

Lesson Plan

Name of the Faculty : Mr. Rahul Nehra
Discipline : Electrical Engineering
Semester : 5th Semester
Subject : Electrical Machines-II
Lesson Plan Duration : 13-15 Week

Week	Theory		Practical	
	Lecture Day	Topic (including assignment / test)	Practical Day	Topic
	1	Introduction to 3-Phase Induction Motor	1	Determination of efficiency by (a) no load test and blocked rotor test on an induction motor (b) direct loading of an I.M.
	2	Constructional features of squirrel cage and slip ring 3-phase induction Motors	2	Determination of effect of rotor resistance on torque speed curve of an induction motor
	3	Principle of operation, slip and its significance	3	Observe the performance of Ceiling fan without capacitor To study the effect of a capacitor on the performance single phase induction motor and reverse the direction of rotation.
	4	Locking of rotor and stator fields	4	To plot relationship between no load terminal voltage and excitation current in a synchronous generator at constant speed
	5	Rotor resistance, inductance	5	Determination of the relationship between the voltage and load current of an alternator, keeping excitation and speed
	6	Relationship between copper loss and motor slip	6	Determination of the regulation and efficiency of alternator from the open circuit and short circuit test
	7	Power flow diagram of an induction motor	7	Determination of the effect of variation of excitation on performance of a synchronous motor
	8	Factors determining the torque, Torque-slip curve, stable and unstable zones		
	9	Effect of rotor resistance upon the torque slip relationship		
	10	Double cage rotor motor and its applications		
	11	Starting of 3-phase induction motors,		

		DOL		
	12	Star-delta, auto transformer starting		
	13	Causes of low power factor of induction motors		
	14	Testing of 3-phase induction motor on no load		
	15	And blocked rotor test and to find efficiency		
	16	Speed control of induction motor		
	17	Harmonics and its effects		
	18	Cogging and crawling in Induction Motors		
	19	Specification and rating of induction motor		
	20	Single phase induction motors		
	21	Construction characteristics and applications		
	22	Nature of field produced in single phase induction motor		
	23	Split phase induction motors		
	24	Type of Induction Motor		
	25	Capacitors start and run		
	26	Shaded pole		
	27	Alternating current series motor and universal motors		
	28	1-phase synchronous motor Reluctance type		
	29	Brief description about Synchronous Motor		
	30	Hysteresis motor		
	31	Synchronous Machines		
	32	Main Construction features of Synchronous Machines including commutator and brushless excitation system.		
	33	Production of rotating magnetic field in a 3-phase winding		
	34	Generation of 3-phase emf		
	35	Concept of distribution factor and emf equation		
	36	Armature reaction at unity, lag and leading power factor		
	37	Equivalent circuit diagram of synchronous machine		
	38	Concept of voltage regulation. Determination of voltage regulation by synchronous impedance method.		
	39	Operation of single synchronous machine		

		independently supplying a load.		
	40	Concept of infinite bus bar. Need and necessary conditions of parallel operation of alternators, Synchronizing an alternator (Synchroscope method) with the bus bars		
	41	Operation of synchronous machine as a motor –its starting methods		
	42	Effect of change in excitation of a synchronous motor, V curve, Concept of synchronous condenser.		
	43	Concept and cause of hunting and its prevention		
	44	Specification, rating and cooling of synchronous machines		
	45	Applications of synchronous machines		
	46, 47	Construction, working principle and application of linear induction motor, stepper motor, AC Servomotor, Submersible Motor,		
	48	Revision of Topics already covered		
	49	Class Test		
	50	Problems, Doubts & their solution		
	51	Revision of important topics		

Lesson Plan

Name of the Faculty : Mr. Ashish Kumar Yadav
Discipline : Electrical Engineering
Semester : 5th Semester
Subject : UTILIZATION OF ELECTRICAL ENERGY
Lesson Plan Duration : 13-15 Week

Week	Theory		Practical	
	Lecture Day	Topic (including assignment / test)	Practical Day	Topic
	1	Advantage of Electric heating		
	2, 3	Heating Methods :Resistance heating – direct and indirect resistance heating, electric ovens, their temperature range, properties of resistance heating elements, domestic water heaters and other heating appliances, thermostat control circuit		
	4	Induction heating; principle of core type and coreless induction furnace, their construction and applications		
	5	Electric arc heating; direct and indirect arc heating, construction, working and applications of arc furnace		
	6, 7	Dielectric heating, applications in various industrial fields Infra-red heating and its applications (construction and working of two appliances)		
	8	Microwave heating and its applications (construction and working of two appliances), Solar Heating		
	9	Calculation of resistance heating elements (simple problems)		
	10, 11	Advantages of electric welding, Welding method, Principles of resistance welding, types – spot, projection, seam and butt welding, welding equipment		
	12, 13	Principle of arc production, electric arc welding, characteristics of arc; carbon arc, metal arc, hydrogen arc welding method and their applications. Power supply requirement. Advantages of using coated electrodes, comparison between AC and DC arc welding, welding control circuits, welding of		

		aluminum and copper		
	14, 15	Need of electro-deposition, Laws of electrolysis, process of electro-deposition - clearing, operation, deposition of metals,		
	16	polishing and buffering, Equipment and accessories for electroplating		
	17	Factors affecting electro-deposition, Principle of galvanizing and its applications		
	18	Principles of anodizing and its applications		
	19	Electroplating of non-conducting materials		
	20	Manufacture of chemicals by electrolytic process		
	21, 22	Principle of air conditioning		
	23, 24	Description of Electrical circuit used in a) Refrigerator, b) Air-conditioner, and c) Water cooler		
	25	Advantages of electric drives, Characteristics of different mechanical loads		
	26	Types of motors used as electric drive		
	28	General idea about the methods of power transfer by direct coupling by using devices like belt drive, gears, chain drives etc.		
	29	Examples of selection of motors for different types of domestic loads		
	30	Selection of drive for applications such as general workshop, textile mill, paper mill, steel mill, printing press, crane and lift etc. Application of flywheel.		
	31, 32	Selection of motors for Domestic Appliances		
	33, 34	Advantages of electric traction over other types of traction., Different systems of electric traction, DC and AC systems, diesel electric system, types of services – urban, sub-urban, and main line and their speed-time curves.		
	35, 36	Different accessories for track electrification; such as overhead catenary wire, conductor rail system, current collector-pentagraph		
	37, 38	Factors affecting scheduled speed		
	39	Electrical block diagram of an electric locomotive with description of various equipment and accessories used.		
	40	Types of motors used for electric traction		

	41	Power supply arrangements		
	42	Starting and braking of electric locomotives		
	43	Introduction to EMU and metro railways		
	44	Train Lighting Scheme		
	45,46	Revision of Topics		

Lesson Plan

Name of the Faculties : Mr. Amit Kumar, Mr. Ashish Kumar Yadav, Mr. Rahul Nehra, Mr. Prankit Gupta
Discipline : Electrical Engineering
Semester : 5th Semester
Subject : PROGRAMMABLE LOGIC CONTROLLERS & MC
Lesson Plan Duration : 13-15 Week

Week	Theory		Practical	
	Lecture Day	Topic (including assignment / test)	Practical Day	Topic
	1, 2, 3, 4, 5, 6	Introduction to PLC, What is PLC, concept of PLC, Building blocks of limitations of relays. Advantages of PLCs over programming languages, PLC manufacturer etc. PLC, Functions of various blocks,	1, 2	Components/sub-components of a PLC, Learning functions of different modules of a PLC system
	7, 8	Basic operation and principles of PLC	3, 4	Practical steps in programming a PLC (a) using a Hand held programmer (b) using computer interface
	9, 10	Architectural details processor	5, 6	Demonstration to step 5 programming language, ladder diagram concepts, instruction list syntax
	11, 12	Memory structures, I/O structure	7, 8	Basic logic operations, AND, OR, NOT functions
	13, 14	Programming terminal, power supply	9	Logic control systems with time response as applied to clamping operation
	15	Basic instructions like latch, master control self holding relays	10	Sequence control system e.g. in lifting a device for packaging and counting
	16	Timer instruction like retentive timers, resetting of timers	11	Use of PLC for an application(teacher may decide)
	17	Counter instructions like up counter, down counter, resetting of counters	12	Demonstration and study of Architecture of 8085 kit
	18	Arithmetic Instructions (ADD,SUB,DIV,MUL etc.)	13	Testing of general input/output on Micro controller board
	19	MOV instruction	14	Controlling of LED using Microcontroller Programme
	20	RTC(Real Time Clock Function)		
	21, 22	Comparison instructions like equal, not equal, greater, greater than equal, less than, less than equal		
	23, 24, 25, 26, 27	Programming based on basic instructions, timer, counter, sequencer, and comparison instructions using ladder program.		
	28	Assembly,		

		Packaging, Process controls		
	29, 30	Car parking, Doorbell operation, Traffic light control		
	31, 32	Microwave Oven, Washing machine, Motor in forward and reverse direction		
	33, 34, 35	Star-Delta, DOL Starters, Paint Industry, Filling of Bottles, Room Automation		
	36, 37	Introduction to SCADA		
	38	Pin details		
	39, 40	I/o Port structure		
	41, 42, 43	Memory Organisation		
	44, 45, 46	Special function registers		
	47, 48	Timer operation		
	49, 50	Serial Port operation		
	51, 52	Interrupts		
	53, 55	Assemblers and Compilers		
	55, 56, 57	Keypad interface, 7- segment interface, LCD, stepper motor. A/D, D/A, RTC interface.		
	58	Application of Micro controllers		
	59, 60	Revision of Topics already covered		
	61	Class Test		
	62	Problems, Doubts & their solution		
	63, 64	Revision of important topics		

Lesson Plan

Name of the Faculty : Mr. Amit Kumar
Discipline : Electrical Engineering
Semester : 5th Semester
Subject : INSTRUMENTATION
Lesson Plan Duration : 13-15 Week

Week	Theory		Practical	
	Lecture Day	Topic (including assignment / test)	Practical Day	Topic
	1	Importance of measurement	1	To measure the level of a liquid using a transducer
	2	Basic measuring systems	2	To measure temperature using a thermo-couple
	3	Advantages and limitations of each measuring systems	3	Study and use of digital temperature controller
	4	Generalized measurement system	4	Use of thermistor in ON/OFF transducer
	5, 6, 7, 8	Signal conditioning and display devices	5	Study of variable capacitive transducer
	9	Transducers: Theory	6	Draw the characteristics of a potentiometer
	10, 11	Construction and use of various transducers like resistance	7	To measure linear displacement using LVDT
	12	Inductance, capacitance	8	To study the use of electrical strain gauge
	13	Electromagnetic	9	To study weighing machine using load cell
	14, 15	Piezo electric type	10	To study pH meter
	16	Displacement Measuring Devices: wire wound potentiometer		
	17	LVDT		
	18, 19, 20	Strain gauges and their different types such as inductance type, resistive type, wire and foil type etc.		
	21	Gauge factor, gauge materials, and their selections		
	22, 23	Sources of errors and its compensations		
	24	Use of electrical strain gauges		
	25, 26, 27	Strain gauge bridges and amplifiers		
	28, 29	Different types of force measuring devices and their principles		
	30	Load measurements by using elastic Transducers		
	31	Load measurements by using electrical strain gauges		
	32	Load cells, proving rings		

	33, 34	Measurements of torque by brake, dynamometer		
	35	Electrical strain gauges		
	36	Speed measurements; different methods, devices.		
	37	Bourdon pressure gauges, electrical pressure pick ups and their principle		
	38	Construction and applications		
	39	Use of pressure cells		
	40	Basic principles of magnetic and ultrasonic flow meters		
	41	Bimetallic thermometer		
	42	Pressure thermometers		
	43, 44	Thermoelectric thermometers, resistance thermometers, thermocouple, thermistors and pyrometer		
	45	Errors in temperature measurements in rapidly moving fluids. Temperature recorders		
	46, 47	Measurement of other non electrical quantities such as humidity, pH level and vibrations		
	48	Revision of Topics already covered		
	49	Class Test		
	50	Problems, Doubts & their solution		
	51	Revision of important topics		

Lesson Plan

Name of the Faculty : Mr. Amit Kumar
Discipline : Electrical Engineering
Semester : 5th Semester
Subject : ELECTRICAL POWER –I
Lesson Plan Duration : 13-15 Week

Week	Theory		Practical	
	Lecture Day	Topic (including assignment / test)	Practical Day	Topic
	1	Main resources of energy		
	2	Conventional and non-conventional		
	3	Different types of power stations, thermal, hydro, gas		
	4	Diesel and nuclear power stations		
	5, 6	Flow diagrams and brief details of their operation, Comparison of the generating stations on the basis of running cost, site, starting, maintenance		
	7	Importance of non-conventional sources of energy in the present scenario		
	8	Brief details of solar energy, bio-energy, wind energy		
	9	Fixed and running cost		
	10	Load estimation, load curves, demand factor		
	11	Load factor, diversity factor, power factor and their effect on cost of generation, simple problems there on		
	12, 13	Base load and peak load power stations, inter-connection of power stations and its advantages, concept of regional and national grid		
	14, 15	Layout of transmission system, selection of voltage for H.T and L.T lines, advantages of high voltage for Transmission of power in both AC and DC		
	16, 17	Comparison of different systems: AC versus DC for power transmission		
	18	Conductor material and sizes from standard tables		

	19	Types of supports, types of insulators		
	20	Types of conductors, Selection of insulators, conductors, earth wire and their accessories		
	21	Transposition of conductors and string efficiency of suspension type insulators, Bundle Conductors		
	22	Mechanical features of line: Importance of sag, calculation of sag		
	23, 24	Effects of wind and ice related problems; Indian electricity rules pertaining to clearance		
	25, 26,	Electrical features of line: Calculation of resistance inductance and capacitance without derivation in a.c. transmission line, voltage regulation, and concept of corona.		
	28	Effects of corona and remedial measures		
	29	Transmission Losses		
	30	Lay out of HT and LT distribution system		
	31	Constructional feature of distribution lines and their erection		
	32, 33	LT feeders and service mains; Simple problems on AC radial distribution system, determination of size of conductor		
	34	Preparation of estimates of HT and LT lines (OH and Cables).		
	35, 36	Constructional features of LT (400 V), HT (11 kV) underground cables, advantages and disadvantages of underground system with respect to overhead system		
	37	Calculation of losses in distribution system		
	38, 39	Faults in underground cables- determine fault location by Murray Loop Test		
	40	Varley Loop Test		
	41, 42	Brief idea about substations; out door grid sub-station 220/132 KV, 66/33 KV outdoorsubstations		
	43	Pole mounted substations and indoor substation		
	44, 45, 46	Layout of 33/11 and kV/400V distribution substation and various auxiliaries and equipment associated with it		
	47	Concept of power factor Reasons and disadvantages of low power factor		

	48	Methods for improvement of power factor using capacitor banks, VAR Static Compensator (SVC)		
	49	Revision of Topics already covered		
	50	Class Test		
	51	Problems, Doubts & their solution		