NILASAILA INSTITUTE OF SCIENCE & TECHNOLOGY
SERGARH-756060, BALASORE (ODISHA)
(Approved by AICTE& affiliated to SCTE&VT, Odisha)

LESSON PLAN

SUBJECT: Th-2 (SWITCH GEAR AND PROTECTIVE DEVICES)

CHAPTER WISE DISTRIBUTION OF PERIODS

Sl.No.	Name of the chapter as per the Syllabus	No. of Periods as per the Syllabus	No. of periods actually needed
1	Introduction to switchgear	6	6
2	Fault calculation	10	10
3	Fuses	6	6
4	Circuit breakers	10	10
5	Protective relays	8	8
6	Protection of electrical power equipment and lines	6	6
7	Protection against over voltage and lighting	8	8
8	Static relay	6	6
	TOTAL	75	75

Discipline: ELECTRICAL ENGG.	**Semester:** 6TH	**Name of the Teaching Faculty: Er. BISWAJIT PARIDA**
Week	**Class Day**	**Theory / Practical Topics**

1st	**1st**	INTRODUCTION TO SWITCHGEAR 1.1 Essential Features of switchgear
	2nd	1.2 Switchgear Equipment
	3rd	1.3 Bus-Bar Arrangement
	4th	1.4 Switchgear Accommodation
	5th	TUTORIAL
2nd	**1st**	1.5 Short Circuit
	2nd	1.6 Short circuit
	3rd	1.7 Faults in a power system.
	4th	2. FAULT CALCULATION 2.1 Symmetrical faults on 3-phase system.
	5th	TUTORIAL
3rd	**1st**	2.2 Limitation of fault current.
	2nd	2.3 Percentage Reactance.
	3rd	2.4 Percentage Reactance and Base KVA.
	4th	2.5 Short – circuit KVA.
	5th	TUTORIAL
4th	**1st**	2.6 Reactor control of short circuit currents
	2nd	2.7 Location of reactors.
	3rd	2.8 Steps for symmetrical Fault calculations.
	4th	2.9 Solve numerical problems on symmetrical fault.
	5th	TUTORIAL
	1st	3. FUSES 3.1 Desirable characteristics of fuse element.
	2nd	3.2 Fuse Element materials.

5th	**3rd**	3.3 Types of Fuses and important terms used for fuses.
	4th	3.4 Low and High voltage fuses
	5th	TUTORIAL
6th	**1st**	3.5 Current carrying capacity of fuse element.
	2nd	3.6 Difference Between a Fuse and Circuit Breaker.
	3rd	CIRCUIT BREAKERS 4.1 Definition and principle of Circuit Breaker.
	4th	4.2 Arc phenomenon and principle of Arc Extinction.
	5th	TUTORIAL
7th	**1st**	4.3 Methods of Arc Extinction 4.4 Definitions of Arc voltage, Re-striking voltage and Recovery voltage.
	2nd	4.5 Classification of circuit Breakers. 4.6 Oil circuit Breaker and its classification.
	3rd	4.6 Oil circuit Breaker and its classification 4.7 Plain brake oil circuit breaker.
	4th	4.7 Plain brake oil circuit breaker. 4.8 Arc control oil circuit breaker.
	5th	TUTORIAL
8th	**1st**	4.9 Low oil circuit breaker. 4.10 Maintenance of oil circuit breaker.
	2nd	4.11 Air-Blast circuit breaker and its classification
	3rd	4.12 Sulphur Hexa-fluoride (SF6) circuit breaker 4.13 Vacuum circuit breakers.
	4th	4.13 Vacuum circuit breakers. 4.14 Switchgear component. 4.15 Problems of circuit interruption.

	5th	TUTORIAL
9th	**1st**	4.16 Resistance switching. 4.17 Circuit Breaker Rating.
	2nd	PROTECTIVE RELAYS 5.1 Definition of Protective Relay. 5.2 Fundamental requirement of protective relay.
	3rd	5.3 Basic Relay operation 5.3.1. Electromagnetic Attraction type 5.3.2. Induction type 5.4 Definition of following important terms
	4th	5.5 Definition of following important terms. 5.5.1. Pick-up current. 5.5.2. Current setting. 5.5.3. Plug setting Multiplier. 5.5.4. Time setting Multiplier.
	5th	**TUTORIAL**
10th	**1st**	5.5 Definition of following important terms. 5.5.1. Pick-up current. 5.5.2. Current setting. 5.5.3. Plug setting Multiplier. 5.5.4. Time setting Multiplier.
	2nd	5.6 Classification of functional relays 5.7 Induction type over current relay (Non-directional)
	3rd	5.8 Induction type directional power relay. 5.9 Induction type directional over current relay.
	4th	5.10 Differential relay 5.10.1. Current differential relay 5.10.2. Voltage balance differential relay.
	5th	TUTORIAL
	1st	5.11 Types of protection

11th	**2nd**	PROTECTION OF ELECTRICAL POWER EQUIPMENT AND LINES 6.1 Protection of alternator. 6.2 Differential protection of alternators
	3rd	6.3 Balanced earth fault protection.
	4th	6.4 Protection systems for transformer. 6.5 Buchholz relay.
	5th	TUTORIAL
12th	**1st**	6.6 Protection of Bus bar.
	2nd	6.7 Protection of Transmission line.
	3rd	6.8 Different pilot wire protection (Merz-price voltage Balance system)
	4th	6.9 Explain protection of feeder by over current and earth fault relay
	5th	TUTORIAL
13th	**1st**	PROTECTION AGAINST OVER VOLTAGE AND LIGHTING 7.1. Voltage surge and causes of over voltage.
	2nd	7.2. Internal cause of over voltage.
	3rd	7.3. External cause of over voltage (lighting)
	4th	7.4. Mechanism of lightning discharge.
	5th	TUTORIAL
14th	**1st**	7.5. Types of lightning strokes
	2nd	7.6. Harmful effect of lightning.
	3rd	7.7. Lightning arresters and Type of lightning Arresters. 7.7.1. Rod-gap lightning arrester. 7.7.2. Horn-gap arrester. 7.7.3. Valve type arrester.

	4th	7.8. Surge Absorber
	5th	TUTORIAL
15th	**1st**	STATIC RELAY: 8. 1 Advantage of static relay.
	2nd	8. 2 Instantaneous over current relay.
	3rd	8. 2 Instantaneous over current relay.
	4th	8. 3 Principle of IDMT relay
	5th	TUTORIAL