SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
(Engineering College), VIDISHA M.P.
(An Autonomous Institute Affiliated to RGPV Bhopal)
Department Electronics Engineering
Program Electronics & Communication Engineering

Semester/Year		III[rd]/II[nd]	Program		B.Tech.
Subject Category	DC	Subject Code:	EC-301	Subject Name:	Electro Magnetic Theory

Maximum Marks Allotted					Contact Hours			Total Credits
Theory				Total Marks				
End Sem	Mid-Sem	Assignment	Quiz		L	T	P	
60	20	10	10	100	3	1	0	4

Prerequisites:(Only for open electives)

Course Objective:

To impart the knowledge concepts of different coordinate systems, Maxwell`s equations, static electric and magnetic fields and methods of solving for the quantities associated with these fields, time varying fields and displacement current, propagation of electromagnetic waves and their applications involving electromagnetic fields

Course Outcomes:

After completion of the course, students would be able to -

CO1: Acquire knowledge of different coordinate systems, techniques of vector calculus to understand the different concepts of electromagnetic field, time varying fields, polarizations, plane wave in different media. (BL1, BL2).
CO2: Analyze the behaviour of plane wave in different media, Boundary Condition (BL3, BL4).
CO3: Apply the principles of electrostatics to the solutions of problems relating to electric field and electric potential, boundary conditions (BL3, BL6).
CO4: Solve the numerical based on various concepts of electromagnetic field theory (BL3, BL5)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2								
CO2	2	3		3	2							
CO3	2	2	3	2	2							
CO4	2	2		2								

Contents:			
UNITs	Descriptions	Hrs.	CO's
I	Orthogonal coordinate systems, gradient, divergence and curl. Stokes's theorem, gauss's theorem and divergence theorem. transformation of vectors, Static electric fields: Electric flux density, permittivity, Coulomb's law, and electric field intensity, field of distributed charges in free space and line charge, potential function, Laplace's and Poisson's equations, electric dipole, dipole moment, field due to electric dipole,. Boundary conditions between conductor and free space and two perfect dielectrics, surface charge distribution, capacitance between two isolated conductors.	9	1,23,4
II	Solution of Laplace's equations in systems of dielectric and conducting boundaries, uniqueness theorem, Static current and magnetic fields- current density, mobility, Ohm's law employing mobility. Biot-Savart's law, magnetic field, magnetic field intensity, magnetic flux, and permeability, closed loop currents, Ampere's circuital law in integral and differential vector form, magnetic vector potential. Problems related to straight wire, toroid and cylindrical solenoids. Boundary conditions on magnetic field.	9	1,.2,3,4
III	Time varying fields – Faraday's law in integral and differential forms, displacement current concept, Maxwell's equations in differential and integral forms, wave equations in source free region, continuity equation, Poynting vector theorem, complex Poynting vector. Time harmonic fields, Maxwell's equations for TH field, average energy density, duality concept. Helmholtz wave equation, general solution in free space in various coordinates, plane polarized wave in free space, properties of plane waves, wave front, power flow, stored energy density	8	1,2,3,4
IV	Circular and elliptic polarization, resolution in terms of linear polarized waves and vice- versa. Plane waves in lossy medium, low loss dielectric, uniform plane waves in good conductor, loss tangent, skin depth, transmission line analogy, Interference of two plane waves traveling at oblique directions.	7	1,2,4
V	Reflection and refraction of plane waves at dielectric media and conducting Surfaces, Brewster's angle, total internal reflection, resultant fields and power flow in both media. Frequency dispersive propagation, phase velocity and group velocity. Magnetic vector potential for sources in free space.	7	1,2,4
Guest Lectures (if any)			
Total Hours			
Suggestive list of experiments:			

Text Books-

1. William H. Hayt: Engineering Electromagnetic, TMH.
2. John D. Kraus: Electromagnetics, Mc. Graw Hill.
3. U.A. Bakshi: Electromagnetic Theory,

Reference Books-

1. Mathew N.O Sadiku: Elements of Electromagnetic, Oxford University Press
2. Jordan Balmian: Electromagnetic wave and Radiating System, PHI.
3. David K. Cheng: Electromagnetic Fields and Wave, Addison Wesley.
4. Ramo, Whinnerry and VanDuzzer " Fields and waves in communication electronics ",Wiley 1984
5. Harrington RF, "Electromagnetic fields" McGraw Hill

Modes of Evaluation and Rubric

There will be continuous evaluation for during the semester for 40 sessional marks and 60 semester End Term Marks. Out of 40 sessional marks, 20 shall be awarded for Mid semester, 20 marks to be awarded for day to day performance and Quiz/Assignments. For the 60 Marks, there will be a semester – End examination as per the norms of AICTE.

Recommendation by Board of studies on	Date:
Approval by Academic council on	Date:
Compiled and designed by	Name 1.Dr. Sweety Jain Name 2:
Checked and approved by	Name 1.

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
(Engineering College), VIDISHA M.P.
(An Autonomous Institute Affiliated to RGPV Bhopal)
Department Electronics Engineering
Program Electronics & Communication Engineering

Semester/Year		III[rd]/II[nd]	Program		B.Tech.
Subject Category	DC	Subject Code:	EC-302	Subject Name:	Electronic Devices & Circuits

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical							
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz	Total Marks	L	T	P	
60	20	10	10	30	10	10	150	3	0	2	4

Prerequisites:(Only for open electives)

Basic knowledge of electrical and electronic components and laws such as KCL, KVL, etc.

Course Objective:

1. The course intends to provide an overview of the principles, operation and application of the, JFET and MOSFETs for performing various functions.
2. This course relies on elementary treatment and qualitative analysis and makes use of simple models and equation to illustrate the concepts involved.
3. To provide an overview of MOS amplifiers.
4. Sufficient knowledge is provided so that students will be able to use this course as the basis for other advanced courses like Analog Circuits, Power Electronics.

Course Outcomes:

After completion of the course, students would be able to -

CO1. CO1: Acquire knowledge of JFETs and MOSFETs.
CO2: Analyze various JFETs and MOSFETs based electronic circuit configurations.
CO3: Analyze the circuit characteristics and compute its parameters.
CO4: Design various electronic circuits.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	1								2
CO2	2	3	3	2	2							
CO3	2	3	3	2	2							
CO4	2	3	3	3	2						2	

Contents:

UNITs	Descriptions	Hrs.	CO's
I	Field Effect Transistors (FETs): Introduction, Advantages and Disadvantages of FET, Basic Construction; Characteristic curves; Principles of operations of the JFET, Effect of V_{DS} on channel conductivity, Channel Ohmic Region and Pinch-Off Region, Characteristic Parameters and Effect of temperature on FET parameters, FET Biasing. MOSFET: Introduction, Structure and Physical Operation of the nMOS, pMOS, Enhancement –Type MOSFET, Current-Voltage Characteristics of the Enhancement –Type MOSFET, The Depletion –Type MOSFET, Difference between JFETs and MOSFETs.	10	1,2,3,4
II	Common Source AC Amplifier, Fixed Bias with Self Bias, The Common Drain or Source Follower, The Common Gate FET Amplifier, Frequency Response of the FET Amplifier, Other Amplifier Configurations. MOSFET as an Amplifier, Biasing in MOS Amplifier Circuits, Basic Configurations of Single Stage IC MOS Amplifiers.	08	3,4
III	FET Small Signal Analysis: FET Small Signal Model, Voltage Gain, Source Follower Circuit, Common Gate Circuit, Design of FET Amplifier Circuits, Low frequency analysis, High Frequency Analysis of FET.	10	1,2,3,4
IV	IC Technology: Overview of IC fabrication process: crystal growth, wafer preparation, oxidation, epitaxial layer growth, lithography, diffusion, ion implantation, metallization, fabrication process of BJT and CMOS Transistors	9	1,2,3,4
V	The complementary MOS (CMOS) inverter-DC characteristics, Static load MOS inverters, Pseudo NMOS Transistors, Tristate inverter, Static CMOS gate circuits (NAND, NOR, XOR, XNOR etc.) Static and Dynamic Memory Cell.	8	1,2,3,4
Guest Lectures (if any)		NIL	
Total Hours		45	

Suggestive list of experiments:

1. To plot transfer and output characteristics of an n-channel Junction Field Effect Transistor (JFET).
2. To plot transfer and output characteristics of a p-channel Junction Field Effect Transistor (JFET).
3. To plot transfer and output characteristics of an n-channel Metal Oxide Semiconductor Field Effect Transistor (MOSFET) in Common-source configuration.
4. To plot transfer and output characteristics of a p-channel Metal Oxide Semiconductor Field Effect Transistor (MOSFET) in Common-source configuration.
5. To design a common source JFET amplifier and plot its frequency response.
6. To design a common source MOSFET amplifier and plot its frequency response.
7. Study and investigate various fabrication techniques of BJT and MOS ICs.

Text Books-

1. Integrated Electronics. – Millman Halkias
2. Electronic Devices & Circuits – Boyelstad & Nashelsky – PHI
3. Electronic Devices & Circuits – David A. Bell – PHI
4. Principles of Electronic Devices – Malvino
5. Digital Integrated Circuits - D. A. Hodges, H. G .Jackson, R. A. Saleh, McGraw Hill

Reference Books-

1. Microelectronic Circuits- Sedra, Smith.
2. Electronics Circuits And Systems- Owen Bishop
3. Intuitive Analog Circuit Design- Marc T. Thompson
4. Starting Electronics (Fourth Edition)-Keith Brindley

Modes of Evaluation and Rubric

There will be continuous evaluation for during the semester for 40 sessional marks and 60 semester End term Marks. Subjects where laboratory work is prescribed, the practical marks are 50, out of which 30 marks will be awarded for viva voce and 20 marks for lab work & quiz. Out of 40 sessional marks, 20 shall be awarded for Mid semester, 20 marks to be awarded for day to day performance and Quiz/Assignments. For the 60 Marks, there will be a semester – End examination as per the norms of AICTE.

Recommendation by Board of studies on	Date:
Approval by Academic council on	Date:
Compiled and designed by	Dr. Suchi Mishra
Checked and approved by	

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
(Engineering College), VIDISHA M.P.
(An Autonomous Institute Affiliated to RGPV Bhopal)
Department Electronics Engineering
Program Electronics & Communication Engineering

Semester/Year		III[rd]/II[nd]	Program		B.Tech.
Subject Category	DC	Subject Code:	EC-303	Subject Name:	Network Analysis

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical							
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz	Total Marks	L	T	P	
60	20	10	10	30	10	10	150	3	0	2	4

Prerequisites:(Only for open electives)

Course Objective:

The objective of this subject is to make the students capable of analyzing any given electrical network in time domain and frequency domain.

Course Outcomes:

After completion of the course, students would be able to -

CO1. Acquire and demonstrate the knowledge of circuit elements, different laws and theorems. (BL1, BL2)

CO2. Analyze and solve different electrical networks in time and frequency domain by utilizing fundamental concepts and mathematics. (BL3, BL4)

CO3. Design the electrical networks in time and frequency domain. (BL3, BL6)

CO4. Evaluate the performance of a particular network. (BL3, BL5)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	2	2	-	-	-	-	-	-	-
CO3	3	2	3	2	2	-	-	-	-	-	-	-
CO4	3	2	-	2	2	-	-	-	-	-	-	-

Contents:			
UNITs	Descriptions	Hrs.	CO's
I	**DC circuits-** Current, voltage, power, energy, circuit elements, ideal & practical voltage & current sources, dependent & independent sources, Ohm's Law, Kirchhoff's law, Voltage and current division, Nodal & mesh analysis, Source transformation, Supermesh & supernode, Star-Delta transformation. **Steady state AC circuits-** RMS & Average value, Concept of phasor & vector, Impedance & admittance, Node and Mesh analysis of RL, RC and RLC networks with sinusoidal and other driving sources.	12	1, 2, 3, 4
II	**Network Theorems for AC & DC circuits-** Superposition, Thevenin's & Norton's, Reciprocity, Maximum power transfer, Millman's, Tellegen's, and Substitution theorem, Problems with dependent & independent sources.	08	1, 2, 3, 4
III	**Transient analysis-** Transients in RL, RC & RLC Circuits, initial conditions and time constants, Network driven by constant driving sources & their solutions.	07	1, 2, 3, 4
IV	**Frequency domain analysis –** Review of Laplace transform and its properties, Initial and final value theorem, Application of Laplace transform: circuit element models, circuit analysis. **Resonance-** Series & parallel resonance, Quality factor. **Analysis of magnetically coupled circuits-** Mutual and self inductance, Energy in coupled circuit, Dot convention.	10	1, 2, 3, 4
V	**Two port networks-** Impedance parameter, admittance parameter, hybrid and inverse hybrid parameter, transmission line and inverse transmission line parameter, reciprocity and symmetry in two port network, relationship between parameters, Interconnection of two ports networks.	08	1, 2, 3, 4
Guest Lectures (if any)		Nil	
Total Hours		45	

Suggestive list of experiments:

1. To observe and plot the V-I characteristic of Constant Current Source. CO1
2. To observe and plot the V-I characteristic of Constant Voltage Source.CO1
3. To verify Superposition Theorem for a given electrical circuit. CO2
4. To verify Thevenin's Theorem for a given electrical circuit. CO2
5. To verify Norton's Theorem for a given electrical circuit. CO2
6. To verify Maximum Power Transfer Theorem for a given electrical circuit. CO2
7. To verify Milliman's Theorem for a given electrical circuit. CO2
8. To observe the Response of RC Integrating Circuit using various input signals and measure the Time Constant of the circuit. CO2
9. To observe the Response of RC Differentiating Circuit using various input signals and measure the Time Constant of the circuit. CO2
10. To determine the Open Circuit and Short Circuit parameters of a Two Port Network. CO4
11. To determine the h- parameters of a Two Port Network. CO4
12. To determine the ABCD Circuit parameters of a Two Port Network. CO4
13. To determine the Inverse ABCD Circuit parameters of a Two Port Network. CO4

Text Books-

1. Hayt, Kemmerley and Durbin, “Engineering Circuit Analysis”, TMH.
2. M.E. Van Valkenburg, “Network analysis”, PHI.
3. Charles K. Alexander and Matthew N. O. Sadiku “Fundamentals of Electric Circuits”, 4th edition, McGraw Hill.

Reference Books-

1. Artice M Davis “Linear Circuit Analysis”, PWS Pub. Co.
2. Van Valkenberg M.E., B.K. Kinarawala “Linear circuits”, PHI.
3. David K. Cheng “Analysis of Linear Systems”, Narosa Publishing House.
4. Bruce Carlson, “Circuits”, Thomson Learning.

Modes of Evaluation and Rubric

There will be continuous evaluation for during the semester for 40 sessional marks and 60 semester End term Marks. Subjects where laboratory work is prescribed, the practical marks are 50, out of which 30 marks will be awarded for viva voce and 20 marks for lab work. Out of 40 sessional marks, 20 shall be awarded for Mid semester, 20 marks to be awarded for day to day performance and Quiz/Assignments. For the 60 Marks, there will be a semester – End examination as per the norms of AICTE.

Recommendation by Board of studies on	Date:
Approval by Academic council on	Date:
Compiled and designed by	Dr. Ankita Srivastava
Checked and approved by	

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
(Engineering College), VIDISHA M.P.
(An Autonomous Institute Affiliated to RGPV Bhopal)
Department Electronics Engineering
Program : Electronics & Communication Engineering

Semester/Year		III[rd]/II[nd]		Program		B.Tech.					
Subject Category	DC	Subject Code:	EC-304	Subject Name:	Signal and Systems						
Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	30	10	10	150	3	0	2	4

Prerequisites:(Only for open electives)

Basic algebra, Differential equations, Trigonometry, Complex Arithmetic

Course Objective:

This course is introduces the fundamental concepts of signals and system. These concepts form the building blocks of modern digital signal processing, communication and control systems. Hence, a sound understanding of these concepts is necessary for all students of Electronics and Communication Engineering. The course will cover various basic tools of signal and system analysis such as signal classification, LTI systems, Properties of LTI Systems, Frequency Response, Laplace Transform, Z-Transform, Fourier Transform, Fourier Series, Discrete Time Fourier Transform (DTFT), Discrete Fourier Transform (DFT), Cascade/ Parallel structures and their various practical applications. Various concepts such as convolution, impulse/ frequency response, causality, stability of systems will be especially emphasized. This course is suitable for all UG students who are looking to build the fundamental concepts of signals and systems as well as students preparing for their competitive exams.

Course Outcomes:

Upon completion of this course, the student will be able to-

CO1: Discriminate the nature of the given signals and systems.

CO2: Analyze Linear Time Invariant Systems (LTI) and its representation.

CO3: Analyze the discrete and continuous time signals and systems in frequency domain.

CO4: Understand the process of sampling and the effects of under sampling.

CO5: Compute the response of an LTI system in the time and frequency domains.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	1		2		1			1			1
CO2	3	2	2		1							
CO3	3	3	2	3	1							
CO4	3	2	2	3								
CO5	3	2	1	3	1	1			1			1

Contents:			
UNITs	Descriptions	Hrs.	CO's
I	Signals and systems in everyday life, Definition of signal and system, Classification of signals: Continuous time and Discrete-time signal, Elementary signals: The unit step, impulse, ramp exponential, sine, triangular etc., Operations on signals: Amplitude scaling, addition, multiplication, time scaling, time shifting, time folding, differentiation, and integration. Classification of systems, System representation and properties of systems.	8	1
II	Linear Time-Invariant Systems: Introduction, Convolution: impulse response representation for LTI systems, properties of the impulse response representation for LTI systems, differential and difference equation for LTI Systems, block diagram representations (direct form-I, direct form-II, cascade and parallel).	8	2
III	Fourier series and their properties; Application of Fourier series to LTI systems; Dirichlet's conditions; Fourier Transform & its properties; Applications of Fourier Transform to LTI systems; Magnitude and phase response; Parseval's theorem; Sampling theorem; Reconstruction of a signal from its samples; Aliasing and its effect in frequency domain, Basic concept of DTFT and DFT.	10	3, 4
IV	Introduction of Laplace transform; Region-of-convergence; Properties of Laplace transform; Inverse Laplace Transform, Applications of Laplace Transform in analysis of LTI systems, Unilateral Laplace transform & its applications to solve differential equations.	6	3,5
V	Z-transform: Basic principle of z-transform, definition, region of convergence, transfer functions, poles and zeros of systems and sequences, properties of z-transform, Inverse z-transform relationship between z-transform and Fourier transform, Unilateral z-transform & its applications to solve difference equations.	8	3,5
Guest Lectures (if any)			
Total Hours		40	

Suggestive list of experiments:

1. Basic operations on matrices
2. Generation of various signals and sequence
3. Operation on signals and sequences
4. Gibbs phenomenon
5. Fourier transforms and inverse Fourier transform
6. Properties of Fourier transforms
7. Laplace transforms
8. Z-transforms
9. Convolution between signals and sequences
10. Auto correlation and cross correlation
11. Spectral Analysis of sine wave.
12. Distribution and density functions of standard random variables

Text Books-

1. Signals and Systems, A Nagoor Kani, 2e, TMH, 2010.
2. Signals and Systems, A. Anand Kumar, 2e, PHI, 2012.
3. Signals and Systems, Tarun Kumar Rawat, Oxford University Press, 2010.
4. Signals and Systems, B. Kumar, New Age International Publishers, 2011.

Reference Books-

1. Signals and Systems, H P Hsu, Schaum's Outline Series, 2e, McGraw Hill, 2008.
2. B.P. Lathi, "Signal Processing and Linear Systems", Oxford University Press, 1998.
3. Signals and Systems, Simon Haykin, Barry van Veen, John Wiley and Sons (Asia) Private Limited, 1998.

Modes of Evaluation and Rubric

There will be continuous evaluation for during the semester for 40 sessional marks and 60 semester End term Marks. Subjects where laboratory work is prescribed, the practical marks are 50, out of which 30 marks will be awarded for viva voce and 20 marks for lab work. Out of 40 sessional marks, 20 shall be awarded for Mid semester, 20 marks to be awarded for day to day performance and Quiz/Assignments. For the 60 Marks, there will be a semester – End examination as per the norms of AICTE.

Recommendation by Board of studies on	Date:
Approval by Academic council on	Date:
Compiled and designed by	Name 1. Dr. D. K. Shakya
Checked and approved by	Name 1. Dr Ashutosh Datar