

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.**  
**TEACHING & EXAMINATION SCHEME OF S.E. (EC/E&C/E&TC/IE) Effective from July 2007(20**

Sr. No.	SUBJECTS	TEACHING SCHEME (Hours/Week)			EXAMINATION SCHEME (Marks)		
		Theory	Practical	Total	Paper	Term Work	Pract & Or
<b>Part - I (First Term)</b>							
1	Engineering Maths - III	4	---	4	100	---	---
2	Electronics Devices & Circuits - I	4	2	6	100	---	50
3	Network Theory	4	2	6	100	---	50
4	Signals & Systems	4	2	6	100	---	50
5	Data Structure & Num Comp	4	2	6	100	50	---
6	Communication Skills	2	--	2	---	50	---
<b>Total of Part - I</b>		<b>22</b>	<b>10</b>	<b>32</b>	<b>500</b>	<b>100</b>	<b>150</b>
<b>Part - II (Second Term)</b>							
7	Engineering Maths - IV	4	---	4	100	---	---
8	Electronics Devices & Circuits - II	4	2	6	100	---	50
9	Digital Systems	4	2	6	100	---	50
10	Analog Communication Engineering	4	2	6	100	---	50
11	Electrical Machines & Instrumentation	4	2	6	100	50	---
12	Electronics Hardware & Software Workshop	---	2	2	---	50	---
<b>Total of Part - II</b>		<b>20</b>	<b>10</b>	<b>30</b>	<b>500</b>	<b>100</b>	<b>150</b>

Prof.S.D.S

Electronics

## ..ENGINEERING MATHEMATICS-III

(Common for all branches)

Exam Scheme

Teaching Scheme

Theory: 100 marks for three hours

4 Hours/week

**1. Vector Calculus:** Differentiation of vectors. Radial, Transverse, Normal and Tangential components of velocity and acceleration. Scalar and vector point functions, Gradient of a scalar point function, Divergence and curl of a vector function, Solenoidal and irrotational fields. Line integral, Surface integral, Gauss's divergence theorem, Stoke's theorem, Green's theorem. Cylindrical, Spherical polar and Curvilinear coordinates.

**(14 Hours)**

**2. Fourier Transform:** Fourier integral, Fourier sine and cosine integral, Complex form of Fourier integral. Fourier transform. Fourier sine and cosine transform and inverse transform..

**( 6 Hours)**

**3. Linear Differential Equation:** Solution of linear differential equation of  $n^{\text{th}}$  order with constant coefficients. General method, Shortcut methods to find particular integral. Method of variation of parameters, Equations reducible to linear form i.e. Cauchy's and Legendre's form, Solution of simultaneous linear differential equations., Application to civil, Mechanical, Electrical and Electronics Engineering.

**(10 Hours)**

**4. Laplace Transform:** introduction to Laplace transform, Properties and theorems of Laplace transform, Laplace transform of special functions, Bessel's, Periodic, Error function, Heaviside Unit Step Function, Displaced Heaviside Unit Step Function, Dirac-Delta function (impulse function), Inverse Laplace Transform. Methods to find inverse Laplace transform by (i) use of Laplace transform table (ii) use of theorems (iii) use of partial fraction (iv) Convolution theorem. Solution of linear differential equation of  $n^{\text{th}}$  order with constant coefficients and simultaneous linear differential equations by Laplace Transform.

**(10 Hours)**

## **ELECTRONICS DEVICES & CIRCUITS -I**

### **Teaching scheme**

Theory: 4hrs / week

Practical: 2hrs /week

### **Examination scheme**

Paper: 100Marks

Practical: 50 Marks

### **Unit 1:- Semiconductor and its application.**

**08 HRS**

A brief review of following types of diodes, their peculiarities and applications. Rectifiers signal, switching power, tunnel Shockley, Gunn, PIN, P-N JUNCTION DIODE:- V-I Characteristics equation of diode (no derivation), voltage equivalent of temperature, Temperature dependence of V I characteristics. Diode Data sheets & specifications -PIV, IFM surge, I<sub>av</sub>.

### **Unit 2:- BJT.**

**08 HRS**

Transistor current component, configuration of BJT -CB, CE, CC, characteristics, V I expressions, concept of load line & Q point. Need for biasing, different types of biasing - fixed, collector to base, self bias & their analysis in CE mode, bias stabilization, compensation techniques, and Thermal runaway. Analysis for stability factor for different methods.

### **Unit 3:- FET.**

**06 HRS**

Configuration of FET -CD,CG,CS,JFET Data sheet specification -IDSS, V<sub>p</sub>,g<sub>m</sub>, r<sub>d</sub>, RDS OR RD(ON) MOSFETS overview of types of MOSFETS, handling precaution of MOSFETS, MOSFET biasing.Introduction to CMOS Device.

### **Unit 4:- Small signal BJT amplifier BJT**

**06 HRS**

Small signal BJT amplifier BJT as two part device, h-parameter model in CE/CB/CC' configuration, AC equivalent circuits of transistor amplifier, need of coupling & bypass capacitor Analysis of CB/CE/CC amplifier for current gain, voltage gain, Input resistance, output resistance.

### **Unit 5:- Frequency response of FET and BJT amplifier**

**06 HRS**

Frequency response of FET and BJT amplifier, concept of frequency response, Human ear response to audio frequencies, significance of Octave & Decades. The Decibel unit, square wave testing of amplifier, millers theorem, effect of coupling, by pass junction and stray capacitances on frequency response for: BJT and FET amplifiers.

**Unit 6:- High frequency amplifiers.****06 HRS**

High frequency equivalent circuits of BJT & FET amplifiers, hybrid II- equivalent circuit, determination of lower and higher cut off frequencies, effect of junction capacitance. Tuned amplifier, signal tuned, & doubled tuned, stagger tuned amplifiers.

**Practical Examination:**

The practical examination shall consist of writing and performing an experiment / assignment and oral based on the syllabus as per the journal record. Duration of examination is three hours

List of Experiments:

- 1) Diode forward characteristics (plot of I vs. V)
- 2) Input & output characteristics of BJT CE amplifier & determination of h- parameters from the graph. .
- 3) Output characteristics of JFET.
  - i) Plot of transfer characteristics from the output characteristics
  - ii) Determination of pinch off voltage and  $I_{DSS}$ .
- 4) Build & test JFET CS as an amplifier. To find performance for JFET amplifier-  $A_V$ ,  $R_i$ ,  $R_o$ .
- 5) Study of different biasing methods of BJT
  - i) Measurement of input resistance and gain
  - ii) Comparison with calculated values etc.
- 6) Frequency Response: -For BJT and FET single stage amplifiers, effect of unbypassed  $R_E$  &  $R_S$ . Effect of coupling and bypass capacitors on low frequency cutoff
- 7) Study of Tuned Amplifier.
- 8) JFET biasing arrangement graphical method.

## NETWORK THEORY

### Teaching scheme

Theory: 4hrs / week

Practical: 2hrs /week

### Examination scheme

Paper: - 100 Mark (3 hrs)

Practical: 50 Mark (3 hrs)

### Unit 1 : Basic Concepts:

**04 HRS**

Distributed and lumped networks, Practical sources, source transformation, network reduction using Star-delta transformation, Loop and node analysis with linearly Dependent and independent sources for DC and AC networks, coupled networks, dot-convention. !

### Unit 2: Network Topology:

**04HRS**

Graph of network, Concept of a tree and co-tree, incidence matrix, Tie-set & cut-set schedules, formulation of equilibrium equations in Matrix form, solution of resistive networks, principles of duality.

### Unit 3. Network Theorems (Applications to A.C. Networks)

**04 HRS**

Superpositions, Reciprocity, Thevenin's, Norton's Maximum power Transfer and Millman's theorems.

### Unit 4. Resonant Circuits

**06 HRS**

Series and parallel resonance, Variation of Current and voltage with frequency in RLC circuit, frequency-response of series and Parallel circuits, Q-factor, Selectivity with variable frequency, capacitance and inductance, Bandwidth.

### Unit 5 : Transient behavior and initial conditions

**06 HRS**

Behavior of circuit element under switching condition and their representation, evaluation of initial and final convolution integral, Transformed RLC circuits for AC and DC excitations.

### Unit 6 : Laplace Transformation & Applications

**08 HRS**

Solution of networks, step, ramp and impulse functions, waveform synthesis, initial and final values; convolution integral, transformed networks and their solution.

### Unit 7: Two port networks

**04 HRS**

Short circuit admittance parameters, Open circuit impedance Parameters, transmission parameters, hybrid parameters relationship between parameters sets, Interconnection of two port networks.

### Unit 8 : Filters

**04 HRS**

Parameters of a filter, Decibel and neper, propagation constant, classification of filters, basic filter network, cut-off frequencies, constant K-filters, M-Derived filters.

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## Signals and Systems

### **Teaching scheme**

Theory: 4hrs / week

Practical: 2hrs /week

### **Examination scheme**

Paper: - 100 Mark (3 hrs)

Practical: 50 Mark (3 hrs)

### **UNIT-1: Introduction to Signals & systems**

Definition of signal, Classification of signal, continuous and discrete time, analog and digital, periodic and non periodic, deterministic and non- deterministic, energy and power. Basic signals and operations on signals, cosine, exponential, unit step, unit impulse.

Representation of continuous time signals by its sample-Sampling theorem-Reconstruction of a Signal from its samples, aliasing-discrete time processing of continuous time signals; sampling of band pass signals

Sum, product differentials, Even, odd. Time shifting, Time scaling, Different ion and integration.

System: Definition, Classification, linear and non-linear, Time variant and time invariant, casual and non-casual, Static and dynamic, Stability. [8]

### **UNIT -2: System Analysis:**

Introduction to LTI systems. Block diagram and system terminology Convolution integral. Impulse response. Convolution and methods of convolution., Properties of convolution. System interconnections, stability and impulse response of system to standard signals. [4]

### **UNIT -3: Continuous time system and discrete time system Analysis**

Response of LTI system to exponential signals, periodic signals, applications of Fourier series and Fourier transforms to the system analysis.

Analysis of DTS (discrete time systems).

Response of :LTI systems to exponentials discrete signals, discrete time Fourier series, discrete Fourier transforms and its properties, Fast Fourier transform (radix two only) [8]

### **UNIT -4: Correlation, energy spectral density and power spectral density:**

Introduction-correlation and correlogram, the correlation function: Conceptual basis, energy signals, power signals, auto-correlation: relation to signal energy and signal power, properties of auto-correlation, cross-correlation: properties of cross correlation, correlation of Fourier series, energy spectral density: definition and derivation of ESD, Effect of system on ESD, the ESD concept,

relation of ESD to auto-correlation, power spectral density: definition and derivation \lof PSD, effect of .system on PSD, the PSD concept, relation of PSD to auto-correlation, sampling theorem and its proof, effect of under sampling, sampling of band pass signals

[10]

**UNIT -6: Random variables and random process:**

Random variables, discrete random variable, cumulative, distributive function, continuous random variable, probability density function, properties of CDF and PDF .Transformation of random variables, statically averages, mean, moments and expectations, standard deviation and variance chebyshev inequality, multivariate expectations. Probability models, binomial, poisons, Gaussian, Rayleigh. Random process, Esemble averages and correlation functions, Ergodic and stationary process, Gaussian process. Random signals, power spectral density, autocorrelation, superposition and modulation, filtered random signals. [10],

**Practical Examination:**

It shall base on writing and performing an experiment & oral based on the syllabus & journal record. Duration of Examination is 3 hours

**Experiment List:** Perform any Ten programs with the help of any computational software like Mat lab /OCT A VE based experiments

- 1) Program for sampling continuous time signal
- 2) Program for folding, shifting of digital signal
- 3) Program to generate impulse, unit step, ramp, sine wave, exponential signals.
- 4) Program for convolution and correlation
- 5) Program to compute magnitude and phase spectrum of given signal
- 6) Program for Jury's stability criteria
- 7) Program for circular convolution
- 8) Program to study the properties of Fourier transform
- 9) Program for linear convolution using DFT
- 10) Program to. compute impulse response of system
- 11) Program to compute even and odd part of given signal
- 12) Program to compute FFT.

## **Data Structures & Numerical computation**

### **Teaching scheme**

Theory: 4hrs / week

Practical: 2hrs /week

### **Examination scheme**

Paper: - 100 Mark (3 hrs)

Term work: 50 Mark

### **Unit 1: Introduction to data structure, The Stacks& Queues -**

The Arrays as an ADT: Using One-Dimensional Arrays, Using Two-Dimensional Arrays, Using Multi-dimensional Arrays, Definition and Examples, Primitive Operation, The stack as an ADT, The queue and its sequential representation, The queue as an ADT, Basic Definition and examples: Infix, Postfix, and Prefix, Circular Queue, priority queue

[6]

### **Unit 2: Linear Data Structure & their representation**

Definition, concept, operation on linked lists, Circular linked lists

Doubly linked lists, Operations like insertion, deletion, insertion in order, searching, updating, Applications of linked lists such as polynomial manipulation, Comparison of singly linked, circularly linked & doubly linked list

[6]

### **Unit 3: Trees**

Definition, Basic terminology, operation on binary trees, linked storage representation for binary search trees, Basic operation on binary search tree such as creating a binary search tree, searching, tree traversals ,in-order, pre-order, post-order, tree application for expression evaluation & for solving sparse matrices. [6]

### **Unit 4: Graphs.**

Definitions, basic terminology, matrix representation & implementation of graphs, graph travels, DFS, BFS, Shortest path, Spanning tree, Minimum cost spanning trees [6]

### **Unit 5: Sorting & searching**

Different sorting tech, classification on the basis of big-O notation, tech such as straight selection sort, bubble sort, merge sort, quick sort, heap sort, shell sort, radix sort, comparisons between different sorting techniques, Sequential searching, binary.

Searching, height balanced trees 2-3 tree, B trees, B+ trees, [6]

### **Unit 6: Numerical methods:**

Solution of transcendental and polynomial equations bisection method, Newton Raphson, Secant, Successive approximation method,

Solution of linear simultaneous equations using Gauss Elimination, Gauss Jordan

methods, Gauss Seidel method, Interpolation using Newton's forward and backward difference formula, Lagrange's interpolation, Numerical integration and differentiation; Trapezoidal rule, Simpson's  $1/3$  and  $3/8$  rule, Euler's methods, Runge-Kutta methods. [10]

**Term work:**

Term work shall consist of ten programs based on the experiment list.

Assessment of term work should be done as follows:

Continues lab assessments 40%

Actually performing in the lab 40%

Oral examination at the time of submission 20%

Experiment List:

Perform ten programs out of seven is from data structure and three is from Numerical

Commutation with the help of C programming

- 1) Program for implementing Stack and Queue
- 2) Program for implementing Singly Linked and Doubly linked List
- 3) Program for implementing Circular Queue, using Linked List
- 4) Program for creation of binary tree and operation on it
- 5) Program for creation of B-T tree
- 6) Program for Depth First search and Breadth First search
- 7) Program for sorts
- 8) Program for Binary search to search an element in the given sequence
- 9) Program to implement two stacks in the one array
- 10) Program to solve numerical methods: Bisection method, Newton Raphson method using user defined function. Functions should incorporate parameter passing techniques.
- 11) Program using function to solve differential equation by Euler's modified method.
- 12) Program using function to find integration by Simpson's  $1/3$  and  $3/8$  method.

## COMMUNICATION SKILL

**Teaching Scheme:**

**Practical: 2 Hrs/week**

**Exam Scheme**

**Term work: 50 marks**

Course Curriculum

### **Basic Communication Skills.**

- .Communicating with Peers
- .Communicating Formally .Communicating Casually
- .Communicating for Daily Requirements

### **Personality Development**

- .Formal Dressing
- .Casual Dressing
- .Dressing up to the occasion.
- .Interview Dressing
- .Body Language
- .Eye Contact
- .Persona Management'

### **Effective Group Discussion**

- .What is Group Discussion
- .Why are Group discussions Held
- .What is judged I a Group Discussion
- .What are the keys to a successful Group Discussion
- .Different topics for a Group Discussion
- .Different ways or Modules of Group-Discussion

### **Effective Public Speaking**

- .How to deliver an Effective
- .How to involve the public at large
- .Stage Courage
- .Effective crowd alertness and zinc.

### **Art of Effective English Communication**

- .Why is it so important
- .What difference does it make
- .Motivation Therapy
- .New Avenues for improved communication
- .New therapies for inculcating English

### **Presentation for Aptitude Test**

- .What is an Aptitude Test
- .Why are Aptitude Test's Held
- .What is judged in an Aptitude Test
- .What are the keys to a successful Aptitude Test
- .Different areas for an Aptitude Test
- .Different ways or Modules of Aptitude Test

### **English Grammar**

- .Why is Grammar important?
- .What are the different parts of English Grammer?
- .How do we practice it?

### **Interview Techniques**

- .Types of Interviews
- .Why is the Interview Held?
- .What is judged in an Interview?
- .Types and rounds of Interviews
- .Operations Round for an Interview
- .HR Round for an Interview
- Technical Round for an Interview
- .How to express freely and ethically in an Interview? .How to make a resume or a bio-data
- .Things meant to be said in an Interview and vice -versa .How to crack and get an offer from an Interviewer? .Psychological aspects of question,
- .Reading the Interviewers mind.

### **Telephonic Etiquettes**

- How to give telephonic Interviews?
- How to introduce yourself and speak on a call?
- How to speak to anyone on the phone?
- What are telephonic Interviews held for?
- How to crack a Telephonic interview?

### **Mock Call Handling.**

- .What is the benefit of Mock Calls?
- .How does one benefit from the Mock Call sessions?

## **ENGINEERING MATHEMATICS -IV**

Theory Exam: 100 marks  
Theory: 4 hours/week.

Theory Exam Time: 3 hours

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### **1. FUNCTIONS OF COMPLEX VARIABLES**

Introduction, Analytic function, Cauchy Riemann equations in Cartesian and polar form, Harmonic functions, Integration:-Line integral, contour integral, Cauchy's integral theorem, extension and Cauchy integral formula (without proof). Taylor's and Laurent's series (without proof). Singularities, Residues, Cauchy's residue theorem (without proof). Integration along unit circle and along the upper half semicircle, conformal transformation and bilinear transformation. **(14 hours)**

### **2. STATISTICS and PROBABILITY**

Measures of dispersion, moments, skewness and kurtosis.  
Binomial, Poisson's and normal distribution **(6 hours)**

### **3. NUMERICAL METHODS**

Solution of algebraic and Transcendental equations by Newton-Raphson method  
solution of linear simultaneous equations by Gauss Elimination and Gauss-Seidel  
method, Lagrange's interpolation formula, Numerical differentiation "Solution  
ordinary differential equations by Picard's method, Taylor's series method. Eulers  
modified method and Runge-Kutta fourth order method. **(10Hours)**

### **4. APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS**

Solution of partial differential equations by method of separation of variable.  
Application to vibration of string (wave equation), one dimensional heat flow equation.  
two dimensional heat flow equation. **(6Hours)**

### **5. Z- TRANSFORMS**

Z-transform of elementary functions, properties of z-transform (without proof) Inverse z-transform, Solution of difference equation by z-transform.

## ELECTRONICS DEVICES & CIRCUITS-II

### Teaching scheme

Theory: 4hrs / week

Practical: 2hrs /week

### Examination scheme

Paper: 100Marks

Practical: 50 Marks

#### Unit 1:

#### **DIODE APPLICATIONS**

**04HRS**

Voltage multiplier circuits: working & comparison of voltage doublers, Tripler and voltage quadruple configuration. Limitation of voltage multiplier circuits.

#### Unit 2:

#### **WAVE SHAPING AND MULTIVIBRATOR CIRCUITS:**

**04HRS**

RL & RC Integrator & differentiator circuits. Diode clippers, clampers and slicers, collector coupled and emitter coupled astable multi vibrator, monostable multivibrators, calculation of switching times. Trigger methods. Speed up capacitors, Schmitt trigger circuit.

#### Unit 3:

#### **BLOCKING OSCILLATORS AND TIME BASE GENERATORS:**

**08HRS**

Monostable and astable blocking oscillators using emitter & base timing frequency control using core saturation. Push pull operation of astable blocking oscillators i.e. inverters. Pulse transformer UJT saw tooth wave generators. Bootstrap and Miller saw tooth generators. Current time base generators.

#### Unit 4:

#### **FEED BACK AMPLIFIERS AND OSCILLATORS:**

**08HRS**

Concept of feedback. Negative and positive feedback. Classification of amplifiers based; on feedback topology (voltage, current, Transconductance and Transresistance amplifiers.) Transfer gain with feedback advantages and disadvantages of negative feedback. Effect of feedback on inputs and outputs impedances and bandwidth of an amplifier. Analysis of one circuit for each feedback topology.

#### **OSCILLATORS:**

**08HRS**

Oscillators startup mechanism, need for amplitude limiting. Study of oscillators circuit using FET. (Derivations not expected.)

**LC OSCILLATORS:** General form of LC Oscillators. Hartley oscillator, Colpitts oscillators, Clapp oscillators, crystal oscillators, Crystal clock.

#### Unit 5:

#### **POWER AMPLIFIERS:**

**08HRS**

Classification of amplifiers (class A, B, AB, C & D), Efficiency of class A, RC coupled and transformer coupled power amplifiers. Class B, complementary-symmetry, push pull

power amplifiers. calculation of power output, efficiency and power dissipation crossover distortion and methods of eliminating it. Heat flow calculations using analogous circuit. calculation of actual power handling capacity of transistors with and without heat sink, heat sink design .

**Unit 6:**

**08HRS**

**LINEAR VOLTAGE REGULATORS AND VOLTAGE REFERENCES:**

Block schematic of linear regulators. Emitter follower regulator, transistor series regulator and its analysis for performance parameters, three terminal floating, dual and adjustable regulators. Methods of boosting output current using external series pass transistors. Performance parameters load and line regulation, ripple rejection, output resistance and efficiency, protection circuit of voltage regulators. Important data sheet specifications of linear regulators. voltage references, their peculiarities and applications.

**LIST OF PRACTICALS:**

Minimum 8 Experiments be conducted.

1) voltage multiplier circuits-Regulation characteristics & effect of frequency

2) Clipping and clamping circuits I

3) Class A transformer coupled. .

Class B push pull Amplifier

Efficiency calculations.

4) Voltage series, current series feedback amplifier.

5) Voltage shunt and current shunt feedback amplifiers

6) LC Oscillator,

7) Linear voltage regulators-

Floating, Adjustable three terminal regulators, current boosting, CV and CC modes of operation.

8) Study of series pass transistorized voltage regulator.

9) power amplifier class AB complementary symmetry.

10) Astable, monostable & Bistable multivibrator.

11) Triggering methods of multi vibrator.

12) UJT Sawtooth generators. .

13) Bootstrap and Miller saw tooth generator.

## **Digital Systems**

### **Teaching scheme**

Theory: 4hrs / week

Practical: 2hrs /week

### **Examination scheme**

Paper: 100Marks

Practical: 50 Marks

#### **.Unit -1 : Logic Families:**

**08HRS**

Parameter definition: noise margin. Power dissipation, voltage & current parameters, propagation delay. Typical values for TTL, CMOS. & ECL. Input/output profile for TTL & CMOS. TTL logic families -standard TTL, Totem-pole, open collector, Tri-state (concept & application.) Significance of TTL sub families.& MOS families, POMS NMOS (inverter only), CMOS (inverter, AND & NOR). TTL-CMOS/CMOS- TTL interfacing comparison of TTL & CMOS. TTL compatible high speed CMOS series.

#### **Unit-2: Combinational logic circuits-I:**

**04HRS**

Review of Logic gates& number systems, Principal of combinational logic Circuits: canonical forms don't care condition, minimization techniques (K-map up to 4 variables only).Quine-Mc Cluskey method (4 variables). Design example -Code converters Binary to Gray & Gray to Binary, .BCD to 7 segment using IC 7447,7448 & gates.

#### **Unit -3: Combinational logic circuits-II:**

**06HRS**

Multiplexer, Demultiplexer (Trees),multivariable function implementation using MUX & decoder parallel adder,(IC7483). (Trees.)Multivariable function implementation using MUX & decoder, parallel adder, (IC7483). Digital comparator (2-bit, 4-bit using IC 7485), Parity generation & checking(IC74180),Design Methods using MSI ICS,Look ahead carry generator, arithmetic logic unit(IC 74181).

#### **Unit -4: Sequential logic circuit:**

**08HRS**

Study of flip-flop, 1 bit latch clocked S- R flip flop, J - K,M/SJ -K, T and D f/f, race around condition, excitation table, flip flop conversion, flip-flop characteristics. Design of Asynchronous (ripple) counter using flipflop using ICs, 4bit up/down counter (positive & negative edge triggered).

Shift register (modes of operation), 4 bit bidirectional using D/J-K, universal shift register, application of shift registers (Ring counter, sequence generator, Johnson's counter) IC7495/74195.

**Unit -5: Synchronous sequential machines:.**

**06HRS**

Design of synchronous counter using, IC 74191 & others, 4 bit up/down mod N counters. Moore & Mealy machines, representation techniques, state diagrams, state table, state reduction, state assignment, implementation using flip flops, Applications like sequence generator & detection.

**Unit -6: Semiconductor Memories & converter:**

**08HRS**

Memory organization & operation, Expanding memory size, classification & characteristics of memory, RAM, ROM, EPROM, EEPROM, NVRAM, SRAM, DRAM  
Programmable logic devices -Details architecture, study of PROM, PAL, PLA,  
Design combinational circuit using PLDs (code conversion), organization of CPLD & FPGA

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**Practical Examination:**

The practical examination shall consist of writing and performing an experiment/assignment and oral based on the syllabus as per the journal record. Duration of examination is three hours

**List of Particles:**

1. Study of Basic Gates-AND,OR,NOT
2. Operation of adder
3. Operation of subtractor
4. Binary to Gray operation
5. Gray to Binary Operation
6. Multiplexer
7. Demultiplexer
8. Study of Flip-flop
9. Couvters

## Electrical Machines & Instrumentation

### Teaching scheme

Theory: 4hrs / week

Practical: 2hrs /week

### Examination scheme

Paper: - 100 Mark (3 hrs)

Practical: 50 Mark (3 hrs)

### Unit -1:- DC machines

**5 HRS**

DC machines, construction, working principle, (moter/gen), EMF Equation, types of moters, and this chractistics, speed control methods and starters, problems on speed control.

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### Unit -2:- Induction motors,

**05HRS**

There phase induction motor, principle of operation, construction, squirrel, cage and ship ring induction motors, Torque equations, Torque ship chaiacteristics, powerstages ,squd control, efficiency.

### Unit -3 -synchronous motors:

**05HRS**

Principle of operation, starting methods; effect of load, effect of excitation on armature current and power factor.

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### Unit -4:- Special machines.

**05HRS**

Working principle and application of servomotor [DC and AC], stepper motor, variable reluctance type, permanent magnets type and hybrid type]

### Unit -5:- Transducer and Signal conditioning

**08HRS**

Classification of input transducers, selecting a transducer, strain gauges Displacement transducer temperature measurement, photosensitive devices

Need of signal conditioning, Definition, analog and digital signal conditioning circuits (Compatible to port/terminal of TTL IC, CMOS JC) Microprocessor/Micro- controller chips (selection criterion circuits)

### Unit 6: Industrial Security Systems

**04HRS**

Fire, smoke, flame, moving object detection using optical cameras, Sensors transducers, detectors use for fire, smoke and flame(working circuits)

## **Unit 7: Applications**

**08HRS**

Object counter, liquid level indicator, industrial on/off timers, real time clock (RTC), sound level meter, tachometer, thermometer, VAW meter, I/O devices and displays: Recorders-Graphic recorder, Optical oscillograph, X- Y recorder, Magnetic recorders, Data plotters Displays: Incandescent Displays, Cold cathode Display, Florescent Display, LED, LCD, Alphanumeric Displays, Bar graph Displays

### **Experiments :-( Any Four)**

- 1) Speed control of DC motor and reversal of direction.
- 2) Load test on DC shunt motor [T/Iq, TIN, N/fq] characteristics.
- 3) Torque/slip characteristics of 3- $\phi$  induction motor.
- 4) Speed control of 3-phase induction motor
- 5) Load test on 3-phase induction motor.
- 6) Study of various stepper motor.

## **Electronics Hardware & Software Workshop**

Teaching Scheme:

Examination scheme ""

Practical: 2 Hrs/Week

Term work 50 Mark

### **Objective:**

The objective of this workshop is to make the students aware of testing of electronics components and devices, handling equipments and circuit fabrications techniques and Use of applications specific software tools in the design, development, simulation and testing of electronic circuits

Study of passive components: specification, application and simple testing procedure and study of capital IEEE symbols for components/devices.

1) Study of active components like diodes, transistors SCR etc. Study using datasheets and simple testing procedures. Use of analog millimeter and DMM.

2) Explain and demonstrate various types of PCB materials and all types of PCBs like single sided double sided, multilayer and flexible etc.

Overview of PCB design and fabrication, Make a Single sided PCB for a simple circuit such as two stage transistor amplifier/discrete voltage regulator. Do not use computer for art work. Manual layout is expected.

3) Soldering practice should be carried out for the above circuit diagram on general purpose PCBV and fabricated. and test the same.

4) The learnt specification and front panel controls of dual trace oscilloscope for measurement of waveforms of parameters.

5) To learn and use signal generator, power supply and digital multimeter. To understand specifications precautions and limitations for measurement.

6) Built and test a digital circuit on general purpose PCB using digital ICs and verify logic levels.

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Note:

Tool kit should consist of following items

Soldering gun/station, Millimeter, Cutter, Desoldering Gun, Noseplier

Journals should contain collection of specification, datasheets, and photographs

Simulation of typical circuits using circuit's simulation tools such as pSpice, multisim sumulink.

A) Transistorized circuits

B) IC based circuits I

Two stage amplifier

Sequential digital circuits

Series regulators

Combinational digital Ckt. .

Audio Driver/Audio power amplifier

Timer circuits