structure 4 Credits

Unit 1: Set Theory, Relation, Function, Theorem Proving Techniques : Set Theory: Definition of sets, countable and uncountable sets, Venn Diagrams, proofs of some general identities on sets Relation: Definition, types of relation, composition of relations, Pictorial representation of relation, Equivalence relation, Partial ordering relation, Job-Scheduling problem Function: Definition, type of functions, one to one, into and onto function, inverse function, composition of functions, recursively defined functions, pigeonhole principle. Theorem proving Techniques: Mathematical induction, Proof by contradiction.

Unit 2: Algebraic Structures: Definition, Properties, types: Semi Groups, Monoid, Groups, Abelian group, properties of groups, Subgroup, cyclic groups, Cosets, factor group, Permutation groups, Normal subgroup, Homomorphism and isomorphism of Groups, example and standard results, Rings and Fields: definition and standard results.

Unit 3: Propositional Logic: Proposition, First order logic, Basic logical operation, truth tables, tautologies, Contradictions, Algebra of Proposition, logical implications, logical equivalence, predicates, Normal Forms, Universal and existential quantifiers. Introduction to finite state machine Finite state machines as models of physical system equivalence machines, Finite state machines as language recognizers

Unit 4: Graph Theory: Introduction and basic terminology of graphs, Planer graphs, Multigraphs and weighted graphs, Isomorphic graphs, Paths, Cycles and connectivity, Shortest path in weighted graph, Introduction to Eulerian paths and circuits, Hamiltonian paths and circuits, Graph coloring, chromatic number, Isomorphism and Homomorphism of graphs. Posets, Hasse Diagram and Lattices: Introduction, ordered set, Hasse diagram of partially, ordered set, isomorphic ordered set, well ordered set, properties of Lattices, bounded and complemented lattices.

Unit 5: Combinatorics: Introduction, Permutation and combination, Binomial Theorem, Multimonial Coefficients Recurrence Relation and Generating Function: Introduction to Recurrence Relation and Recursive algorithms , Linear recurrence relations with constant coefficients, Homogeneous solutions, Particular solutions, Total solutions , Generating functions , Solution by method of generating functions.

References:

1. C.L.Liu, “Elements of Discrete Mathematics” Tata Mc Graw-Hill Edition.

2. Trembley, J.P & Manohar; “Discrete Mathematical Structure with Application CS”, McGraw Hill.

3. Kenneth H. Rosen, “Discrete Mathematics and its applications”, McGraw Hill.

4. Bisht, “Discrete Mathematics”,Oxford University Press

5. Biswal,”Discrete Mathematics & Graph Theory”, PHI

Sub Code IT 227T Sub Name: Communication Systems 4 Credits

Unit-1

Frequency domain representation of signal: Fourier transform and its properties, condition of existence, Fourier transform of impulse, step,signum , cosine, sine, gate pulse, constant, properties of impulse function. Convolution theorem (time & frequency), correlation(auto & cross), energy & power spectral density.

Unit-2

AM modulation: Block diagram of a communication system,need of modulation, types of modulations techniques, Amplitude modulation, Equation and its frequency domain representation, Bandwidth, Power requirement, efficiency. AM suppressed carrier (DSB-SC, SSB-SC, VSB-SC) Power requirement, efficiency waveform equation and frequency domain representation, Generation of AM, DSB-SC, SSB-SC, VSB-SC & its detection, synchronous generation& detection & errors.

Unit-3

AM transmitter& receiver: Tuned radio receiver & super heterodyne, limitation of TRF, IF frequency, image signal rejection, selectivity, sensitivity and fidelity, Noise in AM, FM

Unit-4

Angle modulation: Types of angle modulation, narrowband FM, wideband FM, its frequency spectrum, transmission BW, methods of generation (Direct & Indirect), detection of FM (discriminators: balanced, phase shift and PLL detector),pre emphasis and de-emphasis.

Unit-5

FM transmitter & receiver: Block diagram of FM transmitter& receiver, AGC, AVC, AFC, **Noise:** Classification of noise,S ources of noise, Noise figure and Noise temperature, Noise bandwidth, Noise figure measurement, Noise in analog modulation, Figure of merit for various AM and FM, effect of noise on AM & FM receivers.

References

1. Simon Haykins, Communication System, John Willy
2. Singh &Sapre, Communication System, TMH
3. B.P. Lathi, Modern Digital and analog communication system; TMH
4. Singhal, analog and Digital communication, TMH
5. Rao, Analog communication, TMH
6. P K Ghose, principal of communication of analog and digital, universities press.
7. Taub& shilling, Communication System, TMH
8. Hsu; Analog and digital communication(Schaum); TMH
9. Proakis fundamental of communication system. (Pearson edition).
10.

List of Experiments:

1. To analyze characteristics of AM modulator & Demodulators.
2. To analyze characteristics of FM modulators& Demodulators.
3. To analyze characteristics of super heterodyne receivers.
4. To analyze characteristics of FM receivers.
5. To construct and verify pre emphasis and de-emphasis and plot the wave forms.
6. To analyze characteristics of Automatic volume control and Automatic frequency control.
7. To construct frequency multiplier circuit and to observe the waveform.
8. To design and analyze characteristics of FM modulatorand AM Demodulator using PLL.

Sub Code : CS 227T **Sub Name : Theory Of Computation** **4 Credits**

UNIT 1: Automata: Basic machine, FSM , Transition graph, Transition matrix, Deterministic and nondeterministic FSM'S, Equivalence of DFA and NDFA, Mealy & Moore machines, minimization of finite automata, Two-way finite automata. Regular Sets and Regular Grammars: Alphabet, words, Operations, Regular sets, Finite automata and regular expression, Myhill- Nerode theorem Pumping lemma and regular sets, Application of pumping lemma, closure properties of regular sets.

UNIT 2: Context –Free Grammars: Introduction to CFG, Regular Grammars, Derivation trees and Ambiguity, Simplification of Context free grammars, Normal Forms (Chomsky Normal Form and Greibach Normal forms).

UNIT 3: Pushdown Automata: Definition of PDA, Deterministic Pushdown Automata, PDA corresponding to given CFG, CFG corresponding to a given PDA. Context Free Languages: The pumping lemma for CFL's, Closure properties of CFL's, Decision problems involving CFL's.

UNIT 4: Turing Machines: Introduction, TM model, representation and languages acceptability of TM Design of TM,Universal TM & Other modification, Church's hypothesis, composite & iterated TM. Turing machine as enumerators.Properties of recursive & recursively enumerable languages,Universal Turing machine

UNIT 5: Tractable and Untractable Problems: P, NP, NP complete and NP hard problems, examples of these problems like satisfy ability problems, vertex cover problem, Hamiltonian path problem, traveling sales man problem, Partition problem etc.

References:

1. John E. Hopcroft, Jeffery Ullman,"Introduction to Automata theory, Langauges & computation" , Narosa Publishers.
2. K.L.P Mishra & N.Chandrasekaran,"Theory of Computer Science", PHI Learning
3. Michael Sipsev,"Theory of Computation",Cenage Learning
4. John C Martin, "Introdution to languages and theory of computation", McGraw Hill
5. Daniel I.A. Cohen,"Introduction to Computer Theory",Wiley India.
6. Kohavi,"Switching & Finite Automata Theory",TMH