

SARDAR PATEL UNIVERSITY

S.Y. B.Sc. – 3rd sem. (Instrumentation Vocational)

COURSE CODE: - US03CINV21

Electrical Instrument and Power Electronics-I

(Effective from june-2019)

Unit-1 EM-Induction and Transformers

Production of induced emf and current, faradays Law of Electromagnetic induction, Direction of induced emf, magnetic hysteresis, working principle of transformer, construction, shell type, core type, EMF equation of transformer, voltage transformation ratio, Transformer tests, Losses in Transformer, Three phase Transformer, star and delta connection.

Unit-2 DC Generator

Generator principle, simple loop and practical Generator, Yoke, pole cores and shoes, pole coils, armature core, armature winding, Commutator, brushes and bearings, pole pitch, conductor, coil and winding element, coil span, pinch of winding, Commutator pitch, single layer and two layer winding, Lap winding and wave winding, Types of generator, Equation of a generator, total losses in dc generator

Unit-3 DC Motor

Motor principle, comparison of generator and motor action, significant of back Emf, voltage equation of a motor, condition of maximum power, torque, Armature torque, shaft torque, speed of dc motor, speed regulation, characteristics of series and shunt motor.

Unit-4 Induction motor

Classification of AC motors, principle of induction motor, production of rotating field of TWO phase and Three phase supply, slip, measurements of slip, starting of Induction motor- primary resistor, auto transformer, star- delta starter, speed control of induction motor, power stage in an induction motor, torque developed by an induction motor.

Scope of syllabus from:

1. Electrical technology by B. L. Theraja (VOLUME II).
2. Electrical engineering fundamental by Vincent Del Toro.

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SEM.-3rd B.Sc. (Instrumentation Vocational)

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OPERATIONAL AMPLIFIERS AND FILTERS

UNIT – 1: OPERATIONAL AMPLIFIER BASICS

Basic OP-AMP and its block diagram, Ideal OP - AMP, OP – AMP parameter, Inverting OP – AMP, Non inverting OP – AMP, Basic application of OP – AMP : Inverting amplifier(with feedback), Scale changing amplifier, Phase shift amplifier, Summing amplifier.

UNIT – 2: OP – AMP APPLICATION: 1

Voltage to current converter, Current to voltage converter, DC voltage follower, AC voltage follower, Differential DC amplifier, Integrator, Adding integrator, Differentiator, comparator using OP – AMP.

UNIT – 3: OP – AMP APPLICATION: 2

Zero crossing detector, Square wave from sine wave, timing mark generator, Phase meter, Pulse-time modulation, Astable & mono stable multi-vibrator, Schmitt trigger, Triangular wave generator, Sample and Hold circuit.

UNIT – 4: FIELD AMPLIFIER & FILTERS

AMPLIFIER: Magnetic, Pneumatic, Electronics Instrumentation amplifier, Data acquisition using instrumentation amp.

Active filter: Ideal filter characteristics, Filter approximations, Comparisons of active and passive filters, Low pass, High pass, Band pass, Band elimination, Notch, All pass filter.

Syllabus from:

1. Integrated Electronics by J. Millman & C. Halkis.
2. Linear Integrated Circuits & its Application by P.V.Wani & P. V. Bhatt.
3. Op – Amp & Linear Integrated Circuit by Ramakant A. Gayakwad.
4. Instrumentation Devices and Systems by Mani, Rangan And Sharma.

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PRACTICAL LIST

- 1) D.C. SERVO MOTOR
- 2) A.C. SERVO MOTOR
- 3) OP-AMP APPLICATION
- 4) OP-AMP APPLICATION
 - a. HALF-WAVE RECTIFIER
 - b. FULL-WAVE RECTIFIER
- 5) PASSIVE FILTER

PRACTICAL LIST

- 1) OP-AMP PARAMETER – 1
 - INPUT OFFSET VOLTAGE
 - INPUT BIAS CURRENT
- 2) OP-AMP PARAMETER – 2
 - MEASUREMENT OF SLEW RATE
 - OPEN LOOP VOLTAGE GAIN
- 3) OP-AMP PARAMETER – 3
 - GAIN BANDWIDTH PRODUCT
 - INPUT OFFSET CURRENT
- 4) OP-AMP APPLICATION – 1
 - INVERTING AMPLIFIER
 - NON-INVERTING AMPLIFIER
- 5) OP-AMP APPLICATION – 2
 - SCALAR CIRCUIT
 - SUMMING CIRCUIT
- 6) OP-AMP APPLICATION – 4
 - SQUARE WAVE GENERATOR
 - SCHMITT TRIGGER
- 7) OP-AMP AS INTEGRATOR
- 8) OP-AMP AS DIFFERENTIATOR