B.K.N. Govt. Polytechnic Narnaul Haryana

Electrical Engineering Department

Lesson Plan

Name of Faculty	**Sh. Rajat Malhotra**
Discipline	**Electrical Engineering**
Semester	**4th**
Subject	**Digital Electronics**
Lesson Plan Duration	**From 6 March 2023 to 23 June 2023**
Work load [Theory + Practical] Per Week	**[04+02]**

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 flip flop
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

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Electrical Engineering Department

Lesson Plan

Name of Faculty	**Sh. Sandeep Kumar**
Discipline	**Electrical Engineering**
Semester	**4th**
Subject	**Electrical Engineering Design & Drawing-II**
Lesson Plan Duration	**From 6 March 2023 to 23 June 2023**
Work load [Theory + Practical] Per Week	**[00+06]**

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

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Electrical Engineering Department

Lesson Plan

Name of Faculty	**Sh. Sandeep Kumar**
Discipline	**Electrical Engineering**
Semester	**4th**
Subject	**Electrical Machine -I**
Lesson Plan Duration	**From 6 March 2023 to 23 June 2023**
Work load [Theory + Practical] Per Week	**[04+02]**

Week	Theory		Practical	
	Lecture Day	**Topic**	**Practical Day**	**Topic**
1st	**1st**	**Unit-1 Introduction to Electrical Machines** Definition of motor and generator, concept of torque	**1st**	**PRACTICAL-1** 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
	2nd	Torque development due to alignment of two fields and the concept of torque angle		
	3rd	Electro-magnetically induced emf	**2nd**	**PRACTICAL-1** 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
	4th	Elementary concept of an electrical machine		
2nd	**5th**	Comparison of generator and motor	**3rd**	**PRACTICAL-2** Speed control of dc shunt motor (i) Armature control method (ii) Field control method
	6th	Generalised theory of electrical machines		
	7th	REVISION UNIT-1	**4th**	**PRACTICAL-2** Speed control of dc shunt motor (i) Armature control method (ii) Field control method
	8th	REVISION UNIT-1		
3rd	**9th**	**Unit-2 DC Machines** Main constructional features, Types of armature winding	**5th**	**PRACTICAL-3** Study of dc series motor with starter (to operate the motor on no load for a moment)
	10th	Function of the commutator for motoring and generation action		

	11th	Factors determining induced emf	**6th**	**PRACTICAL-3** Study of dc series motor with starter (to operate the motor on no load for a moment)
	12th	Factors determining the electromagnetic torque		
4th	**13th**	Various types of DC generator	**7th**	**PRACTICAL-4** Determine efficiency of DC motor by Swinburne'sTest at (i)Rated capacity (ii)Half /Full load
	14th	Significance of back e.m.f., the relation between back emf and Terminal voltage		
	15th	Armature Reaction	**8th**	**PRACTICAL-4** Determine efficiency of DC motor by Swinburne'sTest at (i)Rated capacity (ii)Half/ Full load
	16th	Commutation methods to improve commutation		
5th	**17th**	Performance and characteristics of different types of DC motors	**9th**	**PRACTICAL-5** 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
	18th	Speed control of dc shunt/series motors		
	19th	Need of starter, three point dc shunt motor starter and 4-point starter	**10th**	**PRACTICAL-5** 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
	20th	Electric Braking &Applications of DC motors		
6th	**21st**	Faults in dc machines & their retrospective, Losses in a DC machine	**11th**	**PRACTICAL-6** To find the efficiency and regulation of single phase transformer by actually loading it.
	22nd	Determination of losses by Swinburne's test		
	23rd	Rating and Specifications of DC machines	**12th**	**PRACTICAL-6** To find the efficiency and regulation of single phase transformer by actually loading it.
	24th	REVISION UNIT-2		
7th	**25th**	REVISION UNIT-2	**13th**	**PRACTICAL-7** Checking the polarity of the windings of a three phase transformer and connecting the windings in various configurations
	26th	REVISION UNIT-2		

	27th	REVISION UNIT-2	**14th**	**PRACTICAL-7** Checking the polarity of the windings of a three phase transformer and connecting the windings in various configurations
	28th	REVISION UNIT-2		
8th	**29th**	**Unit-3 Transformers(Single phase)** Introduction	**15th**	**PRACTICAL-8** Finding the voltage and current relationships of primary and secondary of a three phase transformer under balanced load in various configurations conditions such as Star-star Star delta Delta star Delta - Delta configuring conditions
	30th	Constructional features of a transformer and parts of transformer		
	31st	Working principle of a transformer	**16th**	**PRACTICAL-8** Finding the voltage and current relationships of primary and secondary of a three phase transformer under balanced load in various configurations conditions such as Star-star Star delta Delta star Delta - Delta configuring conditions
	32nd	EMF equation		
9th	**33rd**	Transformer on no-load and its phasor diagram	**17th**	REVISION PRACTICAL-1
	34th	Transformer – neglecting voltage drop in the windings – Ampere turn balance – its phasor diagram		
	35th	Mutual and leakage fluxes, leakage reactance	**18th**	REVISION PRACTICAL-1
	36th	Transformer on load, voltage drops and its phasor diagram		
10th	**37th**	Equivalent circuit	**19th**	REVISION PRACTICAL-2
	38th	Relation between induced emf and terminal voltage, regulation of a transformer-mathematical relation		
	39th	Losses in a transformer	**20th**	REVISION PRACTICAL-2
	40th	Open circuit and short circuit test. Calculation of efficiency, condition for maximum efficiency-maintenance of Transformer, scheduled Maintenance		
11th	**41st**	Auto transformer construction, saving of copper, working and applications		REVISION PRACTICAL-3

	42nd	Different types of transformers including dry type transformer	**21st**	
	43rd	Rating and Specifications of Single Phase Transformer	**22nd**	REVISION PRACTICAL-3
	44th	REVISION UNIT-3		
12th	**45th**	REVISION UNIT-3	**23th**	REVISION PRACTICAL-4
	46th	REVISION UNIT-3		
	47th	REVISION UNIT-3	**24th**	REVISION PRACTICAL-4
	48th	REVISION UNIT-3		
13th	**49th**	**Unit-4 Transformers three phase** Construction of three phase transformers	**25th**	REVISION PRACTICAL-5
	50th	And accessories of transformers such as Conservator, breather(Brief idea)		
	51st	Buchholz Relay, Tap Changer (off load and on load) (Brief idea)	**26th**	REVISION PRACTICAL-5
	52nd	Types of three phase transformer i.e. delta-delta, delta-star, star-delta and star-star		
14th	**53rd**	Conditions for parallel operation (only conditions are to be studied)	**27th**	REVISION PRACTICAL-6
	54th	On load tap changer		
	55th	Difference between power and distribution transformer	**28th**	REVISION PRACTICAL-6
	56th	Cooling of transformer		
15th	**57th**	Rating and Specifications of Three Phase Transformers	**29th**	REVISION PRACTICAL-7&8
	58th	REVISION UNIT-4		
	59th	REVISION UNIT-4	**30th**	REVISION PRACTICAL-7&8
	60th	REVISION UNIT-4		

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Electrical Engineering Department

Lesson Plan

Name of Faculty	**Sh. Kuldeep Mittal**
Discipline	**Electrical Engineering**
Semester	**4th**
Subject	**Electrical Measuring Instruments and Instrumentation**
Lesson Plan Duration	**From 6 March 2023 to 23 June 2023**
Work load [Theory + Practical] Per Week	**[04+02]**

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 Faculty	**Sh. Sandeep Kumar**
Discipline	**Electrical Engineering**
Semester	**4th (even- semester)**
Subject	**Installation and maintenance of electrical equipment**
Lesson Plan Duration	**From 6 March 2023 to 23 June 2023**
Work load (Theory) Per Week	**(04)**

Week	Day	Topics
1st	1	**Unit 1 : Tools, Accessories** and instruments required for installation maintenance
	2	accessories and repair work Knowledge of Indian Electricity rules, safety codes,
	3	causes prevention of accidents, artificial respiration of an electrocuted person
	4	workmen's safety devices
2nd	1	Class test and revision
	2	**Unit 2 : Installation**, 2.1 Installation of transmission and Distribution Lines:
	3	Erection of steel structures, connecting jumpers, tee-off points, joints and dead ends
	4	crossing of roads, streets, power/telecommunication lines and
3rd	1	railway line crossings clearances; earthing of transmission lines and guarding,
	2	spacing and configuration of conductors:
	3	Arrangement for suspension and strain insulators, bird guards, anti-climbing devices and danger plates;
	4	Sizes of conductor, earth wire and guy wires.
4th	1	Laying of service lines, earthing, provision of service fuses,
	2	installation of energy meters
	3	**2.2 Laying of Underground Cables**:
	4	Inspection, storage, transportation and handling of cables
5th	1	cable handling equipment, cable laying depths and clearances from other services
	2	such as: water, sewerage, gas, heating and other mains,
	3	and also a series of power and telecommunication cables and coordination with these services
	4	excavation of trenches, direct cable laying, including laying of cable from the drum,
6th	1	laying cable in the trench, taking all measurements and making drawings,
	2	back filling of trenches with earth or sand, Laying protective layer of bricks etc.
	3	Laying of cables into pipes and conduits and within buildings.
	4	Class test/ revision
7th	1	Problem solution
	2	*2.3 Elementary idea regarding*, inspection and handling of transformers;
	3	pole mounted substations, plinth mounted substations, grid substation, bus bars
	4	isolators, voltage and current transformers, lightning arrestors,
8th	1	control and relay panels, HT/LT circuit breakers, LT switches, installation of
	2	Power/distribution transformers, dehydration. Earthing system
	3	fencing of yard, equipment foundations and trenches etc.
	4	*2.4 Testing of various electrical equipment* such as electrical motor,
9th	1	transformers, cables, and generators, motor control centres, medium
	2	voltage distribution panels, power control centres, motor control centres,
	3	lighting arrangement, storage, pre-installation checks, connecting and
	4	starting, pre-commissioning checks, drying out
10th	1	Class test/ revision
	2	Problem solution
	3	**3 Maintenance**
	4	*3.1 Types of maintenance*, maintenance schedules, procedures

11th	1	*3.2 Maintenance of Transmission and Distribution System*
	2	Authorized persons, danger notice, caution notice, permit to work,
	3	arranging of shutdowns personally, temporary earthing,
	4	cancellation of permit and restoration of supply
12th	1	Patrolling and visual inspection of lines - points to be noted during patrolling from ground;
	2	special inspections and night inspections; Location of faults using Meggar, effect of open or loose neutral connections,
	3	provision of proper fuses on service lines and their effect on system, causes of dim and flickering lights
	4	*3.3 Maintenance of Distribution Transformers*
13th	1	Transformer maintenance and points to be attended to in respect of various items of equipment
	2	Checking of insulation resistance, transformer oil level and BDV test of oil, measurement of earth resistance
	3	*3.4 Maintenance of Grid Substations,* Checking and maintenance of busbars,
	4	Isolating switches, HT/LT circuit breakers, LT switches. Power transformers
14th	1	*3.5 Maintenance of Motors* , Over hauling of motors, preventive maintenance, trouble shooting of electric motors
	2	*3.6 Domestic Installation: Introduction*
	3	testing of electrical installation of a building, testing of insulation resistance to earth,
	4	testing of insulation and resistance between conductors,
15th	1	continuity or open circuit test
	2	Class test/ revision
	3	Viva-voice related to subject
	4	Revision/Review/Test of old HSBTE Papers