# MVN University

## ELECTRONICS & COMMUNICATION ENGINEERING DEPARTMENT

# $4^{TH}$ SEM

# SCHEME & SYLLABUS

# B. TECH.

# B. TECH. (LEET)

# B. Tech. + M. Tech.

# B. Tech. + MBA

# MVN University, Palwal(Haryana)
## Scheme of Studies & Syllabus 2013-14

**Four year Regular Course:** B. Tech. (ECE) with specialization in CDMA Technology, Medical Instrumentation, Remote Sensing, Agri Electronics

**Three year Regular Course with Lateral Entry Scheme:** B. Tech. (ECE) with specialization in CDMA Technology, Medical Instrumentation, Remote Sensing, Agri Electronics

**Five year Regular integrated Course:** B.Tech + M.Tech (ECE)with specialization in VLSI,Nano Technology, Microwave Engineering, Embedded System Design

**Five Year Regular Dual Degree Course:** B.Tech(ECE) + M.B.A

**Semester:IV**

| S. No | Course Title | Paper Code | Teaching Schedule | | | Total | Credit |
|---|---|---|---|---|---|---|---|
| | | | L | T | P | | |
| 1 | Analog Electronics | ECL202 | 3 | 1 | 2 | 6 | 5 |
| 2 | Electro-mechanical Energy Conversion | EEL206 | 3 | 1 | 2 | 6 | 5 |
| 3 | Electro Magnetic Field Theory | ECL204 | 3 | 1 | 0 | 4 | 4 |
| 4 | Signals and Systems | ECL206 | 3 | 0 | 0 | 3 | 3 |
| 5 | Numerical Methods | AHL 208 | 3 | 1 | 2 | 6 | 5 |
| 6 | Principles of Management | MSL 212 | 3 | 0 | 0 | 3 | 3 |
| 7 | Electronic Circuits & Simulation Lab | ECP208 | 0 | 0 | 2 | 2 | 1 |
| 8 | VAC-I | ECV 202 | 0 | 0 | 2 | 2 | NC |
| | | | | | | | |
| | Total | | 18 | 4 | 10 | 32 | 26 |

| ECL 202 | ANALOG ELECTRONICS | L | T | P | Cr |
|---|---|---|---|---|---|
| | | 3 | 1 | 2 | 5 |

**Objective:** The objective of the course is to provide fundamental knowledge of electronic devices and its applications . It covers basic principle of operations and usefulness of BJT circuits. It is also helpful to design electronic circuits using Operational amplifier.

**THEORY:**

**Note:** Question No 1 is compulsory and will be of short answer type from entire syllabus. Two questions are to be attempted out of three questions from each Section A & B.

## SECTION-A

### UNIT 1 : TRANSISTOR AT LOW FREQUENCY

Review of BJT device structure operation and V-I characteristics, BJT circuits at DC, BJT as amplifier and switch, biasing in BJT amplifier circuit, small-signal operation and models, single stage BJT amplifier.

### UNIT 2 : TRANSISTOR AT HIGH FREQUENCY

CE hybrid-π model, Hybrid–π Conductances and Capacitances, CE Short Circuit Current Gain, Current Gain with Resistive load , Frequency response of a single stage CE Amplifier, Gain-Bandwidth product, Emitter follower at high frequencies.

### UNIT 3 : MULTISTAGE AMPLIFIERS

Introduction, Distortion in Amplifiers, Coupling Types: Direct, RC and Transformer, RC Coupled Amplifier, Low Frequency response of an RC-coupled Stage, Effect of an Emitter bypass capacitor.

## SECTION-B

### UNIT 4 : FEEDBACK AMPLIFIERS

The general feedback structure, properties of negative feedback, the four basic feedback topologies, the series-shunt feedback amplifier, the series-series feedback amplifier, the shunt-shunt and shunt series feedback amplifier.

### UNIT 5 : OSCILLATOR

Basic principles of sinusoidal oscillators: Phase shift oscillators, Wien Bridge oscillator, Colpitts and Hartley oscillator Crystal oscillator.

## UNIT 6 : POWER AMPLIFIERS

Power amplifier circuits, Class A output stage, class B output stage and class AB output stages, class C amplifiers, push pull amplifiers, Complementary symmetry & quasi complimentary symmetry amplifiers.

**Text Books:**


1. Millman and Halkias, "Electronics Devices and Circuits" 2nd Ed., Tata McGraw-Hill, New Delhi (2008).
2. Sedra A S and Smith K C, "Microelectronic Circuits" 4th Ed., New York, Oxford University Press, New York (1997).


**Reference Books:**


3. Education India, New Delhi (2002).
4. Millman and Grabel, "Microelectronics", 2nd Ed. Tata McGraw-Hill (1999).

5 .Cooper and Helfrick, "Modern Electronic Instrumentation and Measuring Techniques", 4th print Prentice Hall of India, New Delhi (1996).

6. Ben G.Streetman and Sanjay Banerjee "Solid State Electronic Devices",5th Ed, Pearson Education India.

**LAB:**

**Note:** At least ten experiments are to be performed during the semester. At least eight experiments should be performed from the list of experiments. Two experiments may either be performed from the given list of experiments or may be designed by the concern faculty in consultation with H.O.D as per the scope of syllabus.

**List of Experiments:**

1. Study the following devices:
   (a) Analog & digital multimeters
   (b) Function/ Signal generators
   (c) Regulated d. c. power supplies (constant voltage and constant current operations)
   (d) Study of analog CRO, measurement of time period, amplitude, frequency & phase angle using Lissajous figures.

2. Study half wave rectifier and effect of filter on wave. Also calculate theoretical and practical ripple factor.
3. Study bridge rectifier and measure the effect of filter network on D.C. voltage output & ripple factor.
4. Application of Diode as clipper & clamper.
5. Plot input and output characteristics of BJT in CB, CC and CE configurations. Find their h parameters.
6. Plot gain- frequency characteristic of emitter follower & find out its input and output resistances

7. Plot drain current - drain voltage and drain current – gate bias characteristics of field effect transistor and measure of Idss & Vp.
8. Plot frequency response curve for single stage amplifier and to determine gain bandwidth
   Product
9. Plot gain- frequency characteristic of two stage RC coupled amplifier & calculate its bandwidth And compare it with theoretical value.
10. Study transistor phase shift oscillator and observe the effect of variation in R & C on oscillator frequency and compare with theoretical value.
11. Study Wein bridge oscillator and observe the effect of variation in R & C on oscillator frequency.
12. Study transistor phase shift oscillator and observe the effect of variation in R & C on oscillator frequency and compare with theoretical value.

| EEL 206 | ELECTRO-MECHANICAL ENERGY CONVERSION | L | T | P | Cr |
|---|---|---|---|---|---|
| | | 3 | 1 | 2 | 5 |

**Objective:**
To give the basic idea of energy conversion mainly from mechanical to electrical and vice-versa. This subject will also include the effect of electric current, its application and transmission principles.

**THEORY:**
**Note:** Question No 1 is compulsory and will be of short answer type from entire syllabus. Two questions are to be attempted out of three questions from each Section A & B.

## SECTION – A

### UNIT 1: Magnetic Circuits and Induction
Magnetic Circuits, Characteristic Of Magnetic Circuit, Important Definitions, Comparison Between Magnetic & Electric Circuit, Series And Parallel Magnetic Circuit, Magnetic Materials and Their Properties, B-H Curve, Magnetic Hysteresis, Hysteresis Loss, Electromagnetic Induction, Static and Dynamic Emfs , Energy Stored in Magnetic Field, Force On Current Carrying Conductor, AC Operation of Magnetic Circuits, Eddy Current and Eddy Current Losses, Magnetostriction

### UNIT 2: Dc Machines
Basic theory of DC generator, brief idea of construction, EMF equation, Classification of DC Generator, Armature Reaction, No Load & load characteristics, Losses & Efficiency, Applications, basic theory of DC motor, concept of back Emfs, torque and power equations, Classification of DC Motor, Characteristics, starting and speed control of DC motors, applications

### UNIT 3: Transformers
Basic theory, construction , operation at no-load and full-load, equivalent circuit, Phasor diagram, O.C. and S.C. tests for parameters determination, efficiency and regulation, auto-transformer principle & Expression for saving of copper material,, Advantages & disadvantages of Auto Transformer, introduction to three-phase transformer ,Various types of Connection of three phase transformer, Principle and applications of Current and Potential Transformers .

## SECTION – B

### UNIT 4: Three Phase Induction Motor
Introduction, Advantages & disadvantages , Construction, Production of rotating magnetic field & Principle of operation, EMF Equation, Phasor diagram, Equivalent circuit, Power Flow Diagram, Torque equation, Starting and Maximum Torque, Torque-Slip/Speed characteristics, starting and speed control of induction motor, No Load & Block Rotor Test, Induction Generator, Applications.

### UNIT 5: Single Phase Motors
Introduction to Motors, Principle, Double revolving field theory, Single Phase Induction motor, Single phase Commutator Motor, Single phase Synchronous Motor and their applications, Introduction to stepper, servo reluctance and universal motors.

**UNIT 6: Synchronous Machines**

Construction and basic theory of synchronous generator, Advantages of rotating magnetic field, Emf equation, Armature winding, Distribution & Pitch factor, Armature Reaction and its effects, Equivalent circuit & Phasor diagram, open circuit & short circuit test, Voltage Regulation, Parallel operation, Basic theory of synchronous motor, Effect of change of Excitation, v-curves, synchronous condenser, applications.

**Text Books:**


1. Mukesh Saini., "Electromechanical Energy Conversion", Vayu Publication, Delhi
2 Nagarath and Kothari, "Electrical Machines", TMH
3 B.L.Thareja. "Electrical Technology-II" S.Chand


**Reference Books:**


4. P.S. Bimbhra, , "Electrical Machines" Khanna
5. Hirschey , Mark, "Managerial Economics", Thomson Learning, Bangalore
6. Mukherjee and Chakravorti., "Electrical Machines", Dhanpat Rai & Sons

| ECL 204 | ELECTRO MAGNETIC FIELD THEORY | L | T | P | Cr |
|---|---|---|---|---|---|
| | | 3 | 1 | 0 | 4 |

**Objective:** The objective of this course is to make better understanding of the electromagnetic waves and their characteristics as they are widely used in communication field.

**THEORY:**

**Note:** Question No 1 is compulsory and will be of short answer type from entire syllabus. Two questions are to be attempted out of three questions from each Section A & B.

## SECTION – A

**UNIT 1: Coordinate Systems and Transformation**

Cartesian coordinates, circular cylindrical coordinates, spherical coordinates Vector calculus: Differential length, area and volume, line surface and volume integrals, del operator, gradient of a scalar, divergence of a vector and divergence theorem, curl of a vector and Stoke's theorem, Laplacian of a scalar

**UNIT 2: Electrostatics**

Electrostatic fields, Coulombs law and field intensity, Electric field due to charge distribution, Electric flux density, Gausses's Law – Maxwell's equation, Electric dipole and flux lines, energy density in electrostatic fields.

**UNIT 3: Electric Field in Material Space**

Properties of materials, convection and conduction currents, conductors, polarization in dielectrics, dielectric constants, continuity equation and relaxation time, boundary condition. Electrostatic boundary value problems: Poission's and Laplace's equations, general procedures for soling Poission's or Laplace's equations, resistance and capacitance, method of images.

## SECTION – B

**UNIT 4 Magnetostatics**

Magneto-static fields, Biot-Savart's Law, Ampere's circuit law, Maxwell's equation, application of ampere's law, magnetic flux density- Maxwell's equation, Maxwell's equation for static fields, magnetic scalar and vector potential. Magnetic forces, materials and devices: Forces due to magnetic field, magnetic torque and moment, a magnetic dipole, magnetization in materials, magnetic boundary conditions, inductors and inductances, magnetic energy

**UNIT 5: Waves and Applications**

Maxwell's equation, Faraday's Law, transformer and motional electromotive forces, displacement current, Maxwell's equation in final form.

**UNIT 6: Electromagnetic Wave Propagation**

Wave propagation in lossy dielectrics, plane waves in lossless dielectrics, plane wave in free space, plain waves in good conductors, power and the pointing vector, reflection of a plain

wave in a normal incidence. Transmission lines: Transmission line parameters, Transmission line equations, input impedance, standing wave ratio and power,

**Text Books:**

7. M. N. O. Sadiku, "Elements of Electromagnetic", 4th Ed, Oxford University Press.

**Reference Books:**

1. W. H. Hayt and J. A. Buck, "Electromagnetic field theory",7th edition TMH

| ECL 206 | SIGNALS AND SYSTEMS | L | T | P | Cr |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**Objective:** The objective of the course is to introduce the various types of signals and their behavior. After the study of this course, the students will be able to understand signal and their effect on various types of systems.

**THEORY:**

**Note:** Question No 1 is compulsory and will be of short answer type from entire syllabus. Two questions are to be attempted out of three questions from each Section A & B.

## SECTION – A

**UNIT 1: Signals**

Definition, types of signals and their representations: continuous-time/discrete-time, periodic/non-periodic, even/odd, energy/power, deterministic/ random, one-dimensional/multi-dimensional; commonly used signals (in continuous-time as well as in discrete-time): unit impulse, unit step, unit ramp (and their inter-relationships), exponential, rectangular pulse, sinusoidal; operations on continuous-time and discrete-time signals (including transformations of independent variables).

**UNIT 2: Fourier Transforms (FT)**

Definition, conditions of existence of FT, properties, magnitude and phase spectra, Some important FT theorems, Parseval's theorem, Inverse FT, relation between LT and FT

**UNIT 3: Discrete time Fourier transform (DTFT)**

Discrete time Fourier transform (DTFT), inverse DTFT, convergence, properties and theorems, Comparison between continuous time FT and DTFT

## SECTION – B

**UNIT 4: Introduction to systems**

Continuous-time (CT) systems, discrete time systems, classification of systems, properties analysis using LT, system functions of CT systems.

**UNIT 5: Laplace-Transform (LT)**

One-sided LT of some common signals, important theorems and properties of LT, inverse LT, solutions of differential equations using LT, Bilateral LT, Regions of convergence (ROC)

**UNIT 6: Z-transform (ZT)**

One sided and Bilateral Z-transforms, ZT of some common signals, ROC, Properties and theorems, solution of difference equations using one-sided ZT, s- to z-plane mapping .

**Text Books:**

1. I J Nagrath, R. Ranjan & Sharan, "Signal and Systems", 2009 Edn., TMH, New Delhi
2. P. Ramesh Babu, R. Anandanatarajan, "Signal and Systems", Fourth Edition, Scitech Publications

**Reference Books:**

3. V. Oppenheim, A.S. Willsky and S. Hamid Nawab, "Signals & System", PEARSON Education, Second edition, 2003.
4. HSU & Ranjan, "Schaume Series on Signals & Systems", TMH, India

| AHL 208 | NUMERICAL METHODS | L | T | P | Cr |
|---|---|---|---|---|---|
| | | 3 | 1 | 2 | 5 |

**THEORY:**

**Note:** Question No 1 is compulsory and will be of short answer type from entire syllabus. Two questions are to be attempted out of three questions from each Section A & B.

**SECTION – A**

**UNIT 1: Errors in Numerical Calculations**

Errors and their analysis, general error formula.

**Interpolation & Curve Fitting**: Taylor series and calculation of functions, Introduction to Interpolation, Lagrange interpolation, Newton interpolation, Chebyshev interpolation. Least square Line, curve fitting, interpolation by Spline functions.

**UNIT 2: Solution of Non-Linear Equations**

Fixed –Point Method, Bisection Method, Secant Method, Newton- Raphson Method, and Muller's Method.

**UNIT 3: System of Linear Equations**

Direct Method, Gaussian Elimination Method and pivoting. Matrix inversion.UV factorization. Iterative methods for linear system

**SECTION – B**

**UNIT 4: Numerical Differentiation & Integration**

Numerical Differentiation using Newton's interpolation Formula and Cubic Spline Method. Numerical integration using Newton-cote's interpolation formula, Trapezoidal rule, Simpson's rule 1/3 and 3/8 Rules, Weddle's Rule, Gauss- Hermite and Gauss-Legendre Formula.

**UNIT 5: Numerical Solution of Ordinary Differential Equation**

Introduction to differential equation, Initial value problems. Euler's Method, Heun's Method, Runge-Kutta Method, Taylor's series Method, System of differential equations, boundary value problems, Corrector predictor Method,Finite difference Method.

**UNIT 6: Numerical Solution of Partial Differential Equation. Eigen Values & Eigen Vectors**

Solution of hyperbolic, parabolic, and elliptic equations. The Eigen value problem .The power method, Jacobi's method, Given Method and House Holder Method for Eigen value problems.Rutishauser method for general matrices.

**Text Books:**


1. M.K.Jain, S.R.K.lyengar and R.K.Jain, "Numerical Methods for Scientific and engineering computation" New Age International Publishers.
2. S.S. Sastry, "Introductory Methods of Numerical Analysis" PHI Learning Pvt.Ltd.

**Reference Books:**


3. B.S.Grewal, "Numerical Methods in Science and Engineering"
4. E.Balagurusamy, "Numerical Methods" TMH.
5. John H. Mathews, "Numerical Methods for Mathematics, Science and Engineering" PHI.


**LAB:**

**Note:** At least ten experiments are to be performed during the semester. At least eight experiments should be performed from the list of experiments. Two experiments may either be performed from the given list of experiments or may be designed by the concern faculty in consultation with H.O.D as per the scope of syllabus.

**List of Experiments:**

1. Solution of Non-linear equation using the bisection method.
2. Solution of Non-Linear equation using the Secant method.
3. Solution of Non-Linear equation using the Newton – Raphson method.
4. Solution of a system of simultaneous algebraic equations using the Gaussian elimination Procedure.
5. Solution of a system of simultaneous algebraic equations using the Gauss-Seidel iterative Method.
6. Solution of a system of simultaneous algebraic equations using the Gauss-Jordan iterative Method.
7. Numerical solution of an ordinary differential equation using the Euler's method.
8. Numerical solution of an ordinary differential equation using the Modified Euler's method.
9. Numerical solution of an ordinary differential equation using the Runge - Kutta 4th order method.
10. Numerical solution of a definite integral using Simpson's $\left(\frac{1}{3}\right)^{rd}$ rule.

| MSL 212 | PRINCIPLES OF MANAGEMENT | L | T | P | Cr |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

**Objective:**
The objectives of this course is to expose the students to basic concepts of management and to enable them to gain appreciation for emerging ideas, techniques, procedures and practices in the field of management

**THEORY:**
**Note:** Question No 1 is compulsory and will be of short answer type from entire syllabus. Two questions are to be attempted out of three questions from each Section A & B.

## SECTION – A

### UNIT 1: Fundamentals of Management
Concepts, Nature, Importance; Management: As an Art and Science, Management as a profession, Professionalization of Management in India, Management vs. Administration, Levels of Management.

### UNIT 2: Human Relations
Evolution of Management: Taylor and Scientific Management, Fayol's Administrative Management, Bureaucracy, Hawthorne Experiments and Human Relations, Social System Approach, Decision Theory Approach, Social Responsibility of Management.

### UNIT 3: Management Functions
Introduction to functions of Management, Planning: Nature, Significance, Types, Process, limitations to Effective Planning, Decision Making.

## SECTION – B

### UNIT 4: Organizing
Concept, Forms of Organizational Structure, Departmentation, Span of Control, Delegation of Authority, Authority and Responsibility, Organizational Design.

### UNIT 5: Decision making and Motivation
Basics of Motivation: Concept, Importance of motivation , theories of Motivation, Methods for improving Motivation, Manpower Planning, Job Design.

**UNIT 6: Leadership**

Concept of Leadership: importance, Functions of Leaders, Leadership Styles, **Controlling:** Concept, Characterstics, Types of control, Significance, Process, Relationship between planning and control.

**Text Books:**


1. C.B Gupta, Management Concepts and Application, Sultan Chand.
2. Robbins S.P & Decenzo David A., Fundamentals of Management; Essential Concepts and Applications, Pearson Education.
3. P.K Aggrawal, Fundamentals of Management.
4. T. N Chabra, Principles of Management.


**Reference Books:**


1. Prasad L.M. - Principles and Practice of Management
2. Stoner & Wankel - Management
3. Peter F. Drucker - Practice of Management
4. Harold Koontz, Aryasri & Heniz Weirich - Principles of Management - Tata McGraw-Hill

| ECP 208 | ELECTRONIC CIRCUITS & SIMULATION LAB | L | T | P | Cr |
|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 1 |

## LAB:

**Note:** At least ten experiments are to be performed during the semester. At least eight experiments should be performed from the list of experiments. Two experiments may either be performed from the given list of experiments or may be designed by the concern faculty in consultation with H.O.D as per the scope of syllabus.

**List of Experiments:(to be performed using simulation software available)**

1. Simulate and study half-wave, full-wave, and bridge-rectifier.
2. Simulate and study diode clipper and clamper circuits.
3. Simulate and study emitter bias and fixed bias BJT and JFET circuits, and determine quiescent conditions.
4. Simulate a common emitter amplifier using self biasing and study the effect of variation in emitter resistor on voltage gain , input and output impedance.
5. Determine the frequency response of Vo/Vs for CE BJT amplifier. Study the effect of cascading of two stages on band width.
6. Simulate and study Darlington pair amplifier circuit and determine dc bias and output ac voltage.
7. Study an operational amplifier and find out: CMMR, gain band width product, slew rate, 3-db frequency, and input offset voltage.
8. Simulate and study active low pass, high pass, and band pass filters.
9. Simulate and study class A, B, C, and AB amplifier.
10. Study the operation of 555 timer oscillator.
11. Simulate given logical expression (by Faculty) and determine its truth table.
12. Simulate logic expression of full adder circuit and determine its truth table.
13. Simulate a synchronous 4-bit counter and determine its count sequence.
14. Simulate a master-slave flip-flop using NAND gates and study its operation. Study the operation of asynchronous preset and clear .

| ECV-202 | VAC -I | L T P | Cr |
|---|---|---|---|
| | | 0 0 2 | NC |

**Objective:**

1. To Make students capable to fulfill expectations' of Industry.
2. To increase the employability by conducting technical training programs.
3. Organizing Guest Lecturers, Industrial Visit, internship, students training.
4. Organizing workshops, conferences and symposia with joint participation of the faculty and the Industries

## SECTION – A

**UNIT 1: Electronic Components and Devices:**

Basics and applications of ground, Resistance, Capacitance, Inductor, Transformer, Diode, Transistor, and General ICs. Practice on above topics through Objective questions, Quiz, Technical Discussion.

**UNIT 2: Electronic Equipments/ Instruments:**

CRO,CRO Probe, Multimeter, Digital CRO, display unit, AC Power Supply and DC Power Supply Practice on above topics through Objective questions, Quiz, Technical Discussion.

**UNIT 3: Software Simulation:**

Introduction and applications of software like TARGET, Xilinx, MATLAB, Simulation of various electronic circuits using software. Practice on above topics through Objective questions, Quiz, Technical Discussion.

## SECTION – B

**UNIT 4: Signals:**

Classification of signals, Analysis of circuits and its response : unit step, unit ramp, unit impulse, unit parabola etc., Digital signals: Bit, Baud, Line encoding, Practice on above topics through Objective questions, Quiz, Technical Discussion.

**UNIT 5: Verbal Reasoning:**

Number Series, Alphabet Series, Test of Direction Sense, Coding-Decoding, Number Ranking, Arithmetical Reasoning, Problem on Age Calculation, Blood Relations, Decision Making etc.

**UNIT 6: Non-verbal Reasoning:**

Non Verbal Series, Mirror Images, Grouping Identical Figures

**Text & Reference Books:**

As per current scenario and suggested by the concerned teacher