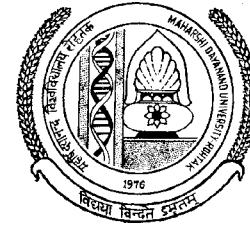


Maharshi Dayanand University  
Rohtak



**Syllabus and Courses of Reading for  
B.Tech. (Electronics & Communication Engg.)  
Semester V and VI**

Session - 2009-2010

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**M.D.UNIVERSITY, ROHTAK**  
**SCHEME OF STUDIES & EXAMINATIONS**  
**Becholer of Technology (Electronics & Comm. Engineering)**  
**Modified 'E' Scheme effective from 2009-10**  
**SEMESTER-V**

Course No.	Course Title	Teaching Schedule				Marks of class work	Examination		Total Marks	Duration Exam.
		L	T	P	Total		Theory	Practical		
EE-301-E	Communication Engineering	3	1	-	4	50	100	-	150	3
EE-303-E	Electronic Measurement and instrumentation (EL,EI, IC,EE, EEE, AEI)	3	1	-	4	50	100	-	150	3
EE-305-E	Analog Electronic Circuits (EL,EI, IC, EE, EEE, AEI)	3	1	-	4	50	100	-	150	3
EE-307-E	Antenna and Wave Propagation	3	1	-	4	50	100	-	150	3
CSE-210-E	Computer Architecture and Organisation (EL, EI, IC, Common with IV sem. CSE, IT)	3	1	-	4	50	100	-	150	3
EE-309-E	Microprocessors and Interfacing (EL,EI, IC,CSE, IT, EEE, AEI)	3	1	-	4	50	100	-	150	3
EE-323-E	Electronic Measurement and Instrumentation Lab (EL,EI, IC,EE)	-	-	2	2	25	-	25	50	3
EE-325-E	Analog Electronic Circuit Lab (EL,EI, IC)	-	-	2	2	25	-	25	50	3
EE-329-E	Microprocessors and Interfacing Lab (EL,EI, IC, CSE,IT, EEE, AEI)	-	-	2	2	25	-	25	50	3
EE-331-E	Electronic Circuit Simulation Lab (Common with VI Sem)IC, AEI)	-	-	2	2	25	-	25	50	3
EE-335-E	Practical Training-I	-	-	2	2	-	-	-	-	-
	<b>TOTAL</b>	<b>18</b>	<b>6</b>	<b>10</b>	<b>34</b>	<b>400</b>	<b>600</b>	<b>100</b>	<b>1100</b>	

**Note :**

- Students will be allowed to use non-programmable scientific calculator. However, sharing of calculator will not be permitted in the examination.
- Assessment of Practical Training-I, undergone at the end of IV semester, will be based on seminar, viva-voce, report and certificate of practical training obtained by the student from the industry. According to performance letter grades, A, B, C, F are to be awarded. A student who is awarded 'F' grade is required to repeat Practical Training.

**EE-301-E****COMMUNICATION ENGINEERING**

L T P  
3 1 0

CLASS WORK :50

EXAM : 100

TOTAL : 150

DURATION OF EXAM : 3 HRS

**UNIT 1 SPECTRAL ANALYSIS :**

Fourier Series, Fourier tranforms, Convolution Theorem, Correlation, Cross-Correlation and autocorrelation.

**UNIT 2 INFORMATION THEORY :**

Introduction to information and entropy, channel capacity for discrete and continuous channels, Shannon's Theorem, Shannon-Hartley Theorem, Noisy channels, coding theory : Shannon-Fano coding, minimum redundance coding, maximization of entropy of a continuous message transmission rate, effect of medium on the information, selection of channels ,effect of noise and its minimization.

**UNIT 3 RANDOM SIGNAL THEORY :**

Representation of random signals, concept of probability, probability of joint occurrence, conditional probability, discrete probability theory, continuous random variables, probability distribution function, probability density function, joint probability density functions. Statistical average and moments, Ergodic processes, correlation function, power spectral density, central limit theory, response of linear system to random signals. Error function, regularity, covariance relation among the spectral densities of the two input-output random processes. Cross spectral densities, optimum filters.

**TEXT BOOK :**

- Principles of Communication Systems : Taub Schiling; TMH

**REFERENCE BOOKS.**

- Communication Systems : Singh and Sapre ; TMH
- Communication Systems : A Bruce Carlson; TMH

**NOTE:**

Eight questions are to be set, at least two from each unit. Students have to attempt five questions in all.

**EE-303-E ELECTRONIC MEASUREMENT AND INSTRUMENTATION**

L T P	CLASS WORK :50
3 1 0	EXAM : 100
	TOTAL : 150
	DURATION OF EXAM : 3 HRS

**UNIT 1. OSCILLOSCOPE:**

Block diagram, study of various stages in brief, high frequency CRO considerations. Sampling and storage oscilloscope.

**UNIT 2. ELECTRONIC INSTRUMENTS:**

Instruments for measurement of voltage, current & other circuit parameters, Q-meters, R.F. power measurements, introduction to digital meters.

**UNIT 3. GENERATION & ANALYSIS OF WAVEFORMS:**

Block diagram of pulse generators, signal generators, function generators wave analysers, distortion analysers, spectrum analyser, Harmonic analyser, introduction to power analyser.

**UNIT 4. FREQUENCY & TIME MEASUREMENT:**

Study of decade counting Assembly(DCA), frequency measurements, period measurements, universal counter, introduction to digital meters.

**UNIT 5. DISPLAY DEVICES:**

Nixie tubes, LED's LCD's, discharge devices.

**UNIT 6 TRANSDUCERS:**

Classification, Transducers of types: RLC photocell, thermocouples etc. basic schemes of measurement of displacement, velocity, acceleration, strain, pressure, liquid level & temperature.

**UNIT 7 INTRODUCTION TO SIGNAL CONDITIONING:**

DC signal conditioning system, AC signal conditioning system, data acquisition and conversion system

**TEXT BOOK:**

1. A course in Electrical & Electronics Measurements & Instrumentation : A.K.Sawhney; Dhanpat Rai & Sons.

**REFERENCE BOOKS.**

1. Electronics Instrumentation & Measurement Techniques : Cooper; PHI.

**NOTE:**

Eight questions are to be set - at least one from each unit. Students have to attempt five questions in all.

**EE-305-E ANALOG ELECTRONIC CIRCUITS**

L T P

3 1 0

CLASS WORK :50

EXAM : 100

TOTAL : 150

DURATION OF EXAM : 3 HRS

**UNIT1. SINGLE AND MULTISTAGE AMPLIFIERS:**

Classification of amplifiers, distortion in amplifiers, frequency response of an amplifier, step response of an amplifier, pass-band of cascaded stages, RC-coupled amplifier, low frequency response of RC coupled stage, effect of an emitter bypass capacitor on low Frequency response, multistage CE amplifier .

**UNIT2. FEEDBACK AMPLIFIERS :**

Feedback concept, transfer gain with feedback, general characteristics of negative feedback amplifiers, input resistance, output resistance, voltage series feedback, current series feedback, current shunt feedback, voltage shunt feedback.

**UNIT3. OSCILLATORS:**

Sinusoidal oscillators, Barkhausen criteria, R-C phase shift oscillator, generalform of oscillator circuit, wien-bridge oscillator, crystal oscillator.

**UNIT4. POWER AMPLIFIERS:**

Class A, B, and C operations; Class A large signal amplifiers, higher order harmonic distortion, efficiency, transformer coupled power amplifier, class B amplifier : efficiency & distortion; class A and class B push-pull amplifiers; class C power amplifier.

**UNIT5. OPERATIONAL AMPLIFIERS :**

Ideal and practical operational amplifiers, inverting and non-inverting amplifier, differential amplifier, emitter coupled differential amplifier,

transfer characteristics of a differential amplifier, offset error : voltage and current, common mode rejection ratio (CMRR) .

**UNIT6. LINEAR APPLICATIONS OF OPERATIONAL****AMPLIFIERS :**

Scale changer, phase shifter, adder, voltage to current converter, current to voltage converter, DC voltage follower, Bridge amplifier, AC coupled amplifier, AC voltage follower, Integrator, differentiator.

**UNIT7. NON-LINEAR APPLICATIONS OF OPERATIONAL****AMPLIFIERS :**

Comparators, sample & hold circuits, Logarithmic amplifier, anti-log amplifier, logarithmic multiplier, waveform generators , Miller & Bootstrap sweep generators, regenerative comparator (Schmitt Trigger), multivibrators, ADC.

**TEXT BOOK:**

1. Integrated Electronics: Milman Halkias, TMH.
2. Microelectronic Circuits : Sedra & Smith.

**REFERENCE BOOKS:**

1. Operational Amplifiers:Gaikwad
2. Electronic Circuit Analysis and Design ( Second edition) : D.A.Neamen; TMH

**NOTE:**

Eight questions are to be set - at least one from each unit. Students have to attempt five questions.

**EE-307-E ANTENNA AND WAVE PROPAGATION**

L T P

3 1 0

CLASS WORK :50

EXAM : 100

TOTAL : 150

DURATION OF EXAM : 3 HRS

**UNIT 1. RADIATION OF ELECTROMAGNETIC WAVES :**

Retarded potential, field of short dipole, Antenna pattern & antenna parameters.

**UNIT 2. ANTENNA PARAMETERS :**

Antenna pattern, Gain, Directivity, Radiation resistance, Aperture, Beam-width etc, Reciprocity theorem for antenna.

**UNIT 3. ELEMENTAL ANTENNA:**

Wave equation for radiated fields from current and voltage sources in terms of electric scalar potential and magnetic vector potential. Fields and pattern of an infinitesimal dipole. Definition of various potentials used in antenna theory.

**UNIT 4. PRACTICAL LINEAR ANTENNAS:**

Relation between current distribution and field pattern of an antenna, linear antenna, half wave dipole, Antenna impedance, Directivity, Radiation resistance, Directional properties, Effect of ground on antenna pattern, Input impedance Broad band matching. Mutual impedance.

**UNIT 5. ANTENNA ARRAYS :**

Two element array, broad side, End fired pattern, Beam width pattern multiplication, multi element array and their properties, Synthesis of an array.

**UNIT 6. VARIOUS TYPES OF ANTENNA :**

parabolic feeds, conical, helix, log periodic, horn, Microwave antenna.

**UNIT 7. PROPAGATION :**

Ground waves, Space waves, Effect of Earth, Duct formation, Ionosphere, and sky waves.

**TEXT BOOKS :**

1. Antennas by J.D.Kraus, TMH.
2. Antenna & Wave Propagation by K.D Prasad.

**REFERENCE. BOOKS :**

1. Antenna & Radiowave Propagation by Collin, TMH
2. Electromagnetic Waves & Radiating Systems by Jordan & Balman, PHI.

**NOTE :**

Eight questions are to be set - at least one question from each unit. Students have to attempt five question in all.

**CSE- 210 E    COMPUTER ARCHITECTURE & ORGANIZATION**

L T P

CLASS WORK :50

3 1 0

EXAM : 100

TOTAL : 150

DURATION OF EXAM : 3 HRS

**Unit-1:** Basic Principles: Boolean algebra and Logic gates, Combinational logic blocks(Adders, Multiplexers, Encoders, de-coder), Sequential logic blocks(Latches, Flip-Flops, Registers, Counters)

**Unit-2:** General System Architecture: Store program control concept, Flynn's classification of computers (SISD, MISD, MIMD); Multilevel viewpoint of a machine: digital logic, micro architecture, ISA, operating systems, high level language; structured organization; CPU, caches, main memory, secondary memory units & I/O; Performance metrics; MIPS, MFLOPS.

**Unit-3:** Instruction Set Architecture: Instruction set based classification of processors (RISC, CISC, and their comparison); addressing modes: register, immediate, direct, indirect, indexed; Operations in the instruction set; Arithmetic and Logical, Data Transfer, Control Flow; Instruction set formats (fixed, variable, hybrid); Language of the machine: 8086 ; simulation using MSAM.

**Unit-4:** Basic non pipelined CPU Architecture: CPU Architecture types (accumulator, register, stack, memory/ register) detailed data path of a typical register based CPU, Fetch-Decode-Execute cycle (typically 3 to 5 stage); microinstruction sequencing, implementation of control unit, Enhancing performance with pipelining.

**Unit-5:** Memory Hierarchy & I/O Techniques: The need for a memory hierarchy (Locality of reference principle, Memory hierarchy in practice: Cache, main memory and secondary memory, Memory parameters: access/ cycle time, cost per bit); Main memory (Semiconductor RAM & ROM organization, memory expansion, Static & dynamic memory types); Cache memory (Associative & direct mapped cache organizations).

**Unit-6:** Introduction to Parallelism: Goals of parallelism (Exploitation of concurrency, throughput enhancement); Amdahl's law; Instruction

level parallelism (pipelining, super scaling -basic features); Processor level parallelism (Multiprocessor systems overview).

**Unit-7:** Computer Organization [80x86]: Instruction codes, computer register, computer instructions, timing and control, instruction cycle, type of instructions, memory reference, register reference. I/O reference, Basics of Logic Design, accumulator logic, Control memory, address sequencing, micro-instruction formats, micro-program sequencer, Stack Organization, Instruction Formats, Types of interrupts; Memory Hierarchy.

**Text Books:**

- Computer Organization and Design, 2nd Ed., by David A. Patterson and John L. Hennessy, Morgan 1997, Kauffmann.
- Computer Architecture and Organization, 3rd Edi, by John P. Hayes, 1998, TMH.

**Reference Books:**

- Operating Systems Internals and Design Principles by William Stallings, 4th edition, 2001, Prentice-Hall Upper Saddle River, New Jersey
- Computer Organization, 5th Edi, by Carl Hamacher, Zvonko Vranesic, 2002, Safwat Zaky.
- Structured Computer Organisation by A.S. Tanenbaum, 4th edition, Prentice-Hall of India, 1999, Eastern Economic Edition.
- Computer Organisation & Architecture: Designing for performance by W. Stallings, 4th edition, 1996, Prentice-Hall International edition.
- Computer System Architecture by M. Mano, 2001, Prentice-Hall.
- Computer Architecture- Nicholas Carter, 2002, T.M.H.

**Note:**

Eight questions will be set in all by the examiners taking at least one question from each unit. Students will be required to attempt five questions in all.

**EE-309-E MICROPROCESSORS AND INTERFACING**

L	T	P	CLASS WORK :50
3	1	0	EXAM : 100
			TOTAL : 150
			DURATION OF EXAM : 3 HRS

**PART A****UNIT1. THE 8085 PROCESSOR :**

Introduction to microprocessor, 8085 microprocessor : Architecture, instruction set, interrupt structure, and assembly language programming.

**UNIT2. THE 8086 MICROPROCESSOR ARCHITECTURE :**

Architecture, block diagram of 8086, details of sub-blocks such as EU, BIU; memory segmentation and physical address computations, program relocation, addressing modes, instruction formats, pin diagram and description of various signals.

**UNIT3. INSTRUCTION SET OF 8086 :**

Instruction execution timing, assembler instruction format, data transfer instructions, arithmetic instructions, branch instructions, looping instructions, NOP and HLT instructions, flag manipulation instructions, logical instructions, shift and rotate instructions, directives and operators, programming examples.

**PART B****UNIT4. INTERFACING DEVICE :**

The 8255 PPI chip: Architecture, control words, modes and examples.

**UNIT 5. DMA :**

Introduction to DMA process, 8237 DMA controller,

**UNIT6. INTERRUPT AND TIMER :**

8259 Programmable interrupt controller, Programmable interval timer chips.

**TEXT BOOKS :**

1. Microprocessor Architecture, Programming & Applications with 8085 : Ramesh S Gaonkar; Wiley Eastern Ltd.
2. The Intel Microprocessors 8086- Pentium processor : Brey; PHI

**REFERENCE BOOKS:**

1. Microprocessors and interfacing : Hall; TMH
2. The 8088 & 8086 Microprocessors-Programming, interfacing, Hardware & Applications :Triebel & Singh; PHI
3. Microcomputer systems: the 8086/8088 Family: architecture, Programming & Design : Yu-Chang Liu & Glenn A Gibson; PHI.
4. Advanced Microprocessors and Interfacing : Badri Ram; TMH

**NOTE :**

8 questions are to be set selecting FIVE questions from PART A and THREE questions from PART B. Students have to attempt any five questions.

**EE-323-E ELECTRONIC MEASUREMENT AND INSTRUMENTATION-LAB**

L T P CLASS WORK :25  
 0 0 2 EXAM : 25  
 TOTAL : 50  
 DURATION OF EXAM : 3 HRS

**LIST OF EXPERIMENTS:**

1. Measurement of displacement using LVDT.
2. Measurement of distance using LDR.
3. Measurement of temperature using R.T.D.
4. Measurement of temperature using Thermocouple.
5. Measurement of pressure using Strain Guage.
6. Measurement of pressure using Piezo-Electric Pick up.
7. Measurement of distance using Capacitive Pick up.
8. Measurement of distance using Inductive Pick up.
9. Measurement of speed of DC Motor using Magnetic Pick up.
10. Measurement of speed of DC Motor using Photo Electric Pick up.

**NOTE :**

1. At least ten experiments have to be performed in the semester.
2. At least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus of EE-303-C.

**EE-325-E ANALOG ELECTRONIC CIRCUITS LAB**

L T P CLASS WORK :25  
 0 0 2 EXAM : 25  
 TOTAL : 50  
 DURATION OF EXAM : 3 HRS

**LIST OF EXPERIMENTS:**

1. Design & measure the frequency response of an RC coupled amplifier using discrete components.
2. Design a two stage RC coupled amplifier and determine the effect of cascading on gain and bandwidth
3. Study the effect of voltage series, current series, voltage shunt, and current shunt feed-back on amplifier using discrete components.
4. Design & realize inverting amplifier, non-inverting and buffer amplifier using 741 Op Amp.
5. Verify the operation of a differentiator circuit using 741 op amp and show that it acts as a high pass filter.
6. Verify the operation of an integrator circuit using 741 op amp and show that it acts as a low pass filter.
7. Design and verify the operations of op amp adder and subtractor circuits.
8. Plot frequency response of AC coupled amplifier using op amp 741 and study the effect of negative feedback on the bandwidth and gain of the amplifier.
9. Design & realize using op amp 741, Wein -bridge oscillator.
10. To design & realize using op amp 741, square wave generator.
11. To design & realize using op amp 741, logarithmic amplifier & VCCS.

**NOTE :**

At least ten experiments are to be performed. Seven experiments should be performed from the above list and the remaining three experiments can be either from the above list or set by the concerned institution as per the scope of the syllabus of EE-305-C.



**EE-329-E MICROPROCESSORS AND INTERFACING LAB**

L T P

0 0 2

CLASS WORK :25

EXAM : 25

TOTAL : 50

DURATION OF EXAM : 3 HRS

**LIST OF EXPERIMENTS:**

1. Study of 8085 Microprocessor kit.
2. Write a program using 8085 and verify for :
  - a. Addition of two 8-bit numbers.
  - b. Addition of two 8-bit numbers (with carry).
3. Write a program using 8085 and verify for :
  - a. 8-bit subtraction (display borrow)
  - b. 16-bit subtraction (display borrow)
4. Write a program using 8085 for multiplication of two 8- bit numbers by repeated addition method. Check for minimum number of additions and test for typical data.
5. Write a program using 8085 for multiplication of two 8- bit numbers by bit rotation method and verify.
6. Write a program using 8085 for division of two 8- bit numbers by repeated subtraction method and test for typical data.
7. Write a program using 8085 for dividing two 8- bit numbers by bit rotation method and test for typical data.
8. Study of 8086 microprocessor kit
9. Write a program using 8086 for division of a defined double word (stored in a data segment) by another double Word division and verify.
10. Write a program using 8086 for finding the square root of a given number and verify.

11. Write a program using 8086 for copying 12 bytes of data from source to destination and verify.
12. Write a program using 8086 and verify for:
  - a. Finding the largest number from an array.
  - b. Finding the smallest number from an array.
13. Write a program using 8086 for arranging an array of numbers in descending order and verify.
14. Write a program using 8086 for arranging an array of numbers in ascending order and verify.
15. Write a program for finding square of a number using look-up table and verify. .
16. Write a program to interface a two digit number using seven-segment LEDs. Use 8085/8086 microprocessor and 8255 PPI.
17. Write a program to control the operation of stepper motor using 8085/8086 microprocessor and 8255 PPI.

**NOTE:**

At least ten experiments have to be performed in the semester out of which seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus of EE-309-C.

**EE-331-E ELECTRONICS CIRCUIT SIMULATION LAB**

L T P

0 0 2

CLASS WORK :25

EXAM : 25

TOTAL : 50

DURATION OF EXAM : 3 HRS

**LIST OF EXPERIMENTS:**

1. Simulate and study half-wave, full-wave, and bridge-rectifier using PSPICE windows
2. Simulate and study diode clipper and clamper circuits using PSPICE windows
3. Simulate and study emitter bias and fixed bias BJT and JFET circuits using PSPICE windows, 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 using PSPICE windows .
5. Determine the frequency response of  $V_o/V_s$  for CE BJT amplifier using PSPICE windows. Study the effect of cascading of two stages on band width.
6. Simulate and study Darlington pair amplifier circuit using PSPICE windows and determine dc bias and output ac voltage .
7. Study an operational amplifier using PSPICE windows 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 using PSPICE windows.
9. Simulate and study class A, B, C, and AB amplifier using PSPICE windows.
10. Study the operation of 555 timer oscillator using PSPICE.

11. Simulate logic expression.....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 .

**NOTE :**

At least ten experiments have to be performed in the semester; out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution.

**M.D.UNIVERSITY, ROHTAK**  
**SCHEME OF STUDIES & EXAMINATIONS**  
**Becholer of Technology (Electronics & Comm. Engineering)**  
**Modified 'E' Scheme effective from 2009-10**  
**SEMESTER-VI**

Course No.	Course Title	Teaching Schedule				Marks of class work	Examination		Total Marks	Duration Exam.
		L	T	P	Total		Theory	Practical		
EE-302-E	Microwave and Radar Engineering	3	1	-	4	50	100	-	150	3
EE-304-E	Control System Engg. (EL,EE, EEE)	3	1	-	4	50	100	-	150	3
EE-306-E	MOS IC'S and Technology (Common with 7th Sem.- EI)	3	1	-	4	50	100	-	150	3
IT-305-E	Computer Networks (EL,CSE, Common with V-SEM. - IT, AEI)	3	1	-	4	50	100	-	150	3
EE-308-E	TV Engineering	3	1	-	4	50	100	-	150	3
EE-310-E	Digital System Design (EL,EI, IC,EE,CSE, AEI)	3	1	-	4	50	100	-	150	3
EE-324-E	Control Systems Engg. Lab. (EL,EE, EEE, AEI)	-	-	2	2	25	-	25	50	3
IT-304-E	Network Programming Lab. (EL, IT, AEI)	-	-	2	2	25	-	25	50	3
EE-330-E	Digital System Design Lab. (EL,EI, IC, CSE, AEI)	-	-	3	3	25	-	25	50	3
EE-322-E	Microwave Lab.	-	-	2	2	25	-	25	50	3
GPEE-302-E	General Proficiency	-	-	-	-	50	-	-	50	3
<b>TOTAL</b>		<b>18</b>	<b>6</b>	<b>9</b>	<b>33</b>	<b>450</b>	<b>600</b>	<b>100</b>	<b>1150</b>	

**Note :**

1. Each student has to undergo practical training of 6 weeks during summer vacation and its evaluation shall be carried out in the VII semester.
2. Students will be allowed to use non-programmable scientific calculator. However, sharing of calculator will not be permitted in the examination.

**EE-302-E MICROWAVE AND RADAR ENGINEERING**

L T P

3 1 0

CLASS WORK :50

EXAM : 100

TOTAL : 150

DURATION OF EXAM : 3 HRS

**UNIT1. WAVEGUIDES:**

Introduction, comparison with transmission lines, propagation in TE & TM mode, rectangular wave guide, TEM mode in rectangular wave guide, characteristic impedance, introduction to circular waveguides and planar transmission lines.

**UNIT2 . MICROWAVE COMPONENTS:**

Directional couplers, tees, hybrid ring, S-parameters, attenuators, cavity resonators ,mixers & detectors, matched Load, phase shifter ,wave meter, Ferrite devices: Isolators, circulators.

**UNIT3. MICROWAVE TUBES:**

Limitation of conventional tubes; Construction, operation and properties of Klystron amplifier, reflex Klystron, magnetron, TWT , BWO , crossed field amplifiers.

**UNIT4. MICROWAVE SOLID STATE DEVICES :**

Varactor diode, Tunnel diode, Schottky diode, GUNN diode, IMPATT, TRAPATT and PIN diodes. MASER, parametric amplifiers.

**UNIT5. MICROWAVE MEASUREMENTS :**

Power measurement using calorimeter & bolometers, measurement of SWR, frequency , wavelength and impedance. Microwave bridges.

**UNIT6. INTRODUCTION TO RADAR :**

Block Diagram and operation, Radar Frequencies, Simple form of Radar Equation, Prediction of Range Performance, Pulse Repetition frequency and Range Ambiguities, Applications of Radar

**TEXT BOOKS:**

1. Microwave devices and circuits :Samuel Liao;PHI
2. Microwave devices & Radar Engg :M .Kulkarni;Umesh

**REFERENCE BOOK :**

1. Microwaves and Radar : A.K. Maini; Khanna

**NOTE :**

Eight questions are to be set -atleast one from each unit. Students have to attempt any five questions

**EE-304-E****CONTROL SYSTEM ENGINEERING**

L T P

3 1 0

CLASS WORK :50

EXAM : 100

TOTAL : 150

DURATION OF EXAM : 3 HRS

**UNIT1. INTRODUCTORY CONCEPTS :**

System/Plant model, types of models, illustrative examples of plants and their inputs and outputs, controller, servomechanism, regulating system, linear time-invariant (LTI) system, time-varying system, causal system, open loop control system, closed loop control system, illustrative examples of open-loop and feedback control systems, continuous time and sampled data control systems. Effects of feedback on sensitivity (to parameter variations), stability, external disturbance (noise), overall gain etc. Introductory remarks about non-linear control systems.

**UNIT2. MATHEMATICAL MODELLING :**

Concept of transfer function, relationship between transfer function and impulse response, order of a system, block diagram algebra, signal flow graphs : Mason's gain formula & its application, characteristic equation, derivation of transfer functions of electrical and electromechanical systems. Transfer functions of cascaded and non-loading cascaded elements. Introduction to state variable analysis and design.

**UNIT3. TIME DOMAIN ANALYSIS :**

Typical test signals, time response of first order systems to various standard inputs, time response of 2nd order system to step input, relationship between location of roots of characteristics equation,  $\omega$  and  $\omega_n$ , time domain specifications of a general and an under-damped 2nd order system, steady state error and error constants, dominant closed loop poles, concept of stability, pole zero configuration and stability,

necessary and sufficient conditions for stability, Hurwitz stability criterion, Routh stability criterion and relative stability.

#### **UNIT4. ROOT LOCUS TECHNIQUE :**

Root locus concept, development of root loci for various systems, stability considerations.

#### **UNIT5. FREQUENCY DOMAIN ANALYSIS :**

Relationship between frequency response and time-response for 2nd order system, polar, Nyquist, Bode plots, stability, Gain-margin and Phase Margin, relative stability, frequency response specifications.

#### **UNIT6. COMPENSATION :**

Necessity of compensation, compensation networks, application of lag and lead compensation, basic modes of feedback control, proportional, integral and derivative controllers, illustrative examples.

#### **UNIT7. CONTROL COMPONENTS :**

Synchros, AC and DC tech-generators, servomotors, stepper motors, & their applications, magnetic amplifier.

#### **TEXT BOOK :**

1. Control System Engineering : I.J.Nagrath & M.Gopal; New Age

#### **REFERENCE BOOKS :**

1. Automatic Control Systems : B.C.Kuo, PHI.
2. Modern Control Engg : K.Ogata; PHI.
3. Control Systems - Principles & Design : Madan Gopal; Tata Mc Graw Hill.
4. Modern Control Engineering.R.C.Dorl & Bishop; Addison-Wesley

#### **NOTE:**

Eight questions are to be set - at least one from each unit. Students have to attempt five questions.

#### **EE-306-E**

#### **MOS ICs AND TECHNOLOGY**

L T P

CLASS WORK :50

3 1 0

EXAM : 100

TOTAL : 150

DURATION OF EXAM : 3 HRS

#### **UNIT1. REVIEW OF MOS TECHNOLOGY :**

Introduction to IC technology, MOS Transistor enhancement mode and depletion mode operations, fabrication of NMOS, CMOS and BiCMOS devices. Equivalent circuit for MOSFET and CMOS.

#### **UNIT2. MOS TRANSISTOR THEORY:**

MOS device design equations, MOS transistor, Evaluation aspects of MOS transistor, threshold voltage, MOS transistor transconductance & output conductance, figure of merit, determination of pull-up to pull-down ratio for an n-MOS inverter driven by another n-MOS inverter & by one or more pass transistor, alternative forms of pull-up, CMOS and BiCMOS-inverters. Latch up in CMOS circuitry and BiCMOS Latch up susceptibility.

#### **UNIT3. MOS CIRCUITS AND LOGIC DESIGN :**

Basic physical design of simple logic gates using n-MOS, p-MOS and CMOS, CMOS logic gate design considerations, CMOS logic structures, clocking strategies.

#### **UNIT4. CIRCUIT CHARACTERIZATION AND PERFORMANCE ESTIMATION :**

Resistance estimation, capacitance estimation, inductance, switching characteristics, CMOS gate transistor sizing, power dissipation.

**UNIT5. VLSI FABRICATION :**

Crystal growth, wafer preparation, epitaxy, oxidation, lithography, etching, diffusion, dielectric and poly-silicon film deposition, ion implantation, yield and reliability, metalization.

**UNIT6. DESIGN EXAMPLE USING CMOS :**

Incrementer / decrementer, left/right shift serial/parallel register, comparator for two n-bit number, a two-phase non-overlapping clock generator with buffered output on both phases, design of an event driven element for EDL system

**TEXT BOOKS :**

1. Introduction to Digital Integrated Circuits : Rabaey, Chandrakasan & Nikolic.
2. Principles of CMOS VLSI Design : Neil H.E. Weste and Kamran Eshraghian; Pearson.

**REFERENCE BOOKS :**

1. Introduction to Digital Circuits : Rabaey and .....LPE (PH)
2. ....: S.K.Gandhi.
3. VLSI Technology: S.M. Sze; McGraw-Hill.
4. Integrated Circuits: K.R. Botkar; Khanna

**NOTE:**

Eight questions are to be set -atleast one from each unit. Students have to attempt any five questions

**IT-305 E**

L T P

3 1 0

**COMPUTER NETWORKS**

CLASS WORK :50

EXAM : 100

TOTAL : 150

DURATION OF EXAM : 3 HRS

**Unit-1:** OSI Reference Model and Network Architecture: Introduction to Computer Networks, Example networks ARPANET, Internet, Private Networks, Network Topologies: Bus-, Star-, Ring-, Hybrid -, Tree -, Complete -, Irregular -Topology; Types of Networks : Local Area Networks, Metropolitan Area Networks, Wide Area Networks; Layering architecture of networks, OSI model, Functions of each layer, Services and Protocols of each layer

**Unit-2:** TCP/IP: Introduction, History of TCP/IP, Layers of TCP/IP, Protocols, Internet Protocol, Transmission Control Protocol, User Datagram Protocol, IP Addressing, IP address classes, Subnet Addressing, Internet Control Protocols, ARP, RARP, ICMP, Application Layer, Domain Name System, Email - SMTP, POP, IMAP; FTP, NNTP, HTTP, Overview of IP version 6.

**Unit-3:** Local Area Networks: Introduction to LANs, Features of LANs, Components of LANs, Usage of LANs, LAN Standards, IEEE 802 standards, Channel Access Methods, Aloha, CSMA, CSMA/CD, Token Passing, Ethernet, Layer 2 & 3 switching, Fast Ethernet and Gigabit Ethernet, Token Ring, LAN interconnecting devices: Hubs, Switches, Bridges, Routers, Gateways.

**Unit-4:** Wide Area Networks: Introduction of WANs, Routing, Congestion Control, WAN Technologies, Distributed Queue Dual Bus (DQDB), Synchronous Digital Hierarchy (SDH)/ Synchronous Optical Network (SONET), Asynchronous Transfer Mode (ATM), Frame Relay, Wireless Links.

**Unit-5:** Introduction to Network Management: Remote Monitoring Techniques: Polling, Traps, Performance Management, Class of Service, Quality of Service, Security management, Firewalls, VLANs, Proxy Servers, Introduction to Network Operating Systems: Client-Server infrastructure, Windows NT/2000.

**Text Book:**

- Computer Networks (3rd edition), Tanenbaum Andrew S., International edition, 1996.

**Reference Books:**

- Data Communications, Computer Networks and Open Systems (4th edition), Halsall Fred, 2000, Addison Wesley, Low Price Edition.
- Business Data Communications, Fitzgerald Jerry,.
- Computer Networks - A System Approach, Larry L. Peterson & Bruce S. Davie, 2nd Edition
- Computer Networking - ED Tittel , 2002, T.M.H.

**Note:**

Eight questions will be set in all by the examiners taking at least one question from each unit. Students will be required to attempt five questions in all.

**EE-308-E**

**TELEVISION ENGINEERING**

L T P

CLASS WORK :50

3 1 0

EXAM : 100

TOTAL : 150

DURATION OF EXAM : 3 HRS

**UNIT1 ELEMENTS OF A TELEVISION SYSTEM :**

Picture transmission, sound transmission, picture reception, sound reception synchronization, receiver controls, color television.

Analysis and Synthesis of Television Pictures: Gross structure, image continuity, no. of scanning lines, flicker, fine structure, tonal gradation.

**UNIT2. COMPOSITE VIDEO SIGNAL :**

Video signal dimensions, horizontal sync details, vertical sync details, scanning sequence details, functions of vertical pulse train, sync details of 525 line system.

**UNIT3. SIGNAL TRANSMISSION AND CHANNEL BANDWIDTH :**

Amplitude Modulation, channel bandwidth, vestigial side band transmission, Transmission efficiency, complete channel bandwidth, reception of vestigial side band signals, frequency modulation, FM channel bandwidth, channel bandwidth for color transmission, allocation of frequency bands for television signal transmission, television standards.

**UNIT4. THE PICTURE TUBE :**

Monochrome picture tube, Beam deflection, screen phosphor, face plate, picture tube characteristics, picture tube circuit controls. Television Camera Tubes: Basic principal, Image orthicon, Vidicon.

**UNIT5.BASIC TELEVISION BROADCASTING:**

Television transmitter, positive & negative modulation.

Television Receiver: Receiver sections, vestigial side band correction, choice of intermediate frequencies, picture tube circuitry & controls, sound signal separation, sound section, Sync processing & AFC circuit, vertical Deflection circuit, Horizontal deflection circuit.

Television Signal propagation & Antennas: Television Transmission antennas , television receiver antennas, color television antennas.

**UNIT6.ESSENTIALS OF COLOR TELEVISION:**

Compatibility, natural light, color perception, three color television camera, the luminance signal, values of Luminance & color difference signals on Colors, color television display tubes (Delta gun, PIL, Trinitron).

**UNIT7. COLOR SIGNAL TRANSMISSION AND RECEPTION :**

Color signal transmission, bandwidth for color signal transmission.

**UNIT8. TELEVISION APPLICATIONS:**

Cable television, CCTV, picture phone & facsimile, television via satellite, Remote Control ( Electronic control system ), Introduction to Digital TV Technology and their merits , HDTV.

**TEXT BOOK:**

Monochrome and Color Television : R.R.Gulati ; New Age.

**REFERENCE BOOK :**

TV and Video Engineering : Dhake ; TMH.

**NOTE:**

Eight questions are to be set - one from each unit. Students have to attempt five questions.

**EE-310-E****DIGITAL SYSTEM DESIGN**

L T P

3 1 0

CLASS WORK :50

EXAM : 100

TOTAL : 150

DURATION OF EXAM : 3 HRS

**UNIT 1. INTRODUCTION :**

Introduction to Computer-aided design tools for digital systems. Hardware description languages; introduction to VHDL, data objects, classes and data types, Operators, Overloading, logical operators.Types of delays Entity and Architecture declaration. Introduction to behavioural, dataflow and structural models.

**UNIT 2. VHDL STATEMENTS :**

Assignment statements, sequential statements and process, conditional statements, case statement Array and loops, resolution functions, Packages and Libraries, concurrent statements.

Subprograms: Application of Functions and Procedures, Structural Modelling, component declaration, structural layout and generics.

**UNIT 3. COMBINATIONAL CIRCUIT DESIGN:**

VHDL Models and Simulation of combinational circuits such as Multiplexers, Demultiplexers, encoders, decoders, code converters, comparators, implementation of Boolean functions etc.

**UNIT 4. SEQUENTIAL CIRCUITS DESIGN :**

VHDL Models and Simulation of Sequential Circuits

Shift Registers, Counters etc.



**UNIT 5. DESIGN OF MICROCOMPUTER :**

Basic components of a computer, specifications, architecture of a simple microcomputer system, implementation of a simple microcomputer system using VHDL

**UNIT 6. DESIGN WITH CPLDs AND FPGAs :**

Programmable logic devices : ROM, PLAs, PALs, GAL, PEEL, CPLDs and FPGA. Design implementation using CPLDs and FPGAs

**REFERENCE BOOKS:**

1. IEEE Standard VHDL Language Reference Manual (1993).
2. Digital Design and Modelling with VHDL and Synthesis : KC Chang; IEEE Computer Society Press.
3. "A VHDL Primer" : Bhasker; Prentice Hall 1995.
4. "Digital System Design using VHDL" : Charles. H.Roth ; PWS (1998).
5. "VHDL-Analysis & Modelling of Digital Systems" : Navabi Z; McGraw Hill.
6. VHDL-IV Edition :Perry; TMH (2002)
7. "Introduction to Digital Systems" : Ercegovac. Lang & Moreno; John Wiley (1999).
8. Fundamentals of Digital Logic with VHDL Design : Brown and Vranesic; TMH (2000)
9. Modern Digital Electronics- III Edition: R.P Jain; TMH (2003).

**NOTE :**

Eight questions are to be set - at least one question from each unit. Students will be required to attempt five questions in all.

**EE-324-E****CONTROL SYSTEM LAB**

L T P

0 0 2

CLASS WORK :25

EXAM : 25

TOTAL : 50

DURATION OF EXAM : 3 HRS

**LIST OF EXPERIMENTS :**

1. To study A.C. servo motor and to plot its torque speed characteristics.
2. To study D.C. servo motor and to plot its torque speed characteristics.
3. To study the magnetic amplifier and to plot its load current v/s control current characteristics for :
  - (a) series connected mode
  - (b) parallel connected mode.
4. To plot the load current v/s control current characteristics for self excited mode of the magnetic amplifier.
5. To study the synchro & to:
  - (a) Use the synchro pair (synchro transmitter & control transformer) as an error detector.
  - (b) Plot stator voltage v/s rotor angle for synchro transmitter i.e. to use the synchro transmitter as position transducer.
6. To use the synchro pair (synchro transmitter & synchro motor) as a torque transmitter.
7.
  - (a) To demonstrate simple motor driven closed loop position control system.
  - (b) To study and demonstrate simple closed loop speed control system.

8. To study the lead, lag, lead-lag compensators and to draw their magnitude and phase plots .
9. To study a stepper motor & to execute microprocessor or computer-based control of the same by changing number of steps, direction of rotation & speed.
10. To implement a PID controller for level control of a pilot plant.
11. To implement a PID controller for temperature control of a pilot plant.
12. To study the MATLAB package for simulation of control system design.

**NOTE :**

At least ten experiments have to be performed in the semester, at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus of EE-304-C.

**IT-304 E****NETWORK PROGRAMMING LAB.**

L T P

0 0 2

CLASS WORK :25

EXAM : 25

TOTAL : 50

DURATION OF EXAM : 3 HRS

The socket programming can be done on Unix/Linux operating or/and Windows. Socket programming, and the language can be C/VC++ and/ or Java

1. Write a program to Create Sockets For Sending And Receiving Data.
2. Write a program to Obtain The Local & Remote Socket Address.
3. Write a program to Create Sockets For Handling Multiple Connection
4. Write a program to Obtain The Information About The (A) Host (B) Network (C) Protocols (D) Domains
5. Write a program to Manipulate The IP Address.
6. Write a program to Write A Telnet Client.
7. Write a program to Make An FTP Client

**Note:**

At least 5 to 10 more exercises to be given by the teacher concerned.

**EE-330-E****DIGITAL SYSTEM DESIGN LAB**

L T P

0 0 2

CLASS WORK :25

EXAM : 25

TOTAL : 50

DURATION OF EXAM : 3 HRS

**LIST OF EXPERIMENTS:**

1. Design all gates using VHDL.
2. Write VHDL programs for the following circuits, check the wave forms and the hardware generated
  - a. half adder
  - b. full adder
3. Write VHDL programs for the following circuits, check the wave forms and the hardware generated
  - a. multiplexer
  - b. demultiplexer
4. Write VHDL programs for the following circuits, check the wave forms and the hardware generated
  - a. decoder
  - b. encoder
5. Write a VHDL program for a comparator and check the wave forms and the hardware generated
6. Write a VHDL program for a code converter and check the wave forms and the hardware generated
7. Write a VHDL program for a FLIP-FLOP and check the wave forms and the hardware generated

8. Write a VHDL program for a counter and check the wave forms and the hardware generated
9. Write VHDL programs for the following circuits, check the wave forms and the hardware generated
  - a. register
  - b. shift register
10. Implement any three (given above) on FPGA/CPLD kit

**NOTE :**

Ten experiments are to be performed out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus.

**EE-322-E****MICROWAVE LAB**

L T P

0 0 2

CLASS WORK :25

EXAM : 25

TOTAL : 50

DURATION OF EXAM : 3 HRS

**LIST OF EXPERIMENTS :**

1. Study of wave guide components.
2. To study the characteristics of reflex Klystron and determine its timing range.
3. To measure frequency of microwave source and demonstrate relationship among guide dimensions, free space wave length and guide wavelength.
4. To measure VSWR of unknown load and determine its impedance using a smith chart.
5. To match impedance for maximum power transfer using slide screw tuner.
6. To measure VSWR, insertion losses and attenuation of a fixed and variable attenuator.
7. To measure coupling and directivity of direction couplers.
8. To measure insertion loss, isolation of a three port circulator.
9. To measure the Q of a resonant cavity.
10. To study the V-I characteristics of GUNN diode.

**NOTE :**

Ten experiments have to be performed in the semester. At least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus of EE-302-C.

**GPEE-302- E GENERAL FITNESS FOR THE PROFESSION**

L T P  
- - 8

Class Work : 50 Marks  
Practical : 100 Marks  
Total Marks : 150 Marks

At the end of each year students will be evaluated on the basis of their performance in various fields. The evaluation will be made by the panel of experts/examiners/teachers to be appointed by the Principal/Director of the College. A specimen perform indicating the weight age to each component/ activity is given below :-

Name : \_\_\_\_\_ College Roll No. \_\_\_\_\_  
Univ.Roll No. \_\_\_\_\_  
Branch \_\_\_\_\_ Year of Admission \_\_\_\_\_.

**I. Academic Performance (15 Marks) :**

**(a) Performance in University Examination :-**

Sem.	Result	%age of Marks obtained	Number of Attempt in which the Sem. exam. has been cleared
I			
II			
III			
IV			
V			
VI			
VII			

**II. Extra Curricular Activities (10 Marks) :**

Item Level of Participation	Remarks (Position Obtained)
Indoor Games _____ (Specify the Games _____)	_____

Outdoor Games \_\_\_\_\_  
(Specify the Games) \_\_\_\_\_

Essay Competition \_\_\_\_\_

Scientific Technical Exhibitions \_\_\_\_\_

Debate \_\_\_\_\_

Drama \_\_\_\_\_

Dance \_\_\_\_\_

Music \_\_\_\_\_

Fine Arts \_\_\_\_\_

Painting \_\_\_\_\_

Hobby Club \_\_\_\_\_

N.S.S. \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Hostel Management \_\_\_\_\_  
Activities \_\_\_\_\_  
\_\_\_\_\_

Any other \_\_\_\_\_  
activity (Please \_\_\_\_\_  
Specify) \_\_\_\_\_

**III. Educational tours/visits/Membership of Professional Societies  
(5 Marks)**

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_

**IV. Contribution in NSS Social Welfare Floor Relief/draught relief/Adult Literacy mission/Literacy Mission/Blood Donation/Any other Social Service (5 Marks)**

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_

**V. Briefly evaluate your academic & other performance & achievements in the Institution (5 Marks)**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**VI. Performance in Viva voce before the committee (10 Marks)**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_