Lesson Plan

Name of the Faculty: Ajit Singh

Discipline: Electrical Engineering

Semester: 4th

Subject: Utilisation of Electrical Energy

Lesson Plan Duration: 15 weeks (from January, 2019 to April, 2019)

Week	Day	Topic
1	1.	Introduction to subject
	2.	Advantages of electrical heating
	3.	Resistance heating – direct and indirect resistance heating, electric ovens, their temperature range
	4.	Revision
2	5.	properties of resistance heating elements, domestic water heaters and other heating appliances, thermostat control circuit
	6.	Induction heating; principle of core type and coreless induction furnace, their construction and applications
	7.	Electric arc heating; direct and indirect arc heating, construction, working and applications of arc furnace
	8.	Revision
3	9.	Dielectric heating, applications in various industrial fields, Infra-red heating and its applications (construction and working of two appliances)
	10.	Microwave heating and its applications (construction and working of two appliances), Solar Heating
	11.	Calculation of resistance heating elements (simple problems), Advantages of electric welding
	12.	Revision
4	13.	Principles of resistance welding, types – spot, projection, seam and butt welding
	14.	welding equipment, Principle of arc production, electric arc welding, characteristics of arc; carbon arc, metal arc
	15.	Hydrogen arc welding method and their applications, Power supply requirement.
	16.	Revision
5	17.	Advantages of using coated electrodes, comparison between AC and DC arc welding, welding control circuits, welding of aluminium and copper.
	18.	Need of electro-deposition, Laws of electrolysis
	19.	process of electro-deposition - clearing, operation, deposition of metals, polishing and buffing
	20.	Revision
6	21.	Equipment and accessories for electroplating, Factors affecting electro-deposition
	22.	Principle of galvanizing and its applications, Principles of anodizing and its applications
	23.	Electroplating of non-conducting materials, Manufacture of chemicals by electrolytic process
	24.	Revision
7	25.	Principle of air conditioning
	26.	Description of Electrical circuit used in Refrigerator
	27.	Description of Electrical circuit used in Air-conditioner
	28.	Revision

8	29.	Description of Electrical circuit used in Water cooler
	30.	Advantages of electric drives, Characteristics of different mechanical loads
	31.	Types of motors used as electric drive
	32.	Revision
9	33.	General idea about the methods of power transfer by direct coupling by using devices like belt drive, gears, chain drives etc.
	34.	Examples of selection of motors for different types of domestic loads
	35.	Selection of drive for applications such as general workshop, textile mill, paper mill, steel mill, printing press, crane and lift etc.
	36.	Revision
10	37.	Application of flywheel
	38.	Selection of motors for Domestic Appliances
	39.	Advantages of electric traction
	40.	Revision
11	41.	Different systems of electric traction, DC and AC systems,
	42.	diesel electric system, types of services – urban, sub-urban, and main line
	43.	speed-time curves
	44.	Revision
12	45.	Different accessories for track electrification; such as overhead catenary wire,
	46.	conductor rail system, current collector-pentagraph
	47.	Factors affecting scheduled speed
	48.	Revision
13	49.	Electrical block diagram of an electric locomotive with description of various equipment and accessories used.
	50.	Types of motors used for electric traction
	51.	Power supply arrangements
	52.	Revision
14	53.	Starting and braking of electric locomotives
	54.	Introduction to EMU and metro railways
	55.	Train Lighting Scheme
	56.	Revision
15	57.	Revision
	58.	Revision
	59.	Revision
	60.	Revision

Lesson Plan

Name of the Faculty: Ajit Singh /

Discipline: Electrical Engineering

Semester: 4th

Subject: DIGITAL ELECTRONICS

Lesson Plan Duration: 15 weeks (from January, 2019 to April, 2019)

Week	Day	Topic
1	1.	Introduction to subject
	2.	Decimal, binary, octal and hexa-decimal number systems
	3.	inter-conversion of numbers
	4.	Revision
2	5.	inter-conversion of numbers
	6.	Binary and Hexadecimal addition, subtraction
	7.	Binary and Hexadecimal multiplication
	8.	Revision
3	9.	1's and 2's complement methods of addition/subtraction
	10.	1's and 2's complement methods of addition/subtraction
	11.	Definition, symbol and truth tables for inverter, OR, AND Gate
	12.	Revision
4	13.	Definition, symbol and truth tables for NAND, NOR and X-OR Gates
	14.	Equivalence circuit (Ex.NOR)
	15.	Equivalence circuit (Ex.NOR)
	16.	Revision
5	17.	Boolean Relations and their applications
	18.	DeMorgan's Theorems
	19.	K-Map upto four variables
	20.	Revision
6	21.	K-Map upto four variables continue
	22.	Half adder
	23.	Full adder
	24.	Revision
7	25.	Full adder
	26.	Encoder
	27.	Decoder
	28.	Revision
8	29.	Multiplexer / Demultiplexer introduction
	30.	Multiplexer
	31.	Demultiplexer
	32.	Revision
9	33.	Display Devices - types
	34.	LED
	35.	LCD
	36.	Revision
10	37.	7-segment display
	38.	Flip-Flops Introduction
	39.	J-K Flip-Flop

	40.	Revision
11	41.	R-S Flip-Flop
	42.	D-Type Flip-Flop
	43.	T-Type Flip-Flop
	44.	Revision
12	45.	Applications of Flip-Flops
	46.	Introduction of Shift Registers and Counters
	47.	Registers Continue
	48.	Revision
13	49.	Counters continue…
	50.	A/D converter (Counter ramp, successive approximation method of A/D Conversion)
	51.	A/D converter (Counter ramp, successive approximation method of A/D Conversion)
	52.	Revision
14	53.	D/A converters (Binary weighted, R-2R D/A Converter)
	54.	D/A converters (Binary weighted, R-2R D/A Converter)
	55.	Semi-conductor Memories Types, merits, demerits, and applications
	56.	Revision
15	57.	Revision
	58.	Revision
	59.	Revision
	60.	Revision

Practical

Week	Day	Topic
1.	1.	Verification and interpretation of truth table for AND, OR, NOT, NAND, NOR, X-OR gates
2.	2.	Revision
3.	3.	Construction of Half Adder using gates
4.	4.	Revision
5.	5.	Construction of Full Adder using gates
6.	6.	Revision
7.	7.	To verify the truth table for JK flipflop
8.	8.	Revision
9.	9.	Construction and testing of any counter
10.	10.	Revision
11.	11.	Verification of operation of a 8-bit D/A Converter
12.	12.	Revision
13.	13.	Revision
14.	14.	Revision
15.	15.	Revision

Lesson Plan

Name of the Faculty:

Discipline: Electrical Engineering

Semester: 4th

Subject: ELECTRICAL MACHINES - I

Lesson Plan Duration: 15 weeks (from January, 2019 to April, 2019)

Week	Day	Topic
1	1.	Introduction to subject
	2.	Definition of motor and generator, Torque development due to alignment of two fields and the concept of torque angle
	3.	Electro-magnetically induced emf, Elementary concept of an electrical machine, Comparison of generator and motor
	4.	Revision
2	5.	Generalised theory of electrical machines, Main constructional features
	6.	Types of armature winding
	7.	Function of the commutator for motoring and generation action
	8.	Revision
3	9.	Factors determining induced emf, Factors determining the electromagnetic torque
	10.	Various types of DC generators
	11.	Significance of back e.m.f., the relation between back emf and Terminal voltage
	12.	Revision
4	13.	Armature Reaction, Methods to improve commutation
	14.	Performance and characteristics of different types of DC motors
	15.	Speed control of dc shunt/series motors
	16.	Revision
5	17.	Need of starter, three point dc shunt motor starter and 4 point starter
	18.	Electric Braking
	19.	Applications of DC motors
	20.	Revision
6	21.	Faults in dc machines and their retrospective
	22.	Losses in a DC machine, Determination of losses by Swinburne's test
	23.	Rating and Specifications of DC machines
	24.	Revision
7	25.	Transformer, Introduction
	26.	Constructional features of a transformer and parts of transformer
	27.	Working principle of a transformer, EMF equation
	28.	Revision
8	29.	Transformer on no-load and its phasor diagram,
	30.	Transformer – neglecting voltage drop in the windings – Ampere turn balance – its phasor diagram
	31.	Mutual and leakage fluxes, leakage reactance
	32.	Revision
9	33.	Transformer on load, voltage drops and its phasor diagram
	34.	Equivalent circuit diagram
	35.	Relation between induced emf and terminal voltage
	36.	Revision
10	37.	voltage regulation of a transformer- mathematical relation

	38.	Losses in a transformer, Open circuit and short circuit test
	39.	Calculation of efficiency
	40.	Revision
11	41.	condition for maximum efficiency-
	42.	maintenance of Transformer, scheduled Maintenance
	43.	Auto transformer construction
	44.	Revision
12	45.	working and applications
	46.	Different types of transformers including dry type transformer, Rating and Specifications of single phase transformer
	47.	Construction of three phase transformers and accessories of transformers such as Conservator, breather
	48.	Revision
13	49.	Buchholtz Relay, Tap Changer (off load and on load) (Brief idea)
	50.	Types of three phase transformer i.e. delta-delta, delta-star, star-delta and star-star
	51.	Star delta connections (relationship between phase and line voltage, phase and line current)
	52.	Revision
14	53.	Conditions for parallel operation (only conditions are to be studied), On load tap changer
	54.	Difference between power and distribution transformer, Cooling of transformer
	55.	Rating and Specifications of three phase transformers
	56.	Revision
15	57.	Revision
	58.	Revision
	59.	Revision
	60.	Revision

Practical

Week	Day	Topic
1.	1.	To measure the angular displacement of rotor of the three phase synchronous machine with respect to the stator on application of DC to the field winding and simultaneously to each phase-winding in sequence OR Measurement of the angular displacement of the rotor of a slip-ring induction motor on application of DC to stator of motor winding in sequence and simultaneously to each phase of rotor winding
2.	2.	Speed control of DC shunt motor (i) Armature control method (ii) Field control method
3.	3.	Study of DC series motor with starter (to operate the motor on no load for a moment)
4.	4.	Determine efficiency of DC motor by Swinburne's Test at (i) rated capacity (ii) half full load
5.	5.	Revision
6.	6.	Revision
7.	7.	To perform open circuit and short circuit test for determining: (i) equivalent circuit (ii) the regulation and (iii) efficiency of a transformer from the data obtained from open circuit and short circuit test at full load
8.	8.	To find the efficiency and regulation of single phase transformer by actually loading it

9.	9.	Checking the polarity of the windings of a three phase transformer and connecting the windings in various configurations
10.	10.	Finding the voltage and current relationships of primary and secondary of a three phase transformer under balanced load in various configurations conditions such as (a) Star-star (b) Star-delta (c) Delta-star (d) Delta - Delta configuring conditions
11.	11.	Revision
12.	12.	Revision
13.	13.	Revision
14.	14.	Revision
15.	15.	Revision

Lesson Plan

Name of the Faculty:

Discipline: Electrical Engineering

Semester: 4th

Subject: ELECTRICAL MEASURING INSTRUMENTS AND INSTRUMENTATION

Lesson Plan Duration: 15 weeks (from January, 2019 to April, 2019)

Week	Day	Topic
1	1.	Introduction to subject
	2.	Concept of measurement and instruments
	3.	Concept of measurement of electrical quantities and instruments for their measurements
	4.	Revision
2	5.	sources of error, Types of electrical measuring instruments – indicating type
	6.	integrating and recording type instruments
	7.	Essentials of indicating instruments – deflecting controlling and damping torque
	8.	Revision
3	9.	Concept of ammeter and voltmeters and difference between them,
	10.	Construction and working principles of moving Iron instruments
	11.	Construction and working principles of moving coil instruments,
	12.	Revision
4	13.	Merits and demerits of these instruments, sources of error and application of these instruments
	14.	Construction, working principle of dynamometer type wattmeter, merits and demerits
	15.	Digital wattmeters
	16.	Revision
5	17.	Construction, working principle, merits and demerits of single-phase energy meters
	18.	Construction, working principle, merits and demerits of three-phase energy meters
	19.	Errors and their compensation, Simple numerical problems
	20.	Revision
6	21.	Construction and working principle of maximum demand indicators
	22.	Digital energy meter (diagram, construction and application)
	23.	Construction, working principle and application of Meggar
	24.	Revision
7	25.	Earth tester (Analog and Digital)
	26.	Multimeter, Frequency meter (dynamometer type)
	27.	single phase power factor meter (Electrodynamometer type).
	28.	Revision
8	29.	Working principle of synchroscope and phase sequence indicator, tong tester (Clamp-on meter)
	30.	Construction, working and applications of CT and PT
	31.	Cathode Ray Oscilloscope: Block diagram, working principle of CRO
	32.	Revision
9	33.	various controls. Applications of CRO
	34.	Digital multi-meter (only block diagram) and Applications
	35.	Study of LCR meters and their applications

	36.	Revision
10	37.	Power Measurements in 3-phase circuits by Two wattmeter method in balanced circuits
	38.	Power Measurements in 3-phase circuits by Two wattmeter method in unbalanced circuits
	39.	simple problems
	40.	Revision
11	41.	simple problems
	42.	Power Measurements in 3-phase circuits by Three wattmeter method
	43.	Introduction, Types of Transducers (1 phase,3 phase)
	44.	Revision
12	45.	Introduction, Types of Transducers (1 phase,3 phase) continue
	46.	Basic concept of pressure measurement,
	47.	flow measurement
	48.	Revision
13	49.	level measurement
	50.	displacement measurement using transducers
	51.	Different types of thermometers
	52.	Revision
14	53.	Thermocouple
	54.	Resistance temperature detector and their construction, principle and working.
	55.	Thermal Imager Camera (Concept)
	56.	Revision
15	57.	Revision
	58.	Revision
	59.	Revision
	60.	Revision

Practical

Week	Day	Topic
1.	1.	Use of analog and digital multimeter for measurement of voltage, current (A.C/D.C) and resistance
2.	2.	Measurement of pressure by using LVDT
3.	3.	To measure the value of earth resistance using earth tester
4.	4.	To measure power, power factor in a single-phase circuit, using wattmeter and power factor meter and to verify results with calculations
5.	5.	Revision
6.	6.	Measurement of power and power factor of a three-phase balanced load by two wattmeter method
7.	7.	Measurement of voltage and frequency of a sinusoidal signal using CRO and draw wave shape of signal
8.	8.	Measurement of power in a 3 phase circuit using CT, PT and 3-phase wattmeter
9.	9.	Use of LCR meter for measuring inductance, capacitance and resistance
10.	10.	To record all electrical quantities from the meters installed in the institution premises
11.	11.	To measure Energy at different Loads using Single Phase Digital Energy meter
12.	12.	Measurement of temperature by using thermister/Thermal Imager
13.	13.	Calibration of single phase and three-phase energy meter
14.	14.	Revision
15.	15.	Revision

Lesson Plan

Name of the Faculty:

Discipline: Electrical Engineering

Semester: 4th

Subject: ELECTRICAL ENGINEERING DESIGN AND DRAWING - II

Lesson Plan Duration: 15 weeks (from January, 2019 to April, 2019)

Week	Day	Topic
1.	1.	Introduction to subject
	2.	DOL starting of 3-phase induction motor
2.	3.	3-phase induction motor getting supply from selected feeder
	4.	Forwarding/reversing of a 3-phase induction motor
3.	5.	Two speed control of 3-phase induction motor
	6.	Limit switch control of a 3-phase induction motor
4.	7.	Sequential operating of two motors using time delay relay
	8.	Manually generated star delta starter for 3-phase induction motor
5.	9.	Revision/Test
	10.	Revision/Test
6.	11.	Automatic star delta starter for 3-phase Induction Motor
	12.	Concept and purpose of earthing
7.	13.	Different types of earthing, drawings of plate and pipe earthing
	14.	Procedure of earthing, test of materials required and costing
8.	15.	Method of reducing earth resistance
	16.	Relevant IS specifications of earth electrode for earthing a transformer, a high building
9.	17.	Earthing layout of distribution transformer
	18.	Substation earthing layout and earthing materials
10.	19.	Revision/Test
	20.	Revision/Test
11.	21.	Key diagram of 11kV, 33kV, 66kV, 132 kV sub-stations
	22.	Schematic Diagram of lighting system of conference room/Theatre/sports stadium
12.	23.	Schematic Diagram of lighting system of conference room/Theatre/sports stadium
	24.	Schematic Diagram of lighting system of conference room/Theatre/sports stadium
13.	25.	Schematic Diagram of lighting system of conference room/Theatre/sports stadium
	26.	Schematic Diagram of lighting system of conference room/Theatre/sports stadium
14.	27.	Schematic Diagram of lighting system of conference room/Theatre/sports stadium
	28.	Revision/Test
15.	29.	Revision/Test
	30.	Revision/Test