ELECTRICAL ENGINEERING

4th SEMESTER

THEORY – 1

ENERGY CONVERSION – I

Total Period – 75 | Examination : 3 Hours

Theory – 04 p / week | Total Marks : 100

Tutorial -01 p / week | Theory – 80, IA – 15 + 5

A. RATIONALE

The application DC generators and motors in modern industries are still in practice. The electrical technicians have to look after the installation, operation and control of such machine. So the knowledge of these machines is felt essential. The subject energy Convertion-1 deals with DC machines and transformers. Transformers of various voltage ratios and KV/, ratings are in wide use in industries as well as in distribution and transmission. So an early knowledge of the technicians about transformersis necessary for which it is dealt with broadly in the fourth semester syllabus.

B. OBJECTIVES

1. To acquire knowledge of construction, and control of the DC machines.
2. To acquire knowledge of performance of DC machines and transformers of all types.
3. To acquire knowledge of testing and maintenance of transformers DC machines.

C. TOPIC WISE DISTRIBUTION OF PERIODS

Sl. No.	Topic	Periods
1.	DC GENERATORS	16
2.	DC MOTROS	16
3.	SINGLE PHASE TRANSFORMER	16
4.	AUTO TRANSFORMER	05
5.	THREE PHASE TRANSFORMER	07
	Total	**60**

D. COURSE CONTENT IN TERMS OF SPECIFIC OBJECTIVES

1. D.C Generator

1.1. Explain principle of operation
1.2. Explain Constructional feature
1.3. Armature winding, back pitch, Front pitch, Resultant pitch and commutator pitch.
1.4. Simple Lap and wave winding (problems on winding diagram)
1.5. Explain Different types of D.C. machines Shunt, Series and Compound machine with problem solving methods.
1.6. Explain Armature reaction in D.C. machine & commutation.
1.7. Explain Methods of improving commutation (Resistance and emf commutation)
1.8. Explain role of inter poles and compensating winding. (solve problems)
1.9. Characteristics of D.C. Generators with problem solving methods and uses of different types of D.C. Generators.

1.10. Concept of critical resistance causes of failure of development of emf.
1.11. Explain losses and efficiency of D.C. machines, condition for maximum efficiency and numerical problems.
1.12. Explain parallel operation of D.C. Generators. (solve problems)

2. D. C. MOTORS

2.1 Explain D.C. Motor principle
2.2 State Significance of back emf in D.C. Motor.
2.3 Derive voltage equation of Motor
2.4 Derive torque (Equation of Armature Torque and shaft Torque) (solve problems)
2.5 Explain performance characteristics of shunt, series and compound motors and their application. (solve problems)
2.6 Explain methods of starting shunt, series and compound motors, (solve problems)
2.7 Explain speed control of D.C shunt motors by
  2.7.1 Flux control method
  2.7.2 Armature voltage (rheostatic) Control method.
  2.7.3 Solve problems
2.8 Explain speed control of series motors by Flux control method and series parallel method.
2.9 Explain determination of efficiency of D.C. Machine by break test method.
2.10 Explain determination of efficiency of D.C. Machine by Swibburne's Test method.
2.11 Explain Losses & efficiency and condition for maximum power and solve numerical problems.

3. SINGLE PHASE TRANSFORMER

3.1 Explain working principles.
3.2 Explain Transformer Construction – Arrangement of core & winding in different types of transformer – Brief ideas about transformer accessories such as conservator, tank, breather explosion vent etc.
3.3 Explain types of cooling methods
3.4 State the procedures for Care and maintenance
3.5 Derive EMF equation
3.6 Voltage transformation ratio
3.7 Explain Transformer on no load and on load phasor diagrams.
3.8 Explain Equivalent Resistance. Reactance and Impedance.
3.9 Explain phasor diagram of transformer with winding Resistance and Magnetic leakage.
3.10 Explain Equivalent circuit and solve numerical problems.
3.11 Calculate Approximate & exact voltage drop of a Transformer.
3.12 Calculate Regulation of various loads and power factor.
3.13 Explain Different types of losses in a Transformer. (solve problems)
3.14 Explain Open circuit test.
3.15 Explain Short circuit test.
3.16 Explain Efficiency, efficiency at different loads and power factors, condition for maximum efficiency (solve problems)
3.17 Explain All Day Efficiency (solve problems)
3.18 Explain determination of load corresponding to Maximum efficiency.
3.19 Explain parallel operation of single phase transformer.

4. AUTO TRANSFORMER

4.1 Explain constructional features.
4.2 Explain Working principle of single phase Auto Transformer.
4.3 State Comparison of Auto transformer with an two winding transformer (saving of Copper)
4.4 State Uses of Auto transformer.
4.5 Explain Tap changer with transformer (on load and off load condition)

5. THREE PHASE TRANSFORMER

5.1 State and show Type of connection – Star-Star, Star-Delta, Delta-Star and Delta – Delta.

5.2 Explain parallel operation and state conditions for Parallel operation.

5.3 Maintenance schedule of power transformer.

TEXT BOOK

1. Electrical Technology – II by B. L. Thareja and A. K. Thareja
2. Electrical Technology– by J. B. Gupta

REFERENCE BOOK

1. Electric Machine – by Ashfaq Husain
2. Testing maintenance and repair of electrical machine and equipment – by Jaggi
3. Electrical Machine – by S. K. Bhattarcharya (TMH)

N. B. : After completion of each topic the students are required to submit assignment on concepts and Applications. It is also required to solve mathematical problems as when applicable.

ELECTRICAL ENGINEERING

4th SEMESTER

THEORY-2

ELECTRICAL MEASUREMENT & MEASURING INSTRUMENTS

Total Period – 75	Examination : 3 Hours
Periods : 5p/week	Total Marks : 100
Theory – 04/week, Tutorial -01/week	Theory – 80, IA – 15 + 5

A. RATIONALE :

The subject "Electrical measurement and measuring instruments" is important in the field of electrical engineering. The subjects deals with the methods of measuring voltage, current, power, energy, frequency, power factor & parameters like resistance, inductance and capacitance and constructional detail and principle of operation of the instruments used for such measurements. Also it provides the methods to extent the range of low range instruments to measure higher values. A power measurement includes measurement of DC power, AC single phase power and AC three phase power. The detailed classification of all instruments used for the above measurement is dealt up carefully. Also regarding accuracy, precision, resolution and errors and their correction felt very important and have been fully discussed.

B. OBJECTIVES :

1. To acquire the knowledge of selecting various types of instruments for similar purpose like measurement of voltage, current, power factor, frequency etc.
2. To learn the connection of different types of electrical measuring instruments.
3. To learn the adjustment of different instruments.
4. To understand the working principle and construction of the electrical instruments.
5. To solve different numerical problems associated with the instruments best on their design Formula.

C. TOPIC WISE DISTRIBUTION OF PERIODS

Sl. No.	Topic	Periods
1.	MEASURING INSTRUMENTS	07
2.	ANALOG AMMETERS AND VOLTMETERS	10
3.	WATTMETERS AND MEASUREMENT OF POWER	07
4.	ENERGYMETERS AND MEASUREMENT OF ENERGY	06
5.	MEASUREMENT OF SPEED, FREQUENCY AND POWER FACTOR	05
6.	INSTRUMENT TRANSFORMER	08
7.	MEASUREMENT OF RESISTANCE	06
8.	MEASUREMENT OF INDUCTANCE AND CAPACITANCE	06
9.	DIGITAL INSTRUMENTS	05
	Total	**60**

D. COURSE CONTENT IN TERMS OF SPECIFIC OBJECTIVES

1. MEASURING INSTRUMENTS

1.1 Define Accuracy, precision, Errors, Resolutions Sensitivity and tolerance.

1.2 Classification of measuring instruments.
1.3 Explain Deflecting, controlling and damping arrangements in indicating type of instruments.
1.4 Calibration of instruments.

2. ANALOG AMMETERS AND VOLTMETERS

Describe Construction, principle of operation, errors, ranges merits and demerits of

2.1 Moving iron type instruments.
2.2 Permanent Magnet Moving coil type instruments.
2.3 Dynamometer type instruments
2.4 Rectifier type instruments
2.5 Induction type instruments
2.6 Extension of range of instruments by use of shunts and Multipliers.
2.7 Solve Numericals

3. WATTMETERS AND MEASUREMENT OF POWER

3.1 Describe Construction, principle of working Dynamometer type wattmeter and
3.2 What are the Errors in Dynamometer type wattmeter and methods of their correction
3.3 Discuss L P F Electro – Dynamometer type wattmeters
3.4 Discuss Induction type wattmeters
3.5 Measurement of Power in Single Phase and Three Phase Circuit.

4. ENERGYMETERS AND MEASUREMENT OF ENERGY

4.1 Introduction
4.2 Single Phase and polyphase Induction type Energy meters – construction, working from compensation and adjustments.
4.3 Testing of Meters

5. MEASUREMENT OF SPEED, FREQUENCY AND POWER FACTOR

5.1 Tachometers, types and working principles
5.2 Principle of operation and construction of Mechanical and Electrical resonance Type frequency meters.
5.3 Principle of operation and working of Dynamometer type single phase and three phase power factor meters.
5.4 Synchroscopes – objectives and working.
5.5 Phase Sequence Indicators and its working.

6. INSTRUMENT TRANSFORMER

6.1 Explain Current Transformer and Potential Transformer.
6.2 Explain Ratio error, Phase Angle error and Burden
6.3 Clamp – On Ammeters
6.4 State Use of CT and PT

7. MEASUREMENT OF RESISTANCE

7.1 Classification of resistance
7.2 Explain Measurement of low resistance by voltage drop and potentiometer method & its use to Measure resistance.
7.3 Explain Measurement of medium resistance by wheat Stone bridge method and substitution Method.
7.4 Explain Measurement of high resistance by loss of charge method.

7.5 Explain construction & principle of operations (meggers) insulation resistance & Earth resistance megger.
7.6 Explain construction and principles of Multimeters.

8. MEASUREMENT OF INDUCTANCE NAD CAPACITANCE

Explain measurement of inductance by
8.1 Maxewell's Bridge method.
8.2 Owen Bridge method
Explain measurement of capacitance by
8.3 De Sauty Bridge method
8.4 Schering Bridge method
8.5 LCR Bridge method

9. DIGITAL INSTRUMENTS

9.1 Digital Voltmeters (DVM)
9.2 Characteristic of Digital Meters
9.3 Digital Multimeters

TEXT BOOK :

1. Electric Measurement and Measuring instruments – by A.K. Sawhney (Dhanpat)

REFERENCE BOOKS :

1. Electrical Measurement and Measuring instruments by E. W. Golding and H. Widdis.
2. Electrical and Electronics Measuring instruments and Measurement by J. B. Gupta.

ELECTRICAL ENGINEERING

4th SEMESTER

THEORY-3

GENERATION TRANSMISSION & DISTRIBUTION OF ELECTRICAL POWER

Total Period – 75 | Examination : 3 Hours

Periods : 5p/week | Total Marks : 100

Theory – 04/week, Tutorial -01p/week | Theory – 80, I.A – 15 + 5

A. RATIONALE :

Power system comprises generation, transmission and distribution. In this subject generation, transmission and distribution, types of generation schemes, transmission with transmission loss and efficiencies, different type of sub-stations, different type of distribution schemes, EHV AC and HV DC transmission, underground cable and economics aspects involved are dealt with. Further types of tariff are briefly included to give brief and overall idea to the technicians.

B. OBJECTIVES :

To acquire knowledge of :

1. Different schemes of generation with their block diagram.
2. Mechanical and electrical design of transmission lines and numerical problems.
3. Types of cables and their methods of laying and testing.
4. Different schemes of distribution with problem solving
5. Different types of sub-stations.
6. Economic aspects of power supply system with problem and type of tariff of electricity.

C. TOPIC WISE DISTRIBUTION OF PERIODS.

Sl. No.	Topics	Periods
1.	Generation of electricity	07
2.	Transmission of electric power	05
3.	Over head line	07
4.	Performance of short & medium lines	07
5.	EHV transmission	07
6.	Distribution System	07
7.	Underground cable	06
8.	Economic Aspects	06
9.	Types of tariff	03
10.	Substation	05
	Total	**60**

D. COURSE CONTENTS IN TERMS OF SPECIFIC OBJECTIVES.

1. GENERATION OF ELECTRICITY

1.1 Give Elementary idea on generation of electricity from Thermal / Hydel / Nuclear

1.2 Draw layout of generating stations.

2. TRANSMISSION OF ELECTRIC POWER

2.1 Draw layout of transmission and distribution scheme.

2.2 Explain voltage Regulation & efficiency of transmission.

2.3 State and explain Kelvin's law for economical size conductor.

2.4 Explain corona and corona loss on transmission lines.

3. OVER HEAD LINES

3.1 State types of supports, size and spacing of conductor.

3.2 Types of conductor materials.

3.3 State types of insulator and cross arms.

3.4 Derive for sag in overhead line with support at same level and different level (approximate formula effect of wind, ice and temperature on sag simple problem)

4. PERFORMANCE OF SHORT & MEDIUM LINES

4.1 Calculation of regulation and efficiency.

5. EHV TRANSMISSION

5.1 Explain EHV AC transmission.

5.2 Explain Reasons for adoption of EHV transmission.

5.3 Problems involved in EHV transmission.

5.4 Explain HV DC transmission.

5.5 State Advantages and Limitations.

6. DISTRIBUTION SYSTEMS

6.1 Introduction of Distribution System. Explain Connection Schemes of Distribution System –
(Radial, Ring Main and Inter connected system)

6.2 Explain DC distributions (a) Distributor fed at one End (b) Distributor fed at both the ends (c) Ring distributors.

6.3 Explain AC distribution system. Explain Method of solving AC distribution problem.

6.4 Explain three phase four wire star connected system arrangement.

7. UNDERGROUND CABLES

7.1 Explain cable insulation and classification of cables.

7.2 State Types of L. T. & H.T. cables with construction features.

7.3 State and Explain Methods of cable laying.

7.4 For Localisation of cable faults – Murray and Varley loop test for short circuit fault/Earth fault.

8. ECONOMIC ASPECTS

8.1 State and explain causes of low power factor.

8.2 Explain methods of improvement of power factor.

8.3 Define & explain Load curves.

8.4 Define & explain Demand factor.

8.5 Define & explain Maximum demand.

8.6 Define & explain Load factor.

8.7 Define & explain Diversity factor.

8.8 Define & explain Plant capacity factor.

8.9 Define & explain peak load and Base load on power station.

9. TYPES OF TARIFF

9.1 Explain flat rate and two part tariff and block rate tariff with problems

10. SUBSTATION

10.1 Draw and explain layout of LT. HT and EHT substation.

10.2 Draw and Explain Earthing of Substation, transmission and distribution lines.

TEXT BOOK

1. Electrical power - by V. K. Mehta
2. Power System Engineering – by D. P. Kolhari

REFERENCE BOOKS

1. A course of electrical - by S. L. Uppal
2. A course of electrical Power – by Sony Gupta, Bhat Nagar

ELECTRICAL ENGINEERING

4th SEMESTER

THEORY-4

INSTRUMENTATION & CONTROL SYSTEM

Total Period – 60 | Examination : 3 Hours

Theory : 4p/week | Total Marks : 100

Theory – 80, I.A – 15 + 5

A. RATIONALE

Due to wide spread automation in industry the study of instrumentation and control is few essential. Since the whole system is a combination of analogue and digital system, the topics of both the system has been studies along with the topics of sensors, their characteristics and inter falling technique of analogue and digital system under this subject.

B. OBJECTIVES

1. To acquire knowledge of the construction, characteristics and methods of usage of sensors and transducers.
2. To acquire knowledge of remote control using servo – mechanism.
3. To derive transfer functions for simple circuit for making circuit calculation e.g with use of diagram Algebra.
4. To acquire knowledge of stable Behaviour of circuit and to work out for stability.

C. TOPIC WISE DISTRIBUTION OF PERIODS

Sl. No.	Topic	Periods
1.	Sensor and Transducer	10
2.	Oscilloscope	06
3.	Measurement of Non-electric quanties	10
4.	Control system	5
5.	Servo Mechanism	5
6.	Mathematical model of Physical System	7
7.	Servo motor	6
8.	Block diagram of Control System	5
9.	Stability of Control System	6
	Total	**60**

D.COUSE CONTENT IN TERMS OF SPECIFIC OBJECTIVES

1. SENSORS AND TRANSDUCER

1.1 Define Transducer, sensing element or detector element and transduction elements.

1.2 Classify transducer give examples of various class of transducer.

1.3 Resistive transducer

i) Polentiameter

ii) Strain gauges- a) Derive gauge factor, b) Explain constructional features of Bonded and un bonded strain gauge.

iii) Platium Resistance thermo meter.

iv) Construction and resistance temperature characteristic thermistor.

1.4 Inductance Transducer

i) Explain principle of linear variable differential Transformer (LVDT)

ii) State uses LVDT.

1.5 Capacitive Transducer.

i) Explain general principle of capacitive transducer.

ii) Explain variable area capacitive transducer.

iii) Explain change in distance between plate capacitive transducer.

iv) Advantage and disadvantages of capacitive transducer.

1.6 Piezo electric Transducer and its applied.

1.7 Principle of up to electronic Transducer and its application.

2. OSCILLOSCOPE

2.1 Principle of operation of Cathode Ray Tube.

2.2 Principle of operation of Oscilloscope (with help of block diagram).

2.3 Measurement of DC Voltage & current.

2.4 Measurement of AC Voltage, current, phase & frequency.

3. MEASUREMENT OF NON ELECTRIC QUALITIES

3.1 Principle of measurement of stress and stress by help of deflection type wheelstrne bridge.

3.2 Principle of measurement of pressure

i) Measurement of low pressure by – Pirari gauge.

ii) Measurement of normal pressure by inductive and capacitive transducer.

3.3 Principle of measurement of temperature

i) Measurement of temperature by platinum resistance thermometer.

ii) Measurement of temperature by thermo couple.

iii) Measurement of High temperature high optical pyrometer.

3.4 Measurement of flow by turbine meter.

3.5 Measurement of legend level by resistive transducer.

4. CONTROL SYSTEM

4.1 Introduction

4.2 Classification of control system.

4.3 Open loop control system.

4.4 Closed loop control system.

4.5 Corporation of open loop vrs closed loop control system.

4.6 What feedback is and what its effects are.

5. SERVOMECHANISM

5.1 Introduction.

5.2 Automatic Tank level control system.

5.3 Position control system.

5.4 D. C. closed loop servo control system.

5.5 A.C closed loop servo control system.

6. Mathematical model of physical system.

6.1 Mathematical modeling of translation mechanical system.

6.2 Mathematical modeling of rotation mechanical system.

6.3 Mathematical modeling of electrical system.

6.4 Analogous between mechanical and electrical system.

6.5 Transfer function.

6.6 Transfer function of single input-single output system.

6.7 Characteristic Equation.

6.8 Procedure for deriving transfer function.

7. SERVOMOTORS

7.1 D. C servomotors.

7.2 A. C. servomotors.

7.3 Synchro transmitter and receiver.

7.4 Synchro as an error detector.

8. BLOCK DIAGRAM OF CONTROL SYSTEM

8.1 Block diagram of a closed loop.
8.2 Block diagram and transfer function.
8.3 Procedure for drawing block diagram.
8.4 Block diagram reduction and manipulation.

9. STABILITY OF CONTROL SYSTEM

9.1 Definition of stability of control system.
9.2 Necessary conditions for stability.
9.3 Routs stability criterion.
9.4 Application of Routs stability criterion to liner feedback system.

TEXT BOOK

1. Control System – by A. Ananda Kuamr (PHI)
2. Electric Measurement and Measuring instruments – by A.K. Sawhney (DPT)

ELECTRICAL ENGINEERING

4th SEMESTER

THEORY-5

DIGITAL ELECTRONICS

Total Period – 5 P/Week | Examination : 3 Hours

Theory – 4P/Week | Total Marks : 100

Tutorial : 1 P/Week | Theory : 80, I.A – 15 + 5

A. RATIONALE

The tremendous power and usefulness of digital electronics can be seen from the wide variety of industrial and consumer products, such as automated industrial machinery, computers, microprocessors, pocket calculators, digital watches and clocks, TV games, etc. Which are based on the principles of digital electronics. The years of applications of digital electronics have been increasing every day. In fact, digital systems have invaded all walks of life. This subject will very much helpful for student to understand clearly about the developmental concept of digital devices.

B. OBJECTIVES

On comprehend of the subject, the student will able to

- Comprehend the systems and codes.
- Familiar with logic gates.
- Realise logic expressions using gates.
- Construct and verify the operation of arithmetic & logic circuits
- Understand and appreciate the relevance of combinational circuits.
- Know various logic families & flops.
- Known the concept of D/A & A/D.

C.TOPIC WISE DISTRIBUTION OF PERIODS

Sl. No.	Topics	Periods
1	Number Systems and Codes	6
2	Logic Gates	6
3	Boolean Algebra	6
4	Combinational Circuits	8
5	Sequential Circuits	6
6	Logic Families	2
7	Counters	6
8	Registers	6
9	Digital to analog converters	5
10	Analog to Digital Converters	5
11	Display Devices	4
	Total	**60**

D : **COURSE CONTENT IN TERMS OF SPECIFIC OBJECTIVES**

1 NUMBER SYSTEMS AND CODES

1.1 List different number system & their relevance : binary, octal, decimal, Hexadecimal

1.2 Study the Conversion from one number system to another.

1.3 Perform Arithmetic operations of binary number systems.

1.4 Represent the Concept of complemently numbers : 1's & 2's complement of Binary numbers.

1.5 Perform Subtraction of binary numbers using complementary numbers.

1.6 Perform multiplication and division of binary numbers.

1.7 Define concept of Digital Code & its application.

1.8 Distinguish between weighted & non-weight Code.

1.9 Study Codes : definition, relevance, types (BCD, Gray, Excess-3 and ASCII code and applications.

1.10 Generation of Error Detection & Correction Code using parity bit.

2. LOGIC GATES

2.1 Illustrate the Different between analog signals & systems and digital signals & Systems.

2.2 Discuss the Basic Logic & representation using electric signals.

2.3 Learn the Basic Logic gates (NOT, OR, AND, NOR, NAND, EX-OR & EX-NOR) – Symbol, function, expression, truth table & example IC nos.

2.4 Define Universal Gates with examples & realization of other gates.

3. BOOLEAN ALGEBRA

3.1 Understand Boolean : constants, variables & functions.

3.2 Comprehend the Laws of Boolean algebra.

3.3 State and prove Demorgan's Theorems.

3.4 Represent Logic Expression : SOP & POS forms & conversion.

3.5 Simplify the Logic Expression/Functions (Maximum of 4 variables) : using Boolean algebra and Karnaugh's map methods.

3.6 What is don't care conditions ?

3.7 Realisation of simplified logic expression using gates.

3.8 Illustrate with examples the above.

4. COMBINATIONAL CIRCUITS

4.1 Define a Combinational Circuit and explain with examples.

4.2 Arithmetic Circuits (Binary)

a) Realise function, functional expression, logic circuit, gate level circuit, truth table & applications of Half-adders, Full-adder & full-Subtractor.

b) Explain Serial & Parallel address : concept comparison & application.

c) Working of 2 bit Magnitude Comparator : logic expression, truth table, gate level circuit & examples IC

4.3 Discuss Decorders : definition, relevance, gate level of circuit of simple decoders, Logic circuit of high order encoders, truth table & example IC nos.

4.4 Explain the working of Binary-Decimal Encoder & Decoder.

4.5 Discuss Multiplexers : definition, relevance, gate level circuit of simple.

Demultiplexers (1:4) logic circuit with truth Table & example IC nos.

5. SEQUENTIAL CIRCUITS

5.1 Define Sequential Circuit : Explain with examples.

5.2 Know the Clock-definition characteristics, types of triggering & waveform.

5.3 Define Flip-Flop

5.4 Study RS, Clocked RS, D, T, JK, MS-JK flip-flop with logic Circuit and truth tables.
5.5 Concept of Racing and how it can be avoided.
5.6 Applications of flip-flops & its conversion.

6. LOGIC FAMILIES

6.1 List of various logic families & standard notations.
6.2 Explain propagation Delay, fan-out, fan-in, Power Dissipation & Speed with Reference to logic families.

7. COUNTERS

7.1 List the different types of counters-Synchronous and Asynchronous.
7.2 Explain the modulus of a counter.
7.3 Compare Synchronous and Asynchronous counters and know their ICs nos.
7.4 Explain the working of 4 bit ripple counter with truth table and timing diagram.
7.5 Explain the Synchronous decade counter & binary counter.

8. REGISTERS

8.1 Explain the working of buffer register.
8.2 Explain the working of various types of shift registers – ISO, SIPO, PISO, PIPO with truth table using flip flop.

9. DIGITAL TO ANALOG CONVERTERS

9.1 Explain the performance parameters of ADC-Resolution, Accuracy and Conversion time.
9.2 Explain Binary Weighted resistor DAC.
9.3 Explain the Successive – Approximation type DAC
9.4 Explain R-2R Ladder type DAC.

10. **ANALOG TO DIGITAL CONVERTERS**

10.1 Explain the performance parameters of ADC-Resolution, Quantization Error and conversion time.
10.2 Explain the Ramp type and Dual Slope ADC's
10.3 Explain the Successive – Approximation type ADC

11. DISPLAY DEVICES

11.1 Explain the operation of LED and concept of seven segment display.
11.2 Explain the LCD and its types.
11.3 Compare between LED's and LCD's.
11.4 Explain LED driver using IC 7447 decoder.
11.5 Explain 7 segment decoder/driver for LCD display.

TEXT BOOKS

1. Fundamental of Digital Electronics – Ananda Kumar PHI.
2. Digital Electronics – Principal & Application by S. K. Mondal (TMH)

REFERENCE OOKS

1. Digital Electronics by B. R. Gupta & V. Singhal (S. K. Katteria).
3. Digital Electronics – P. Raja, Sci Tech.

ELECTRICAL ENGINEERING

4th SEMESTER

PRACTICAL - 1

ELECTRICAL LAB PRACTICE-I

Total Period – 90 | Examination : 4 Hours

Periods : 6p/week | Total Marks : 50 + 50

Practical – 100, Ses – 50

1. Study of different part, identification of terminals and testing of insulation resistance of a D.C. machine.
2. Dismantling and assembling of a D. C. machine and testing.
3. Study of 3 points and 4 point D. C. motor starter.
4. Study of a drum controller.
5. Determination OCC of shunt generator.
6. Eternal characteristic shunt generator.
7. Speed variation of DC motor by (a) field / flux control (b) Armature voltage variation method.
8. Determination of efficiency of DC motor by brake test.
9. Determination of efficiency of a 1-phase transformer by direct loading.
10. Parallel operation of a 3-phase Transformer.
11. Identification of terminals, OC test SC test and measurement of iron loss, No load current and no load PF and measurement of copper loss and computation of Zeq and Req and Xeq of a 1-phase transformer and determination of regulation.
12. Prepare a report on transformer accessories and cooling methods of a substation.
13. Study of a moving iron and PMMC meter.
14. Study of a analog multi meter.

1.5. Measurement of earth resistance of an Earthing installation.

1.6. Open MI Voltmeter and study its controlling section, damping section and deflecting section.

17. Open a analog multimeter and study its voltage, current and resistance range selection arrangement.
18. Measure the power and power factor of a single phase load by three voltmeter method.
19. Study the front panel control arrangement of a dual trace oscilloscope and measure A.C and D.C voltage by help of it.
20. Measure unknown frequency by help of lissajeous pattern.

REFERENCE BOOKS

Laboratory Courses in Electrical Engineering - By S. G. Tarnekar, S, D. Naik.

ELECTRICAL ENGINEERING

4th SEMESTER

PRACTICAL - 2

DIGITAL ELECTRONICS LAB

Total Period – 45 Examination : 4 Hours

Periods :3p/w Total Marks : 50

Sessional – 25

A.RATIONALE

In this practical work students knowledge about the Digital systems will be reinforced. They will become capable of developing and implementing Digital Circuits. They will also be able to acquire skills of operating A/D and D/A converters, counters and display system.

B. OBJECTIVE

On completion of the Lab course the student will able to

1. Familiarized with use of Digital ICs.
2. Understand and comprehended the simple the Digital design Circuits.
3. Know A/D & D/A conversions.

C.COURSE CONTENT IN TERMS OF SPECIFIC OBJECTIVES

1. Familiarization of Digital Trainer, Kit, logic Pulser Logic Probe & Digital ICs IE 7400, 7402, 7404, 7408, 7432 & 7486.
2. Verify truth tables of AND, OR, NOT, NOR, NAND, XOR, XNOR gates.
3. Implement various gates by using universal properties of NAND & NOR gates verify and truth table tabulate data.
4. Implement Half adder and Full adder using logic gates.
5. Implement Half subtractor and Full subtractor using logic gates.
6. Implement a 4-bit Binary to Gray code converter.
7. Implement a Single bit digital comparator.
8. Study Multiplexer and demultiplexer.
9. Study of flip-flops.
   i) S-R flip flop ii) J-K flip flop iii) flip flop iv) T flip flop
10. Realize a 4-bit asynchronous UP/Down counter with a control for up/down counting.
11. Realize a 4-bit synchronous UP/Down counter with a control for up/down counting.
12. Implement Mode-10 asynchronous counters.
13. Study shift registers.
14. Study 8-bit D/A and A/D conversion.
15. Study display devices, LED, LCD, 7-segment displays.
16. Mini Project : To collect data like pin configurations of digital IC and display devices. Assemble and tests circuits such as frequency counter and running LED lights.

    (Perform experiment on any 12 of the above experiments.)

REFERENCE BOOKS

1. Electronics Lab premier by Sacikala - (S. Chand)

ELECTRICAL ENGINEERING

4th SEMESTER

PRACTICAL - 3

WORKSHOP PRACTICE

Total Period – 90 | Examination : 4 Hours

Periods : 6p/week | Total Marks : 100

Practical – 50, Ses – 25

Carpentry :

1.1 Name of carpentry tools and uses

1.2 Different operations

(a) Sawing (b) Planning (c) Chiseling (d) Measuring & Marking

1.3 Different types of timbers used by carpenters, substitutions of timbers.

1.4 Jobs – (a) Slot. Notch

(b) Mortise and tenan joint

(c) Single dovetail joint

Turning

Study of S. C. Lathes and their accessories practice in lathe work involving various operations such as plane burning, step turning tapper turning, knurling and external V. Therading one job only.