

GOVERNMENT CO-ED POLYTECHNIC, JAGDALPUR BASTAR(C.G)

DEPARTMENT OF ELECTRICAL ENGINEERING

LESSON PLAN

Session: - July - Dec 2025

Semester: - 5th

Session start date as per University Calendar: - 25/08/2025

Course Name: - Power System Operation and Protection

Course Code: - 2024572(024)

Name of Subject teacher: - BHOLENATH TAMBOLI

Unit -1 Representation of Power System

Class Room Instruction (CI)	No. of Periods	Laboratory Instruction (LI)	No. of Periods	Remark
1.1 Single line representation of a simple power system with standard symbols, Single Phase representation of balanced three phase networks	2	1.1 Determine per unit impedance of a given three phase system. 1.2 Prepare the Single line diagram of your institute power supply system..	2	
1.2 Per unit (PU system) :Introduction, representation, change of base and simple numerical	1			
1.3 change of base and simple numerical.	1			
1.4 Complex power flow, Concept of torque or Load angle (δ) and Power factor angle (θ).	2			
1.5 Simplified representation of Synchronous Machines, Simplified representation of Synchronous Machines.	1			

Number of periods planned (CI + LI) : 07+02

Unit – 2 Power System faults and Stability

Class Room Instruction (CI)	No. of Periods	Laboratory Instruction (LI)	No. of Periods	Remark
2.1 Symmetrical Faults: Definition of transients in a transmission lines, Subtransient, transient and steady state period reactance offered.	1	2.1 Demonstrate fault study with single line and double line in 3 phase system.	2	
2.2 LLL and LLLG faults	1	2.2 Demonstrate the LLL, LLLG and LG, LL, LLG faults.		
2.3 Definition: Short Circuit Capacity (SCC) of a bus, Simple Numerical	1			
2.4 Unsymmetrical faults : LG, LL, LLG faults and their effects	3			
2.5 Stability: Introduction, Steady state and transients stability, Stability limit	1			
2.6 Transient stability ; swing curve, Introduction to equal area criteria of stability and its applications.	2			
2.7 Methods of improving stability.	1			

Number of periods planned (CI + LI) : 10+02

Unit – 3 Active and Reactive Power Control

Class Room Instruction (CI)	No. of Periods	Laboratory Instruction (LI)	No. of Periods	Remark
3.1 Introduction to active and reactive power in power system and their sources.	2	3.1 Simulate real and reactive power control methods using AGC of long distance transmission line (using 'Power World' simulator).	2	
3.2 Requirement of reactive power in power system.	1			
3.3 Effect of DC excitation on lagging and leading operation of a synchronous machine.	1			

		3.2 Simulate real and reactive power control methods using Synchronous machine Excitation Control of long distance transmissionline. (Using 'Power World' simulator)	2	
3.4 V curve of a synchronous machine..	1			
3.5 Voltage control in power system: shunt reactor. synchronous phase Modifier.	2			
3.6 shunt capacitors. series capacitors	1			
3.7 Static VAR system and related circuit diagram.	2			

Number of periods planned (CI + LI) : 10+04

Unit – 4 Elements of Protection and Circuit Interrupting Devices

Class Room Instruction (CI)	No. of Periods	Laboratory Instruction (LI)	No. of Periods	Remark
4.1 Basic elements of a protective system, Types, causes and effects of various Faults.	1	4.1 Determine the fusing factor of a given fusing material.	2	
4.2 Protection zones : Backup protection zones.	1	4.2 Check the Polarity of Current Transformer and Potential Transformer and connect it with the relay.		
4.3 CT and PT: Specifications and Connection diagram (single phase and 3 phase).	1			
4.4 Current limiting Reactors, Neutral Earthing.	1			
4.5 Interrupting devices: Sequence of operation and interlocking, Isolators and Fuses: types, features, testing and applications..	2			
4.6 Construction, working and testing of circuit breakers: Air break, Air Blast, Sulphur Hexa Fluoride (SF ₆), vacuum and oil circuit breakers	3			
4.7 Auto-reclosure. Arc phenomena and extinction, Resistance switching, Working principle of arc quenching in HVDC circuit breaker	2			

Number of periods planned (CI + LI) : 11+04

Unit – 5 Protective Relays and Circuit Breaker

Class Room Instruction (CI)	No. of Periods	Laboratory Instruction (LI)	No. of Periods	Remark
5.1 Protective relay: Principle of working, construction and operation of electromagnetic induction (shaded pole, watt-hour meter and induction cup)	2	5.1 Identify the various components of SF6 circuit breaker..	1	
5.2 Relay Types: Thermal relay, Directional relay, Distance relay (impedance, reactance and mho), Negative phase sequence relay, Static relay, Microprocessor based relay: Principle and working of.	2	5.2 Interpret the protection scheme for an alternator in power station..	1	
5.3 Various faults and abnormal operating conditions in Alternator and its protection schemes.	1	5.3 Interpret different protective scheme for transformer.	1	
5.4 Differential Protection of Bus bars, Over current, Percentage differential and restricted earth fault protection of Transformers.	2			
5.5 Inrush phenomenon and over fluxing phenomenon in Transformer, Buchholz Relay.	1			
5.6 Transmission line Protection scheme –Overload protection, Overcurrent and earth fault protection, Time graded and current graded protection, Current balance differential protection.	3			
5.7 Carrier aided protection, Carrier inter-tripping, acceleration and blocking scheme	1			
5.8 Distance/Impedance protection, Auto reclosing.	1			
5.9 Protection of parallel feeders and Ring Mains	1			

Number of periods planned (CI + LI) : 14+03

Number of Total periods planned : 52



Bholenath Tarkoli
(Name and Signature)

Subject Teacher



HOD
(Department of Electrical Engineering)

GOVERNMENT CO-ED POLYTECHNIC, JAGDALPUR BASTAR(C.G)

DEPARTMENT OF ELECTRICAL ENGINEERING

LESSON PLAN

Session: - Nov-Dec 2025

Semester: - 5th

Session start date as per University Calendar: - 25/08/2024

Course Name: - **Power Electronics**

Course Code: - **2024571(024)**

Name of Subject teacher:- **AJAY KUMAR SWARNKAR**

Unit -1 Power Electronic Devices

Class Room Instruction (CI)	No. of Periods	Laboratory Instruction (LI)	No. of Periods	Remark
1.1 Silicon Controlled Rectifier (SCR): Construction, Principle of operation, Characteristic Curve, Two Transistor Analogy, Switching Characteristics and Triggering Methods	2	1.1 Test the Performance of a given SCR and Plot the VI characteristics. 1.2 Test the performance of a given MOSFET and plot the output Characteristics.	2	
1.2 Rating and Protection: Over Voltage, Over Current, Snubber circuit	1			
1.3 Series and parallel Operation of SCRs: String Efficiency	2	1.3 Test the performance of a given IGBT and plot the output Characteristics.		
1.4 DIAC, TRIAC: Construction, Operation, Characteristic Curves and Applications	1	1.4 Test the performance of TRIAC for the given AC Load Control.	2	
1.5 Power BJT, MOSFET, IGBT: Construction, Operation, Characteristic Curves and Applications	2	1.5 Design the R and RC Triggering Circuit for Triggering SCR.		

Number of periods planned (CI + LI) : 12

Number of periods actually taken :

Unit – 2 Commutation Technique And DC-DC Converter

Class Room Instruction (CI)	No. of Periods	Laboratory Instruction (LI)	No. of Periods	Remark
2.1 Need for commutation in SCR	1	2.1 Test the performance of a buck converter at different duty cycle for a given resistive load. 2.2 Test the performance of a buck converter at different duty cycle for a given resistive inductive load. 2.3 Test the performance of a boost converter at different duty cycle for a given resistive load. 2.4 Test the performance of a forced commutation circuit (A, B, C, D and E)	2	
2.2 Principle of Natural and Forced Commutations (class A, class B, class D and class E)	4			
2.3 Working principle of Buck, Boost and Buck-Boost Converter	3			
2.4 Simple numerical on Converters: duty ratio calculation, output voltage, current, input and output power, efficiency calculation for a buck converter, boost converter	2			

Number of periods planned (CI + LI) : 12

Number of periods actually taken :

Unit – 3 Phase Controlled Rectifier

Class Room Instruction (CI)	No. of Periods	Laboratory Instruction (LI)	No. of Periods	Remark
3.1 Single Phase Half Wave Controlled Rectifier with R, RL and RLE load.	2	3.1 Build and test a triggering circuit for a single phase full wave controlled rectifier using SCR.	2	
3.2 Single phase full wave controlled rectifier (M-2 &B-2 connection) with R, RL and RLE load.	4	3.2 & 3.3 Test the performance of a half wave controlled rectifier comprising of SCR for R and RL load.		
3.3 Effect of free-wheel diode in single phase full converter.	1	3.4 Test and Analyse the performance of a half wave controlled rectifier comprising of SCR for RL load with free Wheeling Diode 3.5 Test the performance of a Full wave controlled rectifier comprising of SCR for RL load and Calculate The Ripple Factor.	2	
3.4 Effect of source inductance on Converter performance.	1			
3.5 Three-phase half wave-controlled rectifier with R and RL load	2			

Number of periods planned (CI + LI) : 14

Number of periods actually taken :

Unit – 4 Inverter & Cycloconverter

Class Room Instruction (CI)	No. of Periods	Laboratory Instruction (LI)	No. of Periods	Remark
4.1 Inverter: Working principle, types-Voltage Source Inverter, Current Source Inverter.	1	4.1 & 4.2 Test the performance of a single-phase half bridge and full bridge VSI feeding R & RL load.	2	
4.2 PWM Inverters: single phase Half bridge and full bridge with R and RL load.	3			
4.3 PWM techniques: single pulse, multi-pulse and SPWM (Uni-polar and bipolar switching)	1	4.3 & 4.4 Measure the input to output frequency of a single phase to single phase step up & step down cyclo-converter.	2	
4.4 Concept of three phase VSI	3			
4.5 & 4.6 Cyclo-converter	2			

Number of periods planned (CI + LI) : 14

Number of periods actually taken :

Unit – 5 AC Voltage Controller, UPS And SMPS

Class Room Instruction (CI)	No. of Periods	Laboratory Instruction (LI)	No. of Periods	Remark
5.1 Single phase AC voltage controller: Working principle and its applications	4	5.1 Measure the output load voltage of a single phase AC Voltage controller using On-off control.	1	
5.2 Significance of UPS, Block diagram of UPS, function of each block, types: On-line & Off-Line UPS.	4	5.2 Measure the output load voltage of a single phase AC Voltage controller using phase angle control for a resistive load.	1	
5.3 SMPS: Block diagram, principle of operation, advantages and Disadvantages and applications of SMPS.	4	5.3 Measure the output load voltage of a single phase AC voltage controller using phase angle control for a resistive Inductive load.	2	

Number of periods planned (CI + LI) : 16

Number of periods actually taken :

Number of Total periods planned : 68

Number of Total periods actually taken :

Subject Teacher : AJAY KUMAR SWARNKAR

(Name and Signature)

HOD
(Department of Electrical Engineering)

Principal
Govt Co-ed Polytechnic , Bastar

GOVERNMENT CO-ED POLYTECHNIC, JAGDALPBASTAR(C.G)

DEPARTMENT OF ELECTRICAL ENGINEERING

LESSON PLAN

Session:-**NOV-DEC 2025**

Semester:- **5th**

Session start date as per University Calendar:- **25/08/2025**

Course Code:-**2024573(025)**

Name of Subject teacher:-**ONKAR DEWANGAN**

Unit-1.0 Basic Instrumentation System and characteristics			
Laboratory Instruction (LI)	No. of Periods	Class room Instruction(CI)	No. of Periods
LE1.1 Determine accuracy of a given measuring instrument.		1.1 Need of instrumentation.	
LE1.2 Determine static characteristics of given instrumentation system.		1.2 Block diagram of a generalized instrumentation system and their functions– Measure, sensing, signal conditioning, data transmission, display and control aspect.	
LE1.3 Determine dynamic characteristics of given instrumentation system.		1.3 Characteristics of an instrumentation system : i. Static characteristics - Accuracy, precision, error, resolution, linearity, reproducibility, repeatability, threshold, dead- zone, sensitivity, drift, distortion. ii. Dynamic characteristics -Fidelity, bandwidth, response time, time constant, settling time, Overshoot, dynamic error.	
Number of periods planned (CI+LI+SW+SL) =12			
Number of periods actually taken :			

Unit-2.0 Transducers

Laboratory Instruction (LI)	No. of Periods	Class room Instruction (CI)	No. of Periods
LE2.1 Plot the displacement versus output voltage characteristic of LVDT.		2.1 Concepts, importance and characteristics	
		2.2 Sensors and transducers.	
LE2.2 Measure pressure using Bourdon tube.		2.3 Classification of transducers based on:	
LE2.3 Measure the strain using strain gauge.		• Energy – Active and passive. • Technology – Mechanical, Electrical, Electronic. • Stages – Primary and secondary. • Pressure, displacement, Temperature.	
LE2.4 Measure the temperature of a hot body using (i) thermocouple (ii) RTD and (iii) Thermistor and interpret the results.		2.4 Construction, fundamental working principle and applications of: • Bourdon tube • LVDT • Strain Gauge • Thermocouple, Resistance Temperature Detector (RTD), Thermistor • Piezoelectric • Resistive, Inductive and Capacitive • Proximity • Ultrasonic	
Number of periods planned (CI+LI+SW+SL) =20			
Number of periods actually taken :			

Unit-3.0 Signal conditioning and data transmission			
Laboratory Instruction (LI)	No. of Periods	Class room Instruction (CI)	No. of Periods
LE3.1 Observe the output of an instrumentation amplifier.		3.1 Signal conditioning- Purpose, Elements	
		3.2 Operational Amplifier, instrumentation Amplifier, Applications.	
LE3.2 Observe the output waveform of A/D and D/A converter.		3.3 Sample and Hold of a signal, Shannon criteria, Quantization (discretization), Quantization error	
LE3.3 Convert a given physical quantity into 4 bit Digital output using ADC.		3.4 Data transmission- Advantages and disadvantages of Digital Transmission over Analog. A/D and D/A conversion. Multiplexing (TDM & FDM), Demultiplexing.	
Number of periods planned (CI+LI+SW+SL) =16			
Number of periods actually taken :			

Unit-4.0 Measurement of Non-Electrical quantities

Laboratory Instruction (LI)	No. of Periods	Class room Instruction (CI)	No. of Periods
LE4.1 Measure the temperature of a water heating system using RTD.		4.1 Measurement of Temperature- using Thermocouple, RTD, Thermistor and Pyrometer.	
LE4.2 Calibrate the low pressure using Pirani gauge.		4.2 Measurement of Pressure- using Pirani Gauge, LVDT, Strain Gauge, and Capacitive Transducer.	
LE4.3 Measure the liquid level using capacitive probe.		4.3 Measurement of speed –using Tachometer, Stroboscope	
		4.4 Measurement of Flow –using electromagnetic pick-up, turbine flow meter.	
LE4.4 Measure the frequency and observe the speed using tachometer.		4.5 Measurement of liquid level –using capacitive transducer.	
LE4.5 Measure the speed using stroboscope.		4.6 Material Analysis- Measurement of pH, Humidity, types of Hygrometer.	
LE4.6 Calibrate the humidity of an environment using Hygrometer.		4.7 Measurement of position, object detection using proximity transducers	
LE4.7 Measure the pH value of a given system using pH meter.		4.8 Measurement of distance, water level and obstacle detection using ultrasonic transducer.	
Number of periods planned (CI+LI+SW+SL) =14			
Number of periods actually taken :			

Unit-5.0 Basic Control System

Laboratory Instruction(LI)	No. of Periods	Class room Instruction(CI)	No. of Periods
LE5.1 Plot time response of first order system using MATLAB/ Scilab.		5.1 Concept of System, representation in "s" domain, Laplace transform, transfer function, poles and zeroes.	
LE5.2 Plot the time response of second order system and determine various parameters using MATLAB/Scilab.		5.2 Concept of system stability based on location of poles and zeroes, system transfer function.	
		5.3 Unit step response of a system – Introduction, response for any stable and unstable system.	
LE5.3 Plot unit step response of a given higher order stable system using MATLAB/Scilab.		5.4 Open loop and closed loop control system: Block diagram representation.	
LE5.4 Plot time response and measure various parameters for under damped, over damped and critically damped system using MATLAB/Scilab.		5.5 Terminology used in feedback control system - plant output, feedback signal, reference input signal, error signal, controller, actuator (final control element), examples of commonly used actuators.	
LE5.5 Plot time response characteristic of a closed loop system using PID controllers and compare the system performance with respect to open loop system.		5.6 Basic control actions – Proportional (P), Integral (I) and Differential (D), PID Controller. 5.7 Use of sensors and transducers in feedback control system	

Number of periods planned (CI+LI+SW+SL) =12

Number of periods actually taken :

Number of Total periods planned : 74

Number of Total periods actually taken :

Subject Teacher : ONKAR DEWANGAN



(Name and Signature)

Onkar Dewangan



HOD

(Department of Electrical Engineering)

GOVT. CO-ED POLYTECHNIC JAGDALPUR
ADAWAL, DIST - BASTAR (C.G.) 494001
DEPARTMENT OF ELECTRICAL ENGINEERING
LESSON PLAN SESSION -(NOV-DEC) 2025

NAME OF FACULTY : TEJESHVARYA

SUBJECT : INSTALLATION AND MAINTENANCE OF ELECTRICAL EQUIPMENT

SUBJECT CODE : 2024574(024)

SEMESTER : DIPLOMA(5TH SEM)

TEXT BOOKS INSTALLATION, MAINTENANCE AND REPAIR OF ELECTRICAL MACHINES AND EQUIPMENTS: GUPTA
 MAINTENANCE AND TESTING OF ELECTRICAL EQUIPMENT: SINGH, R.P.

REF. BOOKS TESTING, COMMISSIONING OPERATION AND MAINTENANCE OF ELECTRICAL EQUIPMENTS: RAO, S.
 PREVENTIVE MAINTENANCE OF ELECTRICAL APPARATUS: SHAROTI, S.K.

LECT. NO.	UNIT	TOPIC TO BE COVERED	EXPECTED NO. OF	REMARKS
		UNIT-1 INSTALLATION OF ELECTRICAL EQUIPMENT AND MACHINES		
1	1	Types of heavy electrical equipment	1	
2		unloading electrical equipment at site	1	
3		inspection of electrical equipment at site	1	
4		installation procedures of small and large static equipment	2	
5		installation procedures of small and large rotating type machine	1	
6		installation of pole mounted transformer	1	
		UNIT-2 COMMISSIONING OF ELECTRICAL EQUIPMENT AND MACHINES		
7	2	Commissioning procedure for static equipment	2	
8		mechanical installation and alignment	1	
9		electrical tests	1	
10		safety precaution to be adopted before energization	1	
11		commissioning the rotating machine:	1	
12		mechanical installation and alignment	1	
13		electrical tests	1	
14		safety precautions to be adopted before energization	1	
15		test report on commissioning and test certificate	1	
		UNIT-3 EARTHING SYSTEM		
16	3	Necessity of earthing	1	
17		different methods of earthing	2	
18		permissible earth resistance value for different electrical installations	1	
19		factors affecting the earth resistance	2	
20		methods for improvement earth resistance	1	
21		measurement of earth resistance	1	
		UNIT-4 MAINTENANCE OF ELECTRICAL MACHINES AND INSTALLATIONS		
22	4	Reason of failure of electrical equipment and machines	1	
23		methods for drying insulation	2	
24		measurement of internal temperature of winding	2	
25		need of vacuum impregnation	1	
26		filtering process of insulating oil	1	
27		testing of insulating oil	2	
28		concepts of preventive maintenance	1	
29		maintenance schedule for induction motor, DC motor	1	
30		maintenance schedule for transformer, power distribution line	1	
31		maintenance schedule for circuit breaker, underground cable	1	
32		tools for hot line maintenance	1	

LECT	TOPIC TO BE COVERED	EXPECTED NO. OF	REMARKS
	UNIT-5 TROUBLE SHOOTING AND SAFETY MEASURES		
33	Normal performance of equipment	1	
34	causes of electrical accidents	1	
35	common fault in electrical equipment, DC machine	1	
36	AC machines, transformers, power cables and electrical installations	1	
37	trouble shooting of internal and external faults; DC machines, AC machines	2	
38	transformers, power cables and electrical installations	1	
39	instruments and accessories for trouble shooting	1	
40	trouble shooting charts, electrical iron, ceiling fan	2	
41	wall fan, washing machine, air cooler	1	
42	safety regulation and safety measures	2	
43	treatment of shock	1	
44	different types of fire extinguishers	2	
TOTAL CLASSES SCHEDULED : <u>55</u>		Signature of Faculty	HOD Signature
TOTAL CLASSES TAKEN:			

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