SUBJECT NO.	SUBJECT	TEACHING SCHEME HRS/ WEEK TH.	PR.	TOTAL	EXAMINATION SCHEME CLASS TEST	TH.	TERM WORK	PR.	TOTAL	DURATION OF THEORY PAPER HRS
	PART – I									
1.	ENGINEERING MATHEMATICS III	4	-	4	20	100	-	-	120	3
2.	INSTRUMENTATION –I	4	2	6	20	100	25	25	170	3
3.	CIRCUIT THEORY	4	-	4	20	100	-	-	120	3
4.	LINEAR INTEGRATED CIRCUITS	4	2	6	20	100	25	25	170	3
5.	DIGITAL ELECTRONICS	4	2	6	20	100	25	25	170	3
6.	COMPUTER GRAPHICS	2	2	4	-	-	25	-	25	
7.	ELECTRONIC WORKSHOP	-	2	2	-	-	25	-	25	
	TOTAL OF PART- I	22	10	32	100	500	125	75	800	
	PART – II									
1.	ENGINEERING MATHEMATICS IV	4	-	4	20	100	-	-	120	3
2.	INSTRUMENTATION – II	4	2	6	20	100	25	25	170	3
3.	ELECTRICAL MACHINES	4	2	6	20	100	25	25	170	3
4.	ELECTRONIC INSTRUMENTATION	4	2	6	20	100	25	25	170	3
5.	FLUID MECHANICS	4	2	6	20	100	25	-	145	3
6.	COMPUTER LABORATORY	-	2	2	-	-	25	-	25	
	TOTAL OF PART – II	20	10	30	100	500	125	75	800	
	GRAND TOTAL OF PART I & II	42	20	62	200	1000	250	150	1600	

FLUID MECHANICS

Teaching Scheme: Theory – 4 Hrs/week, Practical – 2 Hrs/week
Examination scheme: Class Test – 20 marks, Theory – 100 marks, Term work – 25 marks.

1. Properties of Fluid:
Mass density, weight density, specific density, specific gravity, viscosity, compressibility, surface tension &capillarity.

2. Fluid Statics:
Pascal's law, hydrostatic law, and hydrostatic forces on surface: vertical, inclined, curved. Manometers, piezometric head. Introduction to pruoyancy & flotation

3. Fluid Kinematics:
Classification of fluid flow, continuity equation. Rate of flow of discharge, velocity & acceleration of fluid particles, local & convective acceleration, tangential & normal, acceleration , flow patterns ,viscous flow through circular pipe , loss of head due to friction in viscous flow, turbulent flow through pipe , concept of hydrodynamically smooth boundries ,head loss due to friction in rough & smooth pipes.

4. Fluid Dynamics:
Equation of motion, Bernoullis Equation using Euler's Equation of motion, Equation for discharge through Ventury, Orifice, pitot tube, applications, nozzle, hot wire anemometry for magnitude and direction of fluid velocity.

5. Flow Through Pipes:
Pipes & fittings, loss of head in pipeline & fittings, its estimation, hydraulic gradients &total energy line, flow through series, parallel & branched pipes, power transmission through pipes

6. Fluid Transportation & Metering:
Valves & its characteristics, pumps, blowers, fans & compressors.

7. Fluid System:
Introduction to pneumatic systems: components: flapper nozzle amplifier, pneumatic power supply actuators, choice of operating pressure. Introduction to hydraulic systems: basic components, hydraulic ram pressure, and hydraulic intensifier.

Text Books:
1: R.K Bansal; *A Text Book of Fluid Mechanics and Hydraulic Machines:*
2: Dr. Modi & Dr.Seth ; *Hyraulic and Fluid Mechnics Including Hydraulic Machines:*
3: K.L.Kumar;*Engineering Fluid Mechanics:*

Term Work: It shall consists of a record on laboratory experiments/ studies on following (Minimum 6).

1: To find out Reynolds no. experimentally.
2: Flow measurement using through orifice / venture .
3: Losses due to fittings .
4: Flow measurement through straight pipes.
5:Flow measurement through smooth pipes .
6: Flow measurement through rough pipes.
7: Study of pressure measuring devices (manometers & gauges)
8:Study of pneumatic components & circuits.
9: Study of fluid moving machine.
10 : Study of hydraulic components and ckts.

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ELECTRONIC WORKSHOP

Teaching Scheme: Practical – 2 Hrs/week
Examination scheme: Term work – 25 marks.

The students should be able to use different tools used for ckt fabrication and under stand the process of PCB design and testing .Study of different electronic components and various tools used in card level working. Similarly different measuring / testing equipments like CRO , multimeter , function generator , IC tester etc.

1. PCB design technique and mounting ; artwork preparation, etching, tinning, drilling, screen printing , component mounting , leading bending & insertion, testing and soldering / disordering of the jobs.

Reference Book:
1: Booshant : PCB design & technology .

Term Work: It shall consists of a record on laboratory experiments / studies on following (Minimum 2 jobs).

1. Job 1 : Power supply
2. Job 2: Electronic ckts (preferably S.G, LDR ,photodiode thermister , annunciates ,timers etc)
3. Job 3 : Combination (calibration & testing)
   Study of display card is essential it job demands.

LINEAR INTEGRATED CIRCUITS

Teaching Scheme: Theory – 4 Hrs/week, Practical – 2 Hrs/week
Examination scheme: Class Test – 20 marks, Theory – 100 marks, Practical – 25 marks, Term work – 25 marks.

1. Introduction to Operational Amplifiers:
Block diagram representation of a typical op amp . Analysis of typical op-amp equivalent ckt. Types of integrated ckts. Manufacturers designation for IC's . Development of IC's .Package types of IC's . Device identification , interpreting a typical set of data sheets . Ideal op-amp , ideal voltage transfer curve , p & pice simulation .

2. An Op-amp with Negative Feedback:
Block diagram representation of feedback configurations . Voltage series feedback amplifier, Voltage shunt feedback amplifiers , Differential amplifiers.

3.The Practical Op-amp :
Input offset voltage , input bias current ,input offset current , total output offset voltage , thermal drift effect of variation in power supply voltages on offset voltage , change in input offset voltage & current with time , temperature & supply voltage . Sensitivity parameters , noise, CMRR .

4. Frequency Response of an Op-amp:
Frequency response , compensating networks , frequency response of internally compensated op-amp , frequency response of non-compensated op-amps , high frequency op-amp equivalent ckt , open loop voltage gain as a function of frequency , closed loop frequency response , circuit stability , slew rate .

5. General linear applications:
DC & AC Amplifiers , AC amplifiers with a single supply voltage , Peaking amplifier , Summing , Scaling , & averaging amplifiers ,Instrumentation Amplifier , Differential input & differential output amplifier .
Voltage to current converter ,Current to voltage converter , The Integrator , the differentiator.

6. Active filters and oscillators :
Introduction , First order low pass butterworth filter ,first order high pass butterworth, filter second order butterworth filter , band pass filter ,band reject filters , all pass filters .
Oscillators : principle types , frequency stability , phase shift , wein bridge quadrature oscillators ,square wave , triangular wave , saw tooth wave generators , voltage controlled oscillators .

7. Comparators & Converters :
Basic comparator & its characteristics types and applications , zero crossing detector ,schmitt trigger , v/f & f/v converters , window detectors , clippers & clampers , absolute value output ckt , peak detector ,sample and hold ckt .

8. Specialized IC Applications:
Phase lock loops , power amplifiers , voltage regulators , voltage inverters & its applications.

Text Books:

1. Ramakant Gaikwad ;*Op-amp and integrated circuits technology: Prentice Hall of India 4th Ed.*
2. Botkar ; *Integrated ckts:*
3. D.Roy Choudhary Shail Jain; *linear integrated ckts : New age international (P) ltd.*

Reference Books:

1. Dricoll Conyhlin; *Integrated ckts:*
2. Clitin G.B.;*Operational amplifier:*

Term Work: It shall consists of a record on laboratory experiments/ studies on following (Minimum 6).

1: Non Inverting amplifier with feedback .
2: Inverting amplifier with feedback.
3: Differential amplifier with feedback.
4: Measurement of opamp parameters.
5: AC Inverting amplifiers.
6: Instrumentation amplifier.
7: First or low pass and high pass filter.
8: Comparators and Schmitt trigger.
9: Precision rectification using IC 741
10: IC 555 timer as a monostable and astable multivibrator
11: IC 7805 or 7905 as voltage regulator.
12: Logarithmic amplifier .
13: Oscillators using opamp .
14: Application of divider ckt (any1).
15: Pspice simulation.

Practical examination: The practical examination shall consist of performing an experiment based on practical work done during the course, the record of experiments submitted by the candidate and viva – voce based on syllabus . The duration of practical examination shall be three hours.

ELECTRICAL MACHINES

Teaching Scheme: Theory – 4 Hrs/week, Practical – 2 Hrs/week
Examination scheme: Class Test – 20 marks, Theory – 100 marks, Practical – 25 marks, Term work – 25 marks.

1.D.C.Machines:
Construction features, EMF equation, Shunt, Series, Compound generator, Characteristics, Motor operation, Torque equation, Characteristics of different motors, Starting methods, Speed control, Efficiency and applications. 08

2.Synchronous Machines:
Generator operation, Synchronous motor construction and theory of operation, synchronization, Hunting, Synchronous Capacitance. 05

3.Induction Motor:
Classification, General principle of production of rotating field, Motor operation, Emf equation, Torque speed characteristics, Starting and speed control, starters DDL, STAR, DELTA. 07

4.Single Phase Induction Motors And F.H.P. Motors:
Types, Construction, Characteristics of capacitor start and capacitor run motor, Universal motor, Shaded pole motor, Reluctant motor. 06

5.Alternators:
Basic principle , Construction, Star and delta connections, Equation of induced emf, Alternator on load. 04

6.Synchronous Motor:
General principle, Method of starting, different excitations, Effect of loads,Torque, Power developed, comparison between synchronous and induction motor. 06

7.Miscillneous:
Secondary batteries, Introduction to electromagnetic relay, Single line diagram of generation, Distribution, Transmission, Electrical heatings, Transformer connections. 06

Text Books:

1. V.N.Mittal;*Basic Electrical Engineering:*
2. Hussain;*Elected Machines:Pub: Dhanapat Rai & sons.*
3. P.S.Bhimra ;*Electrical Machines:*

Reference Books:

1. Theraja ; *Electrical Technology:Vol.II-B.L.*
2. M.V.Deshpande ;*Elements of Electrical Machines : Pub: P.V.G. Prakashan, Pune-30*
3. R.K.Rajput;*A.C. & D.C. Machines:Pub:Laxmi Publication, New Dehli*

Term Work: It shall consists of a record on laboratory experiments/ studies on following (Minimum 6).
1.Load test on d.c. shunt motor
2.Speed control of d.c. shunt motor
3.Load test on d.c. series motor
4. Magnetisation characteristics of d.c. machines
5.Study of d.c. motor starters

6.Load on slip ring induction motor
7.Study of a.c. motor starter (any two)
8.Study of storage batteries (any two)
9.Plotting V-curves of synchronous motor on no load.

Practical examination: The practical examination shall consist of performing an experiment based on practical work done during the course, the record of experiments submitted by the candidate and viva – voce based on syllabus . The duration of practical examination shall be three hours.

CIRCUIT THEORY

Teaching Scheme: Theory – 4 Hrs/week
Examination scheme: Class Test – 20 marks, Theory – 100 marks.

1.Network Variables And Elements:
Introduction, Network model, Network variables, Network elements active and passive. Resistor, Inductor, Capacitor, Mutual inductance, Dot convention, Energy consideration in the magnetically coupled coils, Duality, Network topology. 10

2.Network Equations:
KVL, The no. of network equations, Source transformation, Examples of the formulation of network equations, Loop variable analysis, Node variable analysis, Network theorems applicable to a.c.networks. 06

3.Initial Conditions In Networks:
Study of initial conditions, Initial conditions in elements, Geometrical interpretation of derivatives, Procedure for evaluating initial conditions, Initial state of Networks, first and Second order differential equations, Internal excitation.
04

4.The Laplace Transform:
Introduction, Laplace transforms, Basic Theorems, Examples, Practical fraction expansion, Examples. Transforms of unit step, Ramp, Impulse waveform synthesis, Initial and final value of F(t) from F(s) Convolution integral, Convolution of a summation.
08

5.Network Functions:
Concept of complex frequency, Transform impedance and transform circuits. Terminal port, Network functions for one port and two port, Calculations of network functions ladder, General network stability of active network, Two port parameters, short circuit admittance parameters, Open circuit parameters 08

6.Fourier Series And Fourier Transform:
Fourier series Evaluation of Fourier coefficient, Waveforms symmetries as related to Fourier series, Convergence in truncated series, Exponential form of Fourier series , Steady state response of periodic signals. Relationship of Furies series and Laplace .Transform ., Spectrum of envelope for recurring pulse, Fourier integral and transform.
06

Text Books:

1. S.Gupta;*Network System & Analysis: Pub:S.Chand & Company*
2. D.Roy,Choudhary;*Networks & systems:New age international publishers*

Reference Books:

1. M.E.Van Valenken Brug; *Network Analysis:Third Edition-PHI*
2. N.C.Jagan;*Network Theory: Second Edition-BSP Publication*
3. Umesh Sinha; *Network Analysis:*

COMPUTER GRAPHICS

Teaching Scheme: Theory – 4 Hrs/week, Practical – 2 Hrs/week
Examination scheme: Class Test – 20 marks, Theory – 100 marks, Practical – 25 marks, Term work – 25 marks.

1. INTRODDUCTION:
Importance of computer graphics, computer graphics hardware, operating system and programming language, Applications of CG for e.g simulation. (2)

2. OVERVIEW OF GRAPHICS SYSTEM:
Raster scan displays, Random scan displays, Color CRT monitors I/P devices - Keyboards, mouse, image scanners, touch panels.Hard copy devices printer, plotters. (4)

3. GRAPHICS PROGRAMMING:
Introduction to 'c'graphics environment, Built in graphics functions used in 'c' language. (4)

4. 2D GRAPHICS:
Introduction, mathematics of 2D graphics, 2D transformations – translation, scaling, rotation, reflection. Windowing, view port and clipping. (4)

5.3D GRAPHICS:
Three dimensional display methods, 3D transformations – translation, scaling, rotation, fractals. (4)

6.COMPUTER ANIMATION:
Design of animation sequences , morphing.

Text Books:

Reference Books:

1. R . G . S Asthana , N . K . sinha;***C****omputer Graphics: (second edition)*
2. Donald Hearn, M. Pauline Baker;*Computer Graphics (second edition)*
3. Yashvant Kanetkar;*Let us 'c'*

Term Work: It shall consists of a record on laboratory experiments/ studies on following (Minimum 6).

a) minimum six experiments based on above syllabus.
b) Miniproject based on any one of the following
    1) Simulation of liquid level control system.
    2) Simulation of flow control system.
    3) Simulation of pressure control system.

Practical examination: The practical examination shall consist of performing an experiment based on practical work done during the course, the record of experiments submitted by the candidate and viva – voce based on syllabus . The duration of practical examination shall be three hours.

INSTRUMENTATION – I

Teaching Scheme: Theory – 4 Hrs/week, Practical – 2 Hrs/week
Examination scheme: Class Test – 20 marks, Theory – 100 marks, Practical – 25 marks, Term work – 25 marks.

1. Introduction to Instruments and their representation:

Introduction, Applications of the instrument systems, Functional elements of measurement system, static & dynamic characteristics of instrumentation systems, Primary sensing element & their classification, selection criteria of transducers, zero, first, second order instrument. (06)

2. Displacement & speed measurement:

Pontentiometric, LVDT, RVDT, capacitive, piezoelectric methods, for displacement and photoelectric, magnetic & stroboscopic methods for speed measurement Calibration of displacement & speed measurement (06)

3. Velocity, Acceleration & Vibration Measurement:

Tachometers, Seismic Transducers, Vibrometers, Accelerometers. (04)

4. Force & Torque Measurement:

Strain Gauges, Types, Proving Rings, Hydraulic, Pneumatic, Electric Load Cells, Dynamometers Introduction to gyroscope, Types, Application Calibration of force, torque measurements and its different methods. (06)

5. Pressure Measurement:

Introduction, Types of Manometers, Elastic transducers, capacitive & resistive transducers, High & low (Vacuum) pressure measurement, calibration of above transducers. (04)

6. Optical Transducer:

Sources of light, photoemmisive cell, photo multiplier tube, photoconductive, photovoltaic cells, photodiodes, Photo Transducers, opt couplers, their types, IC MCT2E & fiber optic Transducers, Photometric measurement, Calibration of optical transducer. (04)

7. Biomedical Transducers:

Typical requirements of transducers for biomedical applications, construction working, of electrodes, PH Electrodes, Electro-physiological measurements, use of strain gauge, piezoelectric, photo sensor for measurement of respiration rate and pulse rate Calibration of biomedical transducer. (04)

8. **Metrology:**

Elements of Engineering Measurement, Abbas & Taylor's Principle, theory of limits & fits and their selection, Screw thread measurement, gear profile measurement, absolute & comparative measurement & measuring principle, Alignment testing, use of auto – collimators, design & use of limit gauges, screw & slip Gauges. (06)

Text Books:

1) R. K. Jain; Mechanical *Measurement:*
2) Patranabis;*Principle of industrial Instrumentation:*
3) R.S. Khanpur;*Handbook Biomedical Instrumentation:*
4) P. Bentaly,Longmen Publishes ; *Principle of measurement Systems*

Reference Books:

1) B. C. Nakra, K. K. Chaudhary;*Instrumentation measurement and analysis: Tata. Mc. graw Hill publishing company Ltd*
2) C.S. Rangan, G.R. Sarma, VSV Mani;*Instrumentation devices & systems: (2nd Edition)*
3) A. K. Sawhney,Dhanpat Rai;*Electrical & electronic Measurement:*
4) D V S Murthy;*Transducers & instrumentation:*
5) Doblin*; Measurement Systems*

Term Work: It shall consists of a record on laboratory experiments / studies on following (Minimum 6).

1) Angular Displacement using capacitive transducers.
2) Speed measurement using photoelectric, magnetic, stroboscopic method (any two)
3) Study of Strain measurement
4) Study of torque measurement
5) Study of pressure measurement
6) Displacement using LDR
7) Force measurement using strain gauges
8) Study of biomedical electrodes
9) PH measurement
10) Vibration measurement using piezoelectric

Practical Examination: The practical examination shall consist of performing an experiment based on practical work done during the course, the record of experiments submitted by the candidate and viva – voce based on syllabus. The duration of practical examination shall be three hours.

INSTRUMENTATION –II

Teaching Scheme: Theory – 4 Hrs/week, Practical – 2 Hrs/week
Examination scheme: Class Test – 20 marks, Theory – 100 marks, Practical – 25 marks, Term work – 25 marks.

1.Flow Measurement:
Construction & Working of FM, Classification of flow meters, Orifice & Nozzles, venturi, pitot tube, rotameters, anemometers , electro magnetic flow meters , turbine meter, impeller meters ,Ultrasonic flow meter,comparisions advantages, disadvantages, specifications, Calibration of all meters (procedure). (08)

2. Temperature Measurement:
Scales, methods, Non-electrical, Electrical, Radiation methods, Temp ICs AD 590, LM 335, AD 594, LM 341 Calibration of thermometers, comparisons. (06)

3. Transducers for Viscosity, humidity, density measurement and calibration procedure for above measurement. (06)

4. Liquid Level Measurement:
Types, Electrical Mechanical ultrasonic methods, comparison of different methods, calibration of liquid level measurement. (06)

5. Digital Transducers:
Hall effect, Proximity, optical encoders, calibrations of Digital Transducers. (03)

6. Acoustics measurement:
Introduction, Characteristics of Sound , Sound pressure & power levels, loudness, Typical sound measurement, calibration of acoustic measurement. (04)

7. Ultrasonic Transducers:
Generation, Ultrasonic, methods for measurement, Distance, Thickness, Flaw detections, Calibration procedure. (04)

8. Smart transducers:
Introduction, types, two wire, four wire introduction to 0 –5v, 4- 20 mA,3 –15 psi, standards in transmitters. (02)

9. Nuclear Instrumentation:
Introduction, scintillation, GM tubes. (02)

Text Books:

1. Patranabis;*Principle of industrial Instrumentation*
2. P. Bentaly;*Principle of measurement Systems:Longmen Publishes*
3. Doblin;*Measurement Systems*

Reference Books:

1. B. C. Nakra, K. K. Chaudhary;*Instrumentation measurement and analysis: Tata. Mc. graw Hill publishing company Ltd*
2. C.S. Rangan, G.R. Sarma, VSV Mani; *Instrumentation devices & systems (2nd Edition)*
3. A. K. Sawhney,Dhanpat Rai;*Electrical & electronic Measurement*
4. D V S Murthy;*Transducers & Instrumentation*

Term Work: It shall consist of a record on laboratory experiments/ studies on following (Minimum 6).

1. Temperature measurement – Using RTD, Using Thermocouple, Using Thermister, Using ICs
2. Flow measurement- Using Orifice, Using venture, Using Rotameter
3. Study of microphones
4. Study of sound level meters
5. Study of level (mechanical, electrical methods)
6. Study of optocoupler
7. Study of proximity
8. Distance measurement using Ultrasonic methods
9. Study of viscometer

Practical Examination: The practical examination shall consist of performing an experiment based on practical work done during the course, the record of experiments submitted by the candidate and viva – voce based on syllabus. The duration of practical examination shall be three hours.

ELECTRONIC INSTRUMENTATION

Teaching Scheme: Theory – 4 Hrs/week, Practical – 2 Hrs/week
Examination scheme: Class Test – 20 marks, Theory – 100 marks, Practical – 25 marks, Term work – 25 marks.

1. Measuring system , Standards of measurement & unit :
Classification of instruments , statically analysis of error in measurement system , fundamental & derived units , standards of mass length , time , frequency, luminous intensity, temp, resistance, capacitance, inductance & emf . (06)

2. Measuring Instruments (D.C.)
Damping ,Support, scales , basic meter movement ,torque & deflection of the galvanometer , Tout Band Instrument , Ammeter ,Voltmeter , Ohm meter , millimeters , multirange ammeter , multirange voltmeter , shunt & multipliers , Calibration of voltmeter & ohmmeter.

3. Measuring Instrument (A.C.)
Moving Iron type instrument, Electrodynamometer type ammeter , voltmeter , wattmeter , power factor meter ,frequency meter , megger meter for measurement of insulation ,LCR & Q-meter. (04)

4. D.C. Bridges:
Whetstones Bridge ,design arrangement of ratio arms , loading of precision resistance bridge , sensitivity , analysis by Thevenins theorem , error in bridge ckt , Kelvin bridge , applications of bridges ,bridge controlled ckts ,guarded wheat stones bridge and numericals. (04)

5 . A.C Bridges:
General form of AC Bridges , detectors used &its applications ,Maxwells bridge , Hay's bridge ,Schering bridge ,Wein bridge ,Resonance bridge , precautions to be taken while using a bridge. (04)

6 . Displays & Recorders :
Classification of displays , display devices ,LED ,LCD & other displays . Strip chart recorder , Galvanometer type recorder ,Null type recorder , Circular chart recorder ,X-Y recorders , Magnetic recorders , Comparison of recorders. (04)

7. Oscilloscope:
CRT , Construction and principle of operation , Vertical and Horizontal deflection systems ,Dual trace oscilloscope ,Storage oscilloscope , Measure of frequency ,Capacitance ,Inductance &Phase using CRO , Applications and Precautions of operation ,Digital storage oscilloscope .
Delay line ,Trigger sweep CRO , Front panel ,Dual beam , Standard Specifications of single and double beam , probes ,attenuators .

8. Potentiometers :
DC Potentiometers ,basic ckts , Multirange potentiometers ,constructional details of potentiometers .Types of potentiometers, Application, C.T., P.T.

9. Signal Generator: Introduction, Basic standard signal generator, Basic wave analyzer, Specification analyzer, Frequency analyzer.

Text Books:

1. A.K.Sawhney;*Electrical & Electronic Measurement*
2. Cooper;*Electronic Instrumentation & Measurement:*
3. H.S.Kalsi;*Electronic Instrumentation:*

Reference Books:

1. R.A.Barapte; *Electronics Instrumentation & Measurement:*
2. S.K.Singh; *Industrial Instrumentation & Control:*
3. N.V.Suryanarayana; *Electrical Measurements and Measuring Instruments:*
4. Rajendra Prasad; *Electrical Measurements and Measuring Instruments:*
5. A.J.Bouwens; *Digital Instrumentation:*

Term Work: It shall consists of a record on laboratory experiments/ studies on following (Minimum 6).

1. Measurement of Resistance.
2. Measurement of Inductor
3. Measurement of capacitance
4. Study of PMMC construction & working
5. Study of multimeter
6. Measurement of Insulation using mugger
7. Study & comparison of at least two DC bridges
8. Study & comparison of at least two AC bridges
9. Study of at least one of the recorder.
10. Measurement of frequency & phase using CRO
11. Study of potentiometer measurement

Practical Examination: The practical examination shall consist of performing an experiment based on practical work done during the course, the record of experiments submitted by the candidate and viva – voce based on syllabus . The duration of practical examination shall be three hours.

COMPUTER LABORATORY
(COMPUTER ORIENTED NUMERICAL METHODS)
LIST OF EXPERIMENTS

Any 10 programs from the list given blow:

1. Bisection method.

2. False position method.

3. Newton–Raphson method.

4. Secant method.

5. Gauss elimination method.

6. Gauss-seidal method.

7. Jacobi's method.

8. Newton forward difference interpolation.

9. Newton backward difference interpolation.

10. Lagrange's interpolation.

11. Fitting a straight line.

12. Fitting a parabola.

13. Trapezoidal Rule.

14. Simpson's 1/3 Rule.

15. Simpson's 3/8 Rule.

16. Taylor series method.

17. Euler's simple & modified method.

18. Runge-Kutta 2^{nd} & 4^{th} order method.

DIGITAL ELECTRONICS

Teaching scheme: Theory - 4 Hrs/week
Practical - 2 Hrs/week

Examination scheme: Class Test - 20 marks
Theory- 100 marks, Practical - 25 marks,
Term work - 25 marks

Number systems and codes: Binary, Octal, Hexadecimal number systems, their conversion to decimal numbers, excess 3 code, ASCII code, Gray code (3)

Digital logic : The basic gates, boolean algebra, positive and negative logic (3)

Arithmetic Circuits : Binary addition, subtraction, unsigned binary numbers,sign magnitude numbers, 2's complement representation, 2's complement arithmetic**,** adders and subtractors.

Combinational Logic circuits : Boolean laws and theorems, sum of product methods, truth table to Karnaugh map, K map simplification, don't care conditions, Product of sums method, Product of sum simplification. (5)

Data Processing circuits : Multiplexers, demultiplexers, decoders, 7 segment decoders, encoders, parity generators and checkers, Programmable logic arrays (4)

Flip Flops: 1 bit memory cell, S-R, J-K, T type flip flops, excitation table flip- flops, clocked flip-flop design, edge triggered flip-flops, applications of flip-flops. (4)

Sequential Logic design : Registers, applications of shift registers, Ripple or asynchronous counters, synchronous counters, clocked sequential circuit design. (5)

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Timing circuits : Application of logic gates in timing circuits, OP-AMP and its applications in timing circuits, Schmitt Trigger, 555 Timer, Monostable and Astable multivibrator using 555 IC. (4)

Memory : Magnetic memory, Memory addressing, ROM, PROM, EPROM, SRAMs, DRAMs, Testing semiconductor memory. (4)

Digital Integrated Circuits : Switching circuits using BJT, MOSFET, TTL parameters, open collector gates, three state TTL devices, external drive for TTL loads, TTL driving external loads, CMOS characteristics, TTL to CMOS interface, CMOS to TTL interface. (4)

Text books:

1. Leach and Malvino; *Digital Principles and Applications*: Tata McGraw- Hill
2. R.P.Jain*; Modern Digital Electronics*: Tata McGraw- Hill
3. Douglas Hall;*Digital Circuits and Systems*: McGraw- Hill

Term Work :

It shall consists of a record on laboratory experiments/ studies on following (Minimum 6)
Study of logic gates
Study of NAND/NOR gates as Universal gates
Study of Half/Full adder/ subtractor
Study of multiplexer / demultiplexer
Study of flip-flops
Study of shift register
Study of synchronous/asynchronous counter
Study of code converter
Study of multivibrators
Study of Magnetic memory/ RAM/EPROM

Practical Examination :

The practical examination shall consists of performing an experiment based on practical work done during the course, the record of experiments submitted by the candidate and viva voce based on the syllabus.