COURSE CONTENT & GRADE (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
	ADVANCED MATHEMATICS	MA-104	Min "D"	Min "D"	5.0

ADVANCED MATHEMATICS

UNIT - I :

Numerical solution of partial differential equation by Finite difference method. Elementary properties of FT, DFT.

UNIT - II :

Probability, compound probability and discrete random variable. Binomial, Normal and Poisson distribution. Elementary concept of estimation and theory of hypothesis, Expectation and its properties.

UNIT - III

Stochastic process, Markov process, transition probability matrix, just and higher order Markov process, Markov chain, Queuing theory : (M/M/1: ∞/∞/FCFS), (M/M/S: ∞/∞/FCFS) models.

UNIT - IV:

Review of set theory binary relations, equivalence relations, principle of partition, Elementary concept of group, ring and field, Applications of algebraic structures in Electronics and Communications.

UNIT - V :

Sturm– Liouville problems, Green's Function in Closed form, Green's Function in integral form. Green's Identities and methods, Green's first & Seconds identities, Generalized Green's Function.

References :

1. Numerical Methods in Science & Engineering by Dr. M.K Venkataraman, The National Pub. Co. 1991.
2. Computer Oriented statistical and Numerical Methods by B Balaguru Swamy, Mac millan India Ltd. 1998
3. Numerical Methods for Scientific and Engineering Computation by M.K Jain, S.R.K Iyengar and R,K Jain Wiley Eastern Ltd, 1987
4. Communication Systems by S Haykins, John Wiley and Sons
5. Green's Function and Boundary Value Problems by I.Stackgold, Wiley, New York, 1979
6. The finite element method, by O.C.Zienkiewicz, McGraw-Hill

COURSE CONTENT & GRADE (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
	ADVANCE ELECTROMAGNETIC THEORY	EC-107	Min "D"	Min "D"	5.0

ADVANCE ELECTROMAGNETIC THEORY

UNIT- I : INTRODUCTION OF WAVES :

Introduction : Basic Equations, Consecutive Relationships, The Generalized Current concept, Energy and Power, Circuit Concepts, Complex Quantities, Complex equations, Complex Consecutive Parameters, Complex Power, AC Characteristics of Matter, A Discussion of current, AC Behaviour of Circuit Elements, Singularities of Field. The Wave Equation, Wave in Perfect Dielectrics, Intrinsic wave Constants, Waves in Lossy Matter ,Reflection of Waves, Transmission Line Concept, Waveguide concepts, Resonator Concept ,Radiation ,Antenna Concepts on Waves.

UNIT- II : THEOREMS AND CONCEPTS :

The Source Concept, Duality, Uniqueness, Image Theory, The equivalence Principle, Fields in Half Space, The Induction Theorem, The Reciprocity, Green's Function, Tensor Green's Function, Integral Functions, Construction of Solution, The Radiation Field.

UNIT – III : PLANE WAVE FUNCTION :

The Wave Functions, Plane Waves, Rectangular Waveguide, Alternative Mode set, The Rectangular Cavity, Partially Filled Waveguide, The Dielectric- Slab Guide, Surface- Guided Waves, Modal Expansions of Fields, Currents in Waveguide ,Aperture in Ground Planes, Plane Current Sheets.

UNIT- IV : CYLINDRICAL WAVE FUNCTION :

The Wave Function, The Circular Waveguide, Radial Waveguide, The Circular Cavity, Other Guided waves ,Source of Cylindrical Waves, Two Dimensional Radiation, Wave Transformations, Scattering By Cylinders, Scattering By Wedges, Three Dimensional Radiation, Aperture in Cylinders, Aperture in Wedges.

UNIT V. SPHERICAL WAVE FUNCTIONS

The Wave Function, The Spherical Cavity, Orthogonality Relationship, Space as a waveguide, Other Radial Waveguides, Other Resonators, Sources of Spherical Waves, Wave Transformations, Scattering by Spheres ,Dipole of Conducting Sphere, Aperture in Spheres, Fields External of Cones, Maximum Antenna Gain.

References :

1. Time-harmonic Electromagnetic field by R.F.Harrington, IEEE Press Series.
2. Electromagnetics by J,D.Krauss.TMH
3. Fundamentals of Engineering Electromagnetics by Rajeev Bansal,Taylor Series
4. Advance Engineering Electromagnetics by C.Balanis, Wiley Series

COURSE CONTENT & GRADE (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
	ANTENNA THEORY & PRACTICE	EC-108	Min "D"	Min "D"	5.0

ANTENNA THEORY & PRACTICE

UNIT –I : REVIEW OF FUNDAMENTAL PARAMETERS OF ANTENNAS : Radiation Pattern, Radiation Power Density, Radiation Intensity Directivity, Gain, Antenna Efficiency, Half-Power Beam width, Beam Efficiency, Bandwidth, Polarization, Input Impedance, Antenna Radiation Efficiency, Antenna Vector Effective Length and equivalent areas,Maximum Directivity and Maximum Effective area, Aperture Concept, Friis Transmission Equation and Radar Range Equation, Antenna Temperature.

Antenna Measurements: Antenna Ranges. Radiation Patterns, Gain Measurements, Directivity Measurements, Radiation Efficiency, Impedance Measurements, Current Measurements, Polarization Measurements, Scale Model Measurements

UNIT – II : ARRAYS: LINEAR, PLANAR & CIRCULAR : Introduction, Two-Element Array, N-Element linear Array with Uniform Amplitude and Spacing, N-Element linear Array : Directivity, Design Procedure, N-element Linear Array : Three –Dimensional characteristics, Rectangular-to-Polar Graphical Solution, N-Element Linear Array with Uniform Spacing & Non uniform Amplitude, Super directivity, Planar Array, Design Considerations, Circular Array.

UNIT – III : ANTENNA SYNTHESIS & CONTINUOUS SOURCES : Continuous Sources, Schelkunoff Polynomial Method, Fourier Transform Method, Woodward-Lawson Method , Taylor Line - Source (Tschebyscheff Error), Taylor Line- Source (One Parameter),Triangular, Cosine and Cosine -Squared Amplitude Distributions, Line-Source Phase Distributions, Continuous Aperture Sources.

Integral Equations, Moment Method, and Self and Mutual Impedances : Introduction, Integral Equation Method, Finite Diameter Wires, Moment Method Solution, Self Impedance, Mutual Impedance between Linear Elements, Mutual Coupling in Arrays

UNIT- IV : FEEDING STRUCTURES & DESIGN : Design of a Coaxially Feed Monopole with Large Ground Plane, Design of a Balun Fed Dipole above a Large Ground Plane, Two -wire -Fed Slots: Open & Cavity –Backed, Coaxially Fed Helix plus Ground Plane, The Design of an Endfire Dipole Array, Yagiuda type Dipole Arrays: Two elements, three or more elements, Frequency-Independent Antennas: Log Periodic Arrays, Ground Plane Backed Linear & Planar Dipole Arrays, The Design of a Scanning Array , The Design of Waveguide-Fed Slot Arrays: The Concept of Active Slot Admittance(Impedance), Arrays of Longitudinal Shunt Slots in a Broad Wall of Rectangular Waveguides:The Basic Design Equations ,The Design of Linear & Planar Waveguide- Fed Slot Arrays, Sum &Difference Pattern for Waveguide-Fed Slot Arrays Mutual Coupling included.

UNIT –V : APERTURE ANTENNAS : Field Equivalence Principle: Huygens' Principle, Radiation Equations, Directivity, Rectangular Apertures-Uniform & Tapered, Circular Apertures- Uniform & Tapered ,Design Considerations, Babinet's Principle, Fourier Transforms in Aperture Antenna Theory ,Ground Plane Edge Effects: The Geometrical theory of Diffraction

Microstrip Antennas: Rectangular patch, Circular Patch, Quality Factor, Bandwidth and Efficiency, Input Impedance, Coupling, Circular Polarization, Arrays and Feed Networks.

References :

1. "Antenna Theory (Analysis & Design)" by Constantine .A. Balanis, John Wiley & Sons, Inc., Publication.
2. "Antenna Theory & Design" by Robert. S . Elliott, John Wiley & Sons, Inc., Publication.
3. "Antenna Theory" by Warren .L. Stutzman & Gary A .Thiele, John Wiley & Sons, Inc., Publication.
4. "Antennas & Radio Wave Propagation" by Robert . E. Collin, Mcgraw Hills Series
5. "Antennas" by J.D.Krauss,TMH
6. " Antennas & Wave Propagation"by K.D.Prasad,Satya Prakashan

COURSE CONTENT & GRADE (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
	MICROWAVE SOLID STATE DEVICES	**EC-109**	Min "D"	Min "D"	5.0

MICROWAVE SOLID STATE DEVICES

UNIT - I : MICROWAVE TRANSISTORS AND DIODES: Microwave Bipolar Transistors, Hetero-junction Bipolar Transistors, Microwave Tunnel diode, PIN-diode and its application - single PIN switch, Varacter Diode, Schottky Diode.

UNIT – II : MICROWAVE FIELD EFFECT TRANSISTORS : MESFET-Principle of operation, equivalent circuit, cut off frequency, power frequency limitations; MOS Structures; MOSFET: Mechanism, modes of operation, transconductance, max operating frequency and microwave applications, memory devices; HEMT: Structure, operation,characteristics, Transconductance and cut off frequency, microwave applications; Charge Coupled Devices (CCD):Operational mechanism, SCCDs, dynamic characteristics.

UNIT - III : TRANSFERRED ELECTRON DEVICES : Gunn Diode- Principle, RWH Theory, Characteristics, Basic Modes of Operation, Oscillation Modes, LSA Diode,modes of operation, Microwave Generation and Amplification; Avalanche Effect Devices: Read diode, carrier current and external current; IMPATT, TRAPATT and BARITT diodes- Principle of Operation and Characteristics, Parametric devices.

UNIT - IV: MICROWAVE LINEAR-BEAM TUBES (O TYPE) :

Klystron: Velocity modulation process, bunching process, output power and beam loading; Multi-cavity Klystron Amplifier, Reflex Klystron: power output and efficiency; Traveling Wave Tubes-Helix and coupled cavity.

UNIT - V : MICROWAVE CROSS-FIELD TUBES (M TYPE) :

Magnetron, Forward wave Crossed field and Backward Wave Crossed field Amplifiers, Backward Wave Oscillators: Device operation, gain and efficiency calculations, operational characteristics, design criteria, and future trends.

References :

1. Microwave Solid-State Circuits and Applications by K. Chang, (New York : John Wiley, 1994).
2. Microwave Semiconductor Devices by S. Yngvesson, (Norwell, Mass : Kluwer, 1991).
3. Microwave Devices, Circuits and Their Interaction by C. A. Lee and G. C. Dalman, (New York: Wiley, 1994)
4. Microwave Solid-State Devices by S. Y. Liao, (Englewood Cliffs, N.J. : Prentice Hall, 1985).
5. Microwave Semiconductor Circuit Design by W.A. Davis, (New York: Van Nostrand Reinhold, 1984).
6. Microwave Solid-State Circuit Design by I. Bahl and P. Bhartia, (New York : Wiley, 1988).
7. Solid-State Microwave Devices by T. S. Laverghetta, (Norwood, Mass. : Arech House, 1987).
8. Microwave Semiconductor Devices and Their Circuit Applications by H. A. Watson, (Mc Graw-Hill, New York, 1969).
9. Microwave Semiconductor Devices by H. V. Shurmer, (Wiley-Interscience, New York, 1971).
10. Physics of Semiconductor Devices by S. M. Sze, (Wiley-Interscience, New York, 1969).

COURSE CONTENT & GRADE (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
	ADVANCE DIGITAL SIGNAL PROCESSING	EC-110	Min "D"	Min "D"	5.0

ADVANCE DIGITAL SIGNAL PROCESSING

UNIT –I

Review of Discrete Time Signals, sequences, representation. Discrete Time Systems, Linear, Time invariant, LTI System, Properties, Constant-Coefficient difference equation. Frequency Domain Representation of discrete time signals & Systems. Review of Z Transform, properties R.O.C., Stability, Casualty, Criterion. Inverse Transform, Recursive and Non Recursive Systems, Realization of discrete time system.

UNIT – II

Theory & Approximation of finite duration impulse response digital filters, Characteristics of FIR filters with linear phase, Frequency of Linear phase FIR system design techniques for linear phase FIR systems design techniques, Windowing, Hamming window Kaiser window, Some practical techniques with window. Chabyshev approximation, Weighted Chabyshev approximation. Non linear equation solution for maximal ripple FIR filters.

UNIT – III

Theory of approximation of infinite impulse response digital filters, Some elementary Properties of IIR filters, Magnitude square response, Phase response & Group delay, Technique for determining IIR filter coefficients, Digital filter design from continuous time filters, Matched Z – Transform.

UNIT- IV

Finite word length effect in digital filters fixed point arithmetic, Floating arithmetic types of quantization in digital filters, Truncation rounding, Spectrum analysis & the Fast Fourier transforms, Introduction to Radix-2 FFTs data suffering bit reversal, Decimation in time algorithm & Decimation in frequency algorithm, Spectrum & analysis at a Single point in the Z-plane, Spectrum analysis using FFTs, Windows in spectrum analysis.

UNIT –V

Application of signal processing in Radar systems, Signal design & Ambiguity functions, Digital matched filters for Radar Signals, Airborne Surveillance Radar for air traffic Control.

References :

1. " Digital Signal Processing using MATLAB" by S. Mittra (2 nd Edition).
2. " Digital Signal Processing" by Proakis Pearson Education.
3. Digital Signal Processing by Rabinar Gold
4. Digital Signal Processing by John G. Proakis
5. Digital Signal Processing by Oppenthiem and Schaffer

COURSE CONTENT & GRADE (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
	ANTENNA LAB	EC-111L	Min "D"	Min "D"	5.0

The exercises in this component shall be designed to demonstrate the basic principles outlined in different units of the theory paper. After completing the exercises the student should have developed a good grasp of the practical utilities of the theory content.

(Suggested Exercise)

1. Analysis and simulation of different types of micro strip antennas :
   (i) Rectangular micro strip antennas
   (ii) Circular micro strip antennas
   (iii) Triangular micro strip antennas
2. Analysis and simulation of different types of micro strip antennas arrays :
   (i) Rectangular micro strip antennas arrays
   (ii) Circular micro strip antennas arrays
   (iii) Triangular micro strip antennas arrays.
3. Analysis and simulation of different types of micro strip filter :
   (i) Low pass filter
   (ii) High pass filter
   (iii) Band pass filter
   (iv) Band stop filter

COURSE CONTENT & GRADE (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
	MINOR PROJECT – I	EC-112L	Min "D"	Min "D"	5.0

The exercises in this component shall be designed to demonstrate the basic principles outlined in different units of the theory paper. After completing the exercises the student should have developed a good grasp of the practical utilities of the theory content.

(Suggested Exercise)

Developing research ability and finding solution of any application oriented problems. Project problems may be implemented in any hardware or software or solutions. There will be a term work presentation/ Seminar and viva-voce. Two students will work in one batch which may be approved by professor-in-charge of the lab.