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

DEPARTMENT OF ELECTRICAL ENGINEERING

LESSON PLAN

Session:-**NOV-DEC 2024**
Semester:- **5th**
Session start date as per University Calendar:- 20/08/2024
Course Code:-**2024573(025)**,
Name of Subject teacher:-**ONKAR DEWANGAN**
Subject Name :- Instrumentation and Process Control

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**
LE2.1Plot the displacement versus output voltage characteristic of LVDT.		2.1 Concepts, importance and characteristics	
		2.2 Sensors and transducers.	
LE2.2Measure pressure using Bourdon tube.		2.3 Classification of transducers based on: • Energy – Active and passive. • Technology – Mechanical, Electrical, Electronic. • Stages – Primary and secondary. • Pressure, displacement, Temperature.	
LE2.3Measure the strain using strain gauge.			
LE2.4Measure the temperature of a hot body using (i) thermocouple (ii) RTD and (iii) Thermistor and plot 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	
LE3.2 Observe the output waveform of A/D and D/A converter.		3.2 Operational Amplifier, instrumentation Amplifier, Applications.	
LE3.3 Convert a given physical quantity into 4 bit Digital output using ADC.		3.3 Sample and Hold of a signal, Shannon criteria, Quantization (discretization), Quantization error	
		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	
LE4.4 Measure the frequency and observe the speed using tachometer.		4.4 Measurement of Flow –using electromagnetic pick-up, turbine flow meter.	
LE4.5 Measure the speed using stroboscope.		4.5 Measurement of liquid level –using capacitivetransducer.	
LE4.6 Measure the humidity of an environment using Hygrometer.		4.6 Material Analysis- Measurement of pH, Humidity, types of Hygrometer.	
LE4.7 Measure the pH value of a given system using pH meter.		4.7 Measurement of position, object detection using proximity transducers	
		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/Scillab.		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)

Principal
Govt Co-ed Polytechnic , Bastar

GOVERNMENT C[illegible]YTECHNIC,JAGDALPUR
[illegible](C.G)

DEPARTMENT O[illegible]CAL ENGINEERING

[illegible]PLAN

Session: - **Nov-Dec 2024**
Semester: - **5th**
Session start date as per Universi[illegible]2024
Course Name: - **Power Electroni[illegible]**
Course Code: - **2024571(024)**
Name of Subject teacher:- **AJAY [illegible]KAR**

U[illegible]	[illegible]ic Devices		
Class Room Instruction (CI)	**[illegible]ratory 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	[illegible] the Performance of a given [illegible]nd Plot the VI [illegible]cteristics. [illegible] Test the performance of a given [illegible]T and plot the output [illegible]cteristics.	2	
1.2 Rating and Protection: Over Voltage, Over Current, Snubber circuit			
1.3 Series and parallel Operation of SCRs: String Efficiency	[illegible] Test the performance of a given [illegible]nd plot the output [illegible]cteristics.	2	
1.4 DIAC, TRIAC: Construction, Operation, Characteristic Curves and Applications	[illegible] Test the performance of TRIAC [illegible] the given AC Load Control.		
1.5 Power BJT, MOSFET, IGBT: Construction, Operation, Characteristic Curves and Applications	[illegible] Design the R and RC Triggering [illegible]cuit for Triggering SCR.		

Number of periods planned (CI + LI) : 12
Number of periods actually taken :

Unit – 2 Commutation Techniques 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 [illegible] load.	2	
2.2 Principle of Natural and Forced Commutations (class A, class B, class D and class E)	4	[illegible]mance of a buck [illegible]ent duty cycle for a [illegible]uctive load.		
2.3 Working principle of Buck, Boost and Buck-Boost Converter	3	[illegible]rmance of a boost [illegible]t duty cycle for a [illegible]		
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	[illegible]rmance of a forced [illegible]		

Number of periods planned (CI + LI) : 12
Number of periods actually taken :

Unit – 3 Phase [illegible]

Class Room Instruction (CI)	No. of Periods	[illegible]nstruction (LI)	No. of Periods	Remark
3.1 Single Phase Half Wave Controlled Rectifier with R, RL and RLE load.	2	[illegible] triggering circuit [illegible]ull wave controlled [illegible]	2	
3.2 Single phase full wave controlled rectifier (M-2 &B-2 connection) with R, RL and RLE load.	4	[illegible]rformance of a [illegible] rectifier [illegible]or R and RL load.		
3.3 Effect of free-wheel diode in single phase full converter.	1	[illegible] the performance [illegible]olled rectifier [illegible]for RL load with [illegible]	2	
3.4 Effect of source inductance on Converter performance.	1	[illegible]nce of a Full [illegible]ier comprising of [illegible] Calculate The		
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)

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GOVT. CO-ED POLYTECHNIC JAGDALPUR
ADAWAL, DIST - BASTAR (C.G.) 494001
DEPARTMENT OF ELECTRICAL ENGINEERING
LESSON PLAN **SESSION -(NOV-DEC) 2024**

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.

Serial N0.	UNIT	TOPIC TO BE COVERED	EXPECTED NO. OF	REMARKS
		UNIT-1 INSTALLATION OF ELECTRICAL EQUIPMENT AND MACHINES	7	
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 machin	1	
6		installation of pole mounted transformer	1	
	2	**UNIT-2 COMMISSIONING OF ELECTRICAL EQUIPMENT AND MACHINES**	10	
7		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 enegization	1	
15		test report on commissioning and test certificate	1	
	3	**UNIT-3 EARTHING SYSTEM**	8	
16		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	
	4	**UNIT-4 MAINTENANCE OF ELECTRICAL MACHINES AND INSTALLATIONS**	14	
22		Reason of failure of electrical equipment and machines	1	
23		methods for drying insulation	2	
24		measurement of internal temprature 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	

Sr.No.		TOPIC TO BE COVERED	EXPECTED NO. OF	REMARKS
		UNIT-5 TROUBLE SHOOTING AND SAFETY MEASURES	16	
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	5	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 : __55__			Signature of Faculty	HOD Signature
TOTAL CLASSES TAKEN:				

Tejeshwarya

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LESSON PLAN

Name of the faculty :- Mr. Bholenath Tamboli
Semester :- 5th
Subject :- **Power System Operation and Protection 2024572(024)**
Lesson Plan Duration (CL+LI+SL) :- 70 Hrs
Session- NOV-DEC 2024

S.No.	No. Of Periods	Topic Name	Practicals	Remarks
	(Approx.Hrs: CI+ LI =10)	**Unit-1.0 Representation of Power System**		
1	2	Single line representation of a simple power system with standard symbols, Single Phase representation of balanced three phase networks	1. Determine per unit impedance of a given three phase system. 2. Prepare the Single line diagram of your institute power supply system.	
2	2	Per unit (PU system) : Introduction, representation, change of base and simple numerical		
3	2	Complex power flow, Concept of torque or Load angle (δ) and Power factor angle (θ)		
4	1	Simplified representation of Synchronous Machines, Simplified representation of Synchronous Machines		
	(CL-7,LI-3)			
	(Approx. Hrs: CI+ LI =12)	**Unit-2.0 Power System faults and Stability**		
1	2	Symmetrical Faults: Definition of transients in a transmission lines, Subtransient, transient and steady state period; reactance offered, LLL and LLLG faults	1. Demonstrate fault study with single line and double line in 3 phase system. 2. Demonstrate the LLL, LLLG and LG, LL, LLG faults.	
2	1	Definition: Short Circuit Capacity (SCC) of a bus, Simple Numerical		
3	2	Unsymmetrical faults : LG, LL, LLG faults and their effects		

4	1	Stability: introduction, Steady state and transients stability, Stability limit		
5	1	Steady State stability: static and dynamic stability		
6	2	Transient stability : swing curve, Introduction to equal area criteria of stability and its applications		
7	1	Methods of improving stability		
	(CL-10,LI-2)			
	(Approx. Hrs: CI+ LI =16)	**Unit-3.0 Active and Reactive power control**		
1	3	Introduction to active and reactive power in power system and their sources. Requirement of reactive power in power system.	1.Simulate real and reactive power control methods using Synchronous machine Excitation Control of long distance transmission line. (Using 'Power World' simulator (opensource)).	
2	4	Effect of DC excitation on lagging and leading operation of a synchronous machine, V curve of a synchronous machine.		
3	3	Voltage control in power system: shunt reactor, synchronous phase modifier, shunt capacitors, series capacitors, static VAR system and related circuit diagram.		
	(CL-10,LI-6)			
	(Approx. Hrs: CI+ LI =16)	**Unit-4.0 Elements of Protection and Circuit Interrupting Devices**		
1	1	Basic elements of a protective system, Types, causes and effects of various Faults.	1. Determine the fusing factor of a given fusing material. 2. Check the Polarity of Current Transformer and Potential Transformer and connect it with the relay.	
2	1	Protection zones : Backup protection zones		
3	2	CT and PT: Specifications and Connection diagram (single phase and 3 phase)		
4	2	Current limiting Reactors, Neutral Earthing		
5	2	Interrupting devices:		

		Sequence of operation and interlocking, Isolators and Fuses: types, features, testing and applications.		
6	2	Construction, working and testing of circuit breakers: Air break, Air Blast, Sulphur Hexa Fluoride (SF6), vacuum and oil circuit breakers		
7	2	Auto-reclosure, Arc phenomena and extinction, Resistance switching, Working principle of arc quenching in HVDC circuit breaker		
	(CL-12,LI-4)			
	(Approx. Hrs: CI+LI = 16)	**Unit-5.0 Protective Relays and Circuit Breaker**		
1	2	Protective relay: Principle of working, construction and operation of electromagnetic induction (shaded pole, watt-hour meter and induction cup), Settings	1. Identify the various components of SF6 circuit breaker. 2. Interpret the protection scheme for an alternator in power station. 3. Interpret different protective scheme for transformer.	
2	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		
3	1	Maintenance and testing of relays		
4	1	Various faults and abnormal operating conditions in Alternator and its protection schemes		
5	1	Various faults and abnormal occurring in the Motor and its protection schemes		
6	1	Differential Protection of Bus bars, Over current, Percentage differential and restricted earth fault protection of Transformers		
7	1	Inrush phenomenon and over fluxing phenomenon in Transformer, Buchholz Relay, analysis of trapped gases		
8	1	Transmission line protection scheme		
9	1	Transmission line Protection scheme –Overload protection, Overcurrent and earth fault protection,Time graded and current graded protection, Current balance differential protection		
10	1	Carrier aided protection, Carrier inter-tripping, acceleration and blocking scheme		
11	1	Distance/Impedance protection, Auto reclosing		
12	1	Protection of parallel feeders and Ring Mains		
	(CL-14,LI-2)			

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