1. FUNDAMENTALS OF ELECTRICAL ENGINEERING
Dc And Ac Series And Parallel Circuits - Kirchhoffs Law - Network Graph - Matrix Representation - Solution Of Steady State, equations - transients in AC networks - Network theorems, super position, reciprocity, Thevenin and Norton’s theorems, Maximum power transfer theorem, star delta transformation - frequency response of RL, RC, RIC series and parallel circuits - solutions of balanced and unbalanced 3 phase circuits.

2. ELECTRICAL MACHINES
Constructional features of DC Machines, emf equation and characteristics of different types of DC generators - DC motor - torque equation - DC motor characteristics - starters of DC motors speed control of DC motors - testing of DC motors - alternators - different types - constructional features - emf equation - regulation of alternators by different methods - phasor diagram - expression for power developed as a function of torque angle - synchronous motors - principle of operation - v and inverted v curves - starting methods - stepper motors - principle of operation - polyphase induction motors - principle of operation phasor diagram and equivalent circuit - starting and speed control - single phase induction motor - principle of opetation and applications - transformers - principle of operation and construction of types different of single phase and three phase transformers - regulation, efficiency and all day efficiency.

3. CONTROL SYSTEMS

4. GENERATION TRANSMISSION AND DISTRIBUTION
Sources of energy - power plants - hydroelectric - nuclear - thermal - layout - storage schemes - turbines - hydroelectric and steam - interconnected systems - cost evaluation - nuclear reactors - fuel materials - coolant - comparison and detection of different types of power plants - transmission lines - performance - short and medium - corona - insulators - transmission towers - underground cables - distribution - feeders - distributors and service main - comparison of distribution system - radial and ring distributors - calculation of voltages and distributors with concentrated and distributed loads.

5. PROTECTION AND SWITCH GEARS

6. BASIC ELECTRONICS
7. DIGITAL TECHNIQUES
Number systems used in Digital electronics - weighted binary codes - non weighted codes - error
detection and correction, alpha numeric codes, BCD - development of Boolean algebra - truth functions -
reading boolean expression - Boolean expansions and logic diagrams - Minterms - tables and maps -
solving digital problems - Map reduction techniques - sum of products from hybrid function - multiple
out put minimizations - tabular minimisations - sequential logic - flip/flops - digital counter - ripple
counter - logic gates - multiplexers, demultiplexers and decoders, code converters - arithmetic
functions - shift registers - semi conductormemory elements - PLA.

8. NETWORK ANALYSIS
One port and two port networks - driving point impedance and admittance of one port network - open
circuit impedance and short circuit admittance of two port network - transfer impedance and
admittance - A,B,C,D parameters - impedance matching - filters - characteristic of ideal filters - low
pass and High pass filters - attenuation and phase shift - bandpass filter - elements of network
synthesis - realiability of one port, hurwitz polynomical positive real function - necessary and sufficient
conditions for positive real function - testing a positive real function properties - synthesis of RL RC
and LC driving point impedances.

9. ELECTRICAL MEASUREMENTS
Measurement of voltage and current - permanent magnet moving coil and moving ion meters -
dynamometer type - thermocouple and rectifier type; e instrument of power and energy - dynamometer
type wattmeter and induction type energy meter - single phase and three phase - testing and
calibration of energy meter - power factor meter - magnetic measurement - ballistic galvanometer and
fluxmeter - BH curve - permeability measurement - current and voltage transformers - use of
instrument transformers with wattimeters - KVA and KVAR metrts - maximum demand indicators -
Megger.

10. ELECTRONIC MEASUREMENTS
BJT, FET and MOSFET voltmeters - solid state multimeter - DMM - audio and Radio frequency signal
generators - AM signal generator - function generator - wave analyzer - spectrum analyzer - frequency
measurement - measurement of period and time - phase angle measurement - bridge type of
measurements - recording instruments - display instruments - general purpose oscilloscope -
multitrace display - digital storage - sampling oscilloscope - sychroscope.

PAPER - II

1. MEASUREMENT SCIENCE
Static characteristics of measuring instruments - accuracy, precision senitivity, non -linerarity,
hysteresis - dynamic characteristics - I order and II order instruments - Standards and calibration -
errors and error analysis.

2. TRANSDUCERS
Variable resistance transducers - potentiometer, strain gauge RTD, thermistor, hygrometer - Variable
inductance transducers - LVDT - variable reluctance accelerometer - variable capacitance transducers
for differential pressure, sound and thickness measurement - piezoelectric transducer - smart
tranaducers.

3. MECHANICAL MEASUREMENTS
Characteristics of instruments for measurement of displacement, velocity, acceleration, force, torque
and vibration.

4. INDUSTRIAL INSTRUMENTS
Temperature measurement - thermocouples, cold-junction compensation for thermocouple, radiation
and optical pyrometers - pressure measurements - bourdon gauge, bellows, diaphragme, differential
pressure transmitter, vacuum gauges, melead gauge, prani gauge - flow measurement - office meter,
venturimeter, electro magnetic flow meter, ultrasonic flow meter, rotameter positive displacement
meters,mass flowmeters.
5. ANALYTICAL INSTRUMENTS
Measurement of pH, viscosity and density - Gas chromatography - UV and IR spectrophotometers, single beam and dual beam spectrophotometers.

6. PROCESS CONTROL
Basic control actions - on - off, P, I, D, P + I, P + D and p + I + D control actions - electronic and pneumatic controllers - feed forward control, ratio control and cascade control - control valves - computer control of process - z transforms.

7. BIO MEDICAL INSTRUMENTS
Measurement of biological signals - ECG, EEG, EMG - blood pressure and blood flow measurements - defibrillators - pace maker.

8. TELEMETRY
Wired telemetry - Radio telemetry - analog modulation - time division multiplexing and frequency division multiplexing - PAM and FM transmitters - digital modulation - PCM transmitters - Demultiplexing - receivers - fibre optic transmitters and receivers.

9. MICRO PROCESSORS AND MICRO CONTROLLERS
8 bit microprocessors - 8085 and z80 - Architecture, programming and interface devices - 16 bit microprocessor 8088 - Micro controllers, 8031 and 8051 Microprocessor based instruments.

10. LOGIC AND DISTRIBUTED CONTROL
Direct digital control - supervisory control - SCADA - programmable logic control - I/o module, PLC programming, ladder diagram - distributed control system - configuration, operator station, displays, communication in DCS, protocols, field bus.