

**Govt. Polytechnic Nanakpur (Panchkula)****Electrical Engineering Department****Name of the Faculty: Sh. Neeraj Kamboj****Discipline : Electrical Engineering****Semester : 5th****Subject : Solar Panel Installation & Maintenance****Lesson Plan Duration : 15 weeks(from August, 2020 to Dec,2020)****Work Load (Lecture/Practical)per week(in Hours) : L- 04, P-02**

Week	Theory		Practical
	Day	Topic	Topic
1	1	Introduction Of The Subject, Its Need, Applications	1.Panel Installation
	2	Basics on solar energy	
	3	power generation systems	
	4	Use and handling procedure of solar panels	
2	5	Energy storage	
	6	control and conversion	
	7	Basic electrical system and functioning	
	8	Mechanical equipment ,	
3	9	functioning of Mechanical equipment	
	10	Maintenance procedure of equipment	
	11	Site survey	
	12	design and evaluation of various parameters	
4	13	Tools involved in installation of system	2.Using Tools and Machines
	14	Quality and process standards	
	15	Occupational health	
	16	and safety standards	
5	17	Queries taken from previous topics from students	
	18	Assignment no.1	
	19	Class test no.1	
	20	Discussion on Questions of class test	
6	21	Introduction Of The Installation of Solar Panel	
	22	Installation of Solar Panel	
	23	Solar energy system components such as panels, batteries, charge controllers, inverters	
	24	Solar energy system components such as panels, batteries, charge controllers, inverters	
7	25	Significance of volts, amps and watts	
	26	series connection	
	27	parallel connection	
	28	Voltage requirement of various equipment	
8	29	Panel mounting	

	30	inclination and angle of tilt	3.Handling Safety Equipment
	31	Placement of solar panel mounting	
	32	Sunlight and direction assessment	
9	33	Site surveying methods and evaluation parameters	
	34	Site surveying methods and evaluation parameters	
	35	Tools involved in installation of system	
	36	Tools involved in installation of system	
10	37	Queries taken from previous topics from students	Revision
	38	Assignment no.2	
	39	Class test no.2	
	40	Discussion on Questions of class test	
11	41	Coordinate colleagues at work	Copy Checking
	42	Company's policies on incentives, delivery standards, and personnel management	
	43	Importance of the individual's role in the workflow	
	44	Reporting structure	
12	45	Communicating effectively	Copy Checking
	46	Building team coordination	
	47	4. Safety at workplace	
	48	Maintaining the work area safe and secure	
13	49	Handling hazardous material	Copy Checking
	50	Operating hazardous tools and equipment	
	51	Emergency procedures to be followed such as fire accidents, etc.	
	52	Concept of Solar Tracking System	
14	53	Concept of Solar Tracking System	Revision
	54	Revision of 1 <sup>st</sup> and 2 <sup>nd</sup> chapters	
	55	Revision of 3 <sup>rd</sup> and 4 <sup>th</sup> chapters	
	56	Previous Exam Questions solved	
15	57	Queries taken from previous topics from students	Revision
	58	Assignment no.3	
	59	Class test no.3	
	60	Discussion on Questions of class test	

**Govt. Polytechnic Nanakpur (Panchkula) Haryana**  
**Electrical Engineering Department**  
**Lesson plan**

<b>Name of Faculty</b>				
<b>Discipline</b>		Electrical Engineering		
<b>Semester</b>		5 <sup>th</sup>		
<b>Subject</b>		Electrical Machines-II		
<b>Lesson Plan Duration</b>		From August 2020 to Nov2020		
<b>Work load [Theory + Practical] Per Week</b>		[05+02]		
<b>Week</b>	<b>Day</b>	<b>Theory Topic/ Assignment/ Test</b>	<b>No.</b>	<b>Practical</b>
1 <sup>st</sup>	1	Unit1: Introduction Synchronous Machines	1	Demonstration of revolving field set up by a 3-phase wound stator
	2	Constructional features of synchronous machine		
	3	Generation of three phase emf		
	4	Production of rotating magnetic field in a three phase winding		
	5	Revision/ Review of above Topics		
2 <sup>nd</sup>	1	Concept of distribution and coil span factor	2	To plot relationship between no load terminal voltage and excitation current in a synchronous generator at constant speed
	2	Drive Emf equation, synchronous speed		
	3	Armature reaction at unity, lag and lead power factor		
	4	Voltage regulation using synchronous impedance method		
	5	Revision/ Review of Topics		
3 <sup>rd</sup>	1	Need and necessary conditions of parallel operation of alternators	3	Determination of the relationship between the voltage and load current of an alternator, keeping excitation and speed
	2	Operation of synchronous machine as a motor –its starting methods		
	3	Effect of change in excitation of a synchronous motor		
	4	Concept and Cause of hunting and its prevention		
	5	Revision/ Review of above Topics		
4 <sup>th</sup>	1	Rating and cooling of synchronous machines	4	Revision/ file checking
	2	Applications of synchronous machines (as an alternator, as a synchronous condenser)		
	3	Revision of important topics		
	4	Assignment / Class test		
	5	Revision/ Review of above Topics		
5 <sup>th</sup>	1	Problem solution/ test check	5	Determination of the regulation and efficiency of alternator from the open circuit and short circuit test
	2	Unit2: Introduction to Induction Motors		
	3	constructional features of squirrel cage and slip ring 3-phase induction Motors		
	4	Principle of operation, slip and its significance		
	5	Revision/ Review of above Topics		
	1	Locking of rotor and stator fields		

6 <sup>th</sup>	2	Rotor resistance, inductance	6	Synchronization of polyphase alternators and load sharing
	3	Emf Equation and current relations		
	4	Relationship between copper loss and motor slip		
	5	Revision/ Review of above Topics		
7 <sup>th</sup>	1	Power flow diagram of an induction motor	7	Determination of the effect of variation of excitation on performance of a synchronous motor
	2	Factors determining the torque, Torque-slip curve, stable and unstable zones		
	3	Effect of rotor resistance upon the torque slip relationship		
	4	Double cage rotor motor and its applications		
	5	Revision/ Review of above Topics		
8 <sup>th</sup>	1	Starting of 3-phase induction motors, DOL	8	Study of ISI/BIS code for 3-phase induction motors
	2	Star-delta, auto transformer starting		
	3	Causes of low power factor of induction motors		
	4	Testing of 3-phase induction motor on no load		
	5	Revision of Unit No-01		
9 <sup>th</sup>	1	And blocked rotor test and to find efficiency	9	Revision/ file checking
	2	Speed control of induction motor		
	3	Harmonics and its effects		
	4	cogging and crawling in Induction Motors		
	5	Revision of Unit No-01		
10 <sup>th</sup>	1	Revision of important topics	10	Determination of efficiency by (a) no load test and blocked rotor test on an induction motor
	2	Assignment / Class test		
	3	Problem solution/ Class Test check		
	4	Unit3: Fractional Kilo Watt (FKW) Motors		
	5	And its description		
11 <sup>th</sup>	1	Single phase induction motors	11	Determination of effect of rotor resistance on torque speed curve of an induction motor
	2	Construction characteristics and applications		
	3	Nature of field produced in single phase induction motor		
	4	Split phase induction motors		
	5	Type of Induction Motor		
12 <sup>th</sup>	1	Capacitors start and run	12	Revision/ file checking
	2	Shaded pole, Reluctance start motor		
	3	Alternating current series motor and universal motors		
	4	1-phase synchronous motor Reluctance type		
	5	Brief description about Synchronous Motor		
13 <sup>th</sup>	1	Hysteresis motor	13	To study the effect of a capacitor on the single phase induction motor to reverse the direction of rotation.
	2	Revision of important topics		
	3	Assignment / Class test		
	4	Problem solution/ test check		
	5	Revision of important topics		
	1	Unit4:Special Purpose Machines		

14 <sup>th</sup>	2	Construction and working principle of linear induction motor	14	Quiz /viva-voice related to electrical machine
	3	stepper motor		
	4	Servomotor		
	5	Revision of important topics		
15 <sup>th</sup>	1	submersible motor	15	Quiz /viva-voice related to electrical machine
	2	introduction to energy efficient motors		
	3	Assignment / Class test		
	4	Problem solution/ test check		
	5	Problem solution/ test check		
16 <sup>th</sup>	1	Problem solution/ test check	16	Internal Practical
	2	Revision/Review/Test of old HSBTE Papers		
	3	Revision/Review/Test of old HSBTE Papers		
	4	Revision/Review/Test of old HSBTE Papers		
	5	Revision/Review/Test of old HSBTE Papers		

**Govt. Polytechnic Nanakpur (Panchkula) Haryana**  
**Electrical Engineering Department**  
**Lesson plan**

Name of Faculty	Sh. Neeraj Kamboj
Discipline	Electrical Engineering
Semester	5 <sup>th</sup> (odd- semester)
Subject	Electrical Power- I
Lesson Plan Duration	From August 2020 to Nov2020
Work load (Theory + Practical ) Per Week	(04+00)

Week	Day	Topics
1 <sup>st</sup>	1	Unit1:introduction to Power Generation
	2	Main resources of energy, conventional and non-conventional
	3	Different types of power stations, thermal power plant
	4	Hydro Power plant Flow diagrams and operation
2 <sup>nd</sup>	1	Gas power plant Flow diagrams and operation
	2	diesel power station Flow diagrams and operation
	3	nuclear power Plant Flow diagrams and operation
	4	comparison of the generating stations on the basis of running cost, site, starting, maintenance
	1	Revision/Assignment/ Class Test

3 <sup>rd</sup>	2	Unit2: Introduction to Economics of Generation
	3	Fixed and running cost, load estimation, load curves
	4	Demand factor, load factor, diversity factor
4 <sup>th</sup>	1	Power factor and their effect on cost of generation
	2	Simple problems based on above relations
	3	Revision/Assignment/ Class Test
	4	Base load and peak load power stations
5 <sup>th</sup>	1	inter-connection of power stations and its advantages
	2	Concept of regional and national grid
	3	Revision/Assignment/ Class Test
	4	Revision/Assignment/ Class Test
6 <sup>th</sup>	1	Unit3: Introduction to Transmission Systems
	2	Layout of transmission system, selection of voltage for H.T and L.T lines
	3	advantages of high voltage for Transmission of power in both AC and
	4	Comparison of different systems: AC versus DC for power transmission,
7 <sup>th</sup>	1	material and sizes from standard tables
	2	Constructional features of transmission lines
	3	Types of supports
	4	Types of insulators
8 <sup>th</sup>	1	Types of conductors, Selection of insulators
	2	conductors, earth wire and their accessories
	3	Transposition of conductors and string efficiency of suspension type insulators, Bundle Conductors
	4	Mechanical features of line
9 <sup>th</sup>	1	Importance of sag, calculation of sag,
	2	effects of wind and ice related problems
	3	Indian electricity rules pertaining to clearance
	4	Electrical features of line: Calculation of resistance, inductance and capacitance
10 <sup>th</sup>	1	A.C. transmission line, voltage regulation, and concept of corona. Effects of corona and remedial measures
	2	Transmission Losses
	3	Revision/Assignment/ Class Test
	4	Revision/Assignment/ Class Test
11 <sup>th</sup>	1	Unit 4: Distribution System Lay out of HT and LT distribution system
	2	constructional feature of distribution lines and their erection
	3	LT feeders and service mains
	4	Simple problems on AC radial distribution system
12 <sup>th</sup>	1	Determination of size of conductor
	2	Preparation of estimates of HT and LT lines
	3	Constructional features of LT (400 V), HT (11 kV) underground cables
	4	Advantages and disadvantages of underground system with respect to overhead system.
13 <sup>th</sup>	1	Calculation of losses in distribution system
	2	Faults in underground cables-determine fault location by

	3	Murray Loop Test, Varley Loop Test
	4	Revision/Assignment/ Class Test
14 <sup>th</sup>	1	Revision/Problem solution/ Class Test
	2	Unit 5: Substations: Brief idea about substations
	3	Outdoor grid sub-station 220/132 KV, 66/33 KV outdoor substations
	4	Pole mounted substations and indoor substation
15 <sup>th</sup>	1	Layout of 33/11 distribution substation and various auxiliaries
	2	Layout of kv/400V distribution substation and various auxiliaries
	3	Revision/Assignment/ Class Test
	4	Unit 6: power factor, reasons and disadvantages of low power factor
16 <sup>th</sup>	1	Methods for improvement of power factor using capacitor banks, VAR Static Compensator (SVC)
	2	Revision and problem solution
	3	Revision/Review/Test of old HSBTE Papers
	4	Revision/Review/Test of old HSBTE Papers

### Lesson Plan

**Name of the Faculty:**

**Discipline : Electrical Engineering**

**Semester : 5th**

**Subject : Utilisation of Electrical Energy**

**Lesson Plan Duration : 15 weeks(from August to November 2020)**

Week	Day	Topic
1	1	Introduction Of The Subject, Its Need, Applications
	2	Nature Of Light, Visibility Spectrum Curve Of Relative Sensitivity Of Human Eye And Wave Length Of Light
	3	Definition: Luminous Flux, Solid Angle, Luminous Intensity
	4	Illumination, Luminous Efficiency, Depreciation Factor, Coefficient Of Utilization
	5	Space To Height Ratio, Reflection Factor, Glare, Shadow, Lux
2	6	Laws Of Illumination - Simple Numericals
	7	Different Type Of Lamps, Construction And Working Of Incandescent And Discharge Lamps - Their Characteristics, Fittings Required For Filament Lamp
	8	Mercury Vapour Sodium Lamp, Fluorescent Lamp, Halogen Lamp, Neon Lamp
	9	Compact Filament Lamp(Cfl), Led Lamp, Comparison Of Incandescent, Fluorescent, CFL & LED
	10	Calculation Of Number Of Light Points For Interior Illumination,
3	11	Calculation Of Illumination At Different Points, Considerations Involved In Simple Design Problems
	12	Illumination Schemes; Indoor And Outdoor Illumination Levels

	13	Main Requirements Of Proper Lighting; Absence Of Glare, Contrast And Shadow
	14	Awareness About Time Switches, Street Lighting, Flood Lighting
	15	Monument Lighting And Decorative Lighting, Light Characteristics Etc.
4	16	Advantages Of Electrical Heating, Resistance Heating - Direct Resistance Heating
	17	Indirect Resistance Heating, Electric Ovens, Their Temperature Range
	18	Properties Of Resistance Heating Elements, Domestic Water Heaters
	19	Other Heating Appliances, Thermostat Control Circuit
	20	Induction Heating; Principle Of Core Type Induction Furnace, Their Construction And Applications
5	21	Principle Of Coreless Type Induction Furnace, Their Construction And Applications
	22	Electric Arc Heating; Direct And Indirect Arc Heating
	23	Construction, Working And Applications Of Arc Furnace
	24	Dielectric Heating, Applications In Various Industrial Fields
	25	Infra-Red Heating And Its Applications
6	26	Microwave Heating And Its Applications
	27	Solar Heating
	28	Calculation Of Resistance Heating Elements
	29	Advantages Of Electric Welding, Principles Of Resistance Welding
	30	Spot, Projection And Seam Welding
7	31	Butt Welding, Welding Equipment
	32	Principle Of Arc Production, Electric Arc Welding, Characteristics Of Arc
	33	Carbon Arc And Metal Arc Welding
	34	Hydrogen Arc Welding Method And Their Applications
	35	Power Supply Requirement. Advantages Of Using Coated Electrodes
8	36	Comparison Between Ac And Dc Arc Welding
	37	Welding Control Circuits, Welding Of Aluminum And Copper
	38	Introduction To Electro Deposition, Need Of Electro-Deposition
	39	Laws Of Electrolysis
	40	Process Of Electro-Deposition - Clearing, Operation, Deposition of Metals, Polishing And Buffing
9	41	Equipment And Accessories For Electroplating
	42	Factors Affecting Electro-Deposition
	43	Principle Of Galvanizing And Its Applications, Principles Of Anodizing And Its Applications
	44	Electroplating Of Non-Conducting Materials
	45	Manufacture Of Chemicals By Electrolytic Process
10	46	Power Supplies For Electroplating
	47	Principle Of Air Conditioning, Vapour Pressure, Refrigeration Cycle, Eco-Friendly Refrigerants
	48	Electrical Circuits Used In Refrigeration
	49	Electrical Circuits Used In Air Conditioning
	50	Electrical Circuits Used In Water Coolers.
11	51	Advantages Of Electric Drives, Characteristics Of Different Mechanical Loads
	52	Types Of Motors Used As Electric Drive



	53	Electric Braking - Plugging
	54	Electric Braking - Rheostatic Braking
	55	Electric Braking - Regenerative Braking
12	56	General Idea About The Methods Of Power Transfer By Direct Coupling And Belt Drive
	57	Gears, Chain Drives Etc.
	58	Examples Of Selection Of Motors For Different Types Of Domestic Loads
	59	Selection Of Drive For Applications Such As General, Workshop, Textile Mill, Papermill
	60	Selection Of Drive For Applications Such As Steel Mill, Printing Press, Crane And Lift Etc
13	61	. Application Of Flywheel, Specifications Of Commonly Used Motors E.G. Squirrel Cage Motors, Slip Ring Induction Motors
	62	Specifications Of Ac Series Motors, Fractional Kilo Watt(Fkw) Motors
	63	Selection Of Motors For Domestic Appliances
	64	Advantages Of Electric Traction Over Other Types Of Traction
	65	Different Systems Of Electric Traction, Dc And Ac Systems, Diesel Electric System
14	66	Types Of Services - Urban, Sub-Urban, And Main Line And Their Speed-Time Curves
	67	Different Accessories For Track Electrification; Such As Overhead Catenary Wire
	68	Conductor Rail System, Current Collector-Pentagraph
	69	Factors Affecting Scheduled Speed
	70	Electrical Block Diagram Of An Electric Locomotive With Description Of Various Equipment And Accessories Used
15	71	Types Of Motors Used For Electric Traction
	72	Power Supply Arrangements
	73	Starting And Braking Of Electric Locomotives
	74	Introduction To Emu And Metro Railways
	75	Train Lighting Scheme

## LESSON PLAN

**Name of the faculty:**

**Discipline :** Electrical Engg.

**Semester :** 5th

**Subject :** Programmable logic controllers  
and Microcontrollers

**Lesson Plan Duration :** 15 weeks (from August  
to Nov,2020)

**Work load (Lecture/Practical) per week : Lectures-05,  
Practicals-02 hrs per group**

Week	Theory		Practical	
	Lecture day	Topic	Practical day	Topic
1st	1	What is PLC, concept of PLC	1st	Components/ subcomponents of a PLC and learning functions of different modules of a PLC system
	2	Building blocks of PLC		
	3	Functions of various blocks of PLC		
	4	Limitations of relays, Advantages of PLCs over electromagnetic relays		
	5	Revision and class test		
2nd	6	Different programming languages,	2nd	Practical steps in programming a PLC using hand held programmer
	7	PLC manufacturers and applications of PLC		
	8	Basic operation of PLC-		
	9	Principles of PLC		
	10	Revision and class test		
3rd	11	Architectural details of Processor-Part-I	3rd	Practical steps in programming a PLC using computer interfacing
	12	Architectural details of Processor-Part-II		
	13	Memory Structures		
	14	Input/output structures		
	15	Revision and class test		
4th	16	Programming Terminals of PLC	4th	Introduction to step 5 programming language, ladder diagram concepts, instruction list syntax
	17	Power supply to PLC		
	18	Basic instructions for latch		
	19	Master control self holding		

		relays		
	20	Revision and class test		
5th	21	Timer instructions-ON and OFF delay	5th	Basic logic operations, AND, Or, NOT functions
	22	Retentive timers, resetting of timers		
	23	Counter instructions like up counter, down counter, resetting of counters		
	24	Arithmetic Instructions (ADD,SUB,DIV,MUL etc.)		
	25	Revision and class test		
6th	26	MOV instruction, RTC (Real Time Clock function)	6th	Logic control systems with time response as applied to clamping operation
	27	Comparison instructions like equal, not equal, greater, greater than equal, less than, less than equal		
	28	Programming on Basic instructions		
	29	Programming on Timer instructions		
	30	Revision and class test		
7th	31	Programming on Counter instructions	7th	Sequence control system in lifting a device for packaging and counting
	32	Programming on Sequencer instructions		
	33	Programming on comparison instructions		
	34	Revision of Ladder diagram Programming		
	35	Revision and class test		
8th	36	Assembly line, Packaging, Process control	8th	Use of PLC for Door Bell operation
	37	Car parking, Doorbell operation, Traffic light control		
	38	Microwave oven, Washing machine, Motor in forward and reverse direction		
	39	Star delta, DOL Starter, paint industry ,filling of bottles, room Automation		
	40	Revision and class test		

9th	41	Microcontroller -Overview	9th	Use of PLC for Traffic light system
		Block diagram and architecture of Microcontroller		
	42	Overview of MCS-51		
	43	8051 -Pin details		
	44	Revision and class test		
10th	45	Input port structures	10th	Use of PLC for Packing process control
		Output port structures		
	46	Memory organisation		
	47	Special function registers		
	48	Revision and class test		
11th	49	Revision of Microcontroller	11th	Use of PLC for Car parking system
		Instruction set of MCS-51		
	50	Addressing modes		
	51	Timer operation		
	52	Revision and class test		
12th	53	Serial port operation and communication	12th	Familiarization with the study of architecture of 8085 kit, basic sub systems and input output connectors, function keys
		Interrupts and its types		
	54	Assemblers operations & compilers		
	55	Assembler directives		
	56	Revision and class test		
13th	57	keypad interfacing	13th	Familiarization of Microcontroller 8051 kit
		7- segment interface, LCD		
	58	Stepper motor interfacing		
	59	A/D, D/A interfacing		
	60	Revision and class test		
14th	61	RTC interfacing	14th	Testing of general input/output on microcontroller board
		Introduction of PIC Micro controllers		
	62	Features of PIC 16C84		
	63	Architecture of PIC 16C84		
	64	Revision and class test		
15th	65	Applications of microcontrollers	15th	Development of Electrical, Instrumentation applications using 8051 microcontroller
		Radio control system		
	66	Revision of complete syllabus		
	67	Revision and class test		
	68	Discussion of previous year HSBTE question papers		
	69			

**Govt.Polytechnic Nanakpur**  
**Electrical Engineering Department**  
**Lesson plan**

<b>Name of Faculty</b>	
<b>Discipline</b>	<b>Electrical Engineering</b>
<b>Semester</b>	<b>5th</b>
<b>Subject</b>	<b>Soft Skills-III</b>
<b>Lesson Plan Duration</b>	<b>From August 2020 to November 2020</b>
<b>Work load [Practical] Per Week</b>	<b>[02 Pr.]</b>

<b>WEEK</b>	<b>DATE</b>	<b>TOPIC</b>
1		Learning outcomes.
		Communications skills- handling
2		Communication skills phobia.
		How to write resume.
3		Resume writing.
		Difference between CV and biodata.
4.		Copy checking.
		Students communication viva.
4.		Communication skills- improving non verbal communication.
		Apply for job through email.
5.		Discussion about various job portal.
		Any left out topic discussion from above.
6.		Mock interview.
		Mock interview.
7.		Group discussion.
		Group discussion
9.		Group discussion.
		Practices of above.
10.		Above discussion will continue.
		Presentation techniques.

11.		Presentation techniques
		Copy checking.
12.		seminar.
		Seminar.
13.		Discussion about safety.
		Disaster management.
14.		Surprise viva.
		Safety and cleanliness.
15.		Swachh abiyaan in institute.
		do
16.		Expert lecture on above topics.
		Expert lecture on above topics.