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

LESSON PLAN

SUBJECT: SWITCH GEAR & PROTECTIVE DEVICE(Th-2)

Name Of The Faculty :- Er.RANJAN KUMAR PADHI
Branch :- Electrical & Electronic Engg. **Semester :-** 6th
Session :- 2024-25 **Examination :-** 2024(S)

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	7
2	Fault calculation	10	10
3	Fuses	6	6
4	Circuit breakers	10	11
5	Protective relays	8	9
6	Protection of electrical power equipment and lines	6	7
7	Protection against over voltage and lighting	8	8
8	Static relay	6	6
9	Tutorial	15	15
Total periods		75	79

Sign of Faculty

Sign of H.O.D.

Discipline: EEE	Semester: 6th	**Name of the Teaching Faculty:** Er.RANJAN KUMAR PADHI
		SESSION : 2024-25 **EXAMINATION :** 2024 (S)
Week	**Class Da**	**Theory / Practical Topics**
1st	1st	**1.INTRODUCTION TO SWITCHGEAR** 1.1 Essential Features of switchgear.
	2nd	1.2Switchgear Equipment. 1.3 Bus-Bar Arrangement.
	3rd	1.4 Switchgear Accommodation.
	4th	1.5 Short Circuit.
	5th	Tutorial
2nd	1st	1.6 Short circuit.
	2nd	1.7 Faults in a power system.
	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	2.6 Reactor control of short circuit currents.
	3rd	2.7 Location of reactors
	4th	2.8 Steps for symmetrical Fault calculations.
	5th	Tutorial
5th	1st	2.9 Solve numerical problems on symmetrical fault.
	2nd	**3. FUSES** 3.1 Desirable characteristics of fuse element.
	3rd	3.2 Fuse Element materials.
	4th	3.3 Types of Fuses and important terms used for fuses.
	5th	Tutorial
6th	1st	3.4 Low and High voltage fuses.
	2nd	3.5 Current carrying capacity of fuse element.
	3rd	3.6 Difference Between a Fuse and Circuit Breaker.
	4th	**4. CIRCUIT BREAKERS** 4.1 Definition and principle of Circuit Breaker. 4.2 Arc phenomenon and principle of Arc Extinction.
	5th	Tutorial

Week	Class Da	Theory / Practical Topics
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	4.7 Plain brake oil circuit breaker.
	4th	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.
	4th	4.13 Vacuum circuit breakers.
	5th	Tutorial
9th	1st	4.13 Vacuum circuit breakers. 4.14 Switchgear component. 4.15 Problems of circuit interruption
	2nd	4.16 Resistance switching. 4.17 Circuit Breaker Rating.
	3rd	**5. PROTECTIVE RELAYS** 5.1 Definition of Protective Relay. 5.2 Fundamental requirement of protective relay.
	4th	5.3 Basic Relay operation a) Electromagnetic Attraction type b) Induction type 5.4Definition of following important terms
	5th	Tutorial
10th	1st	5.5 Definition of following important terms. a) Pick-up current. b) Current setting. c) Plug setting Multiplier. d) Time setting Multiplier.
	2nd	5.6 Classification of functional relays
	3rd	5.7 Induction type over current relay (Non-directional)
	4th	5.8 Induction type directional power relay.
	5th	Tutorial
11th	1st	5.9 Induction type directional over current relay.
	2nd	5.10 Differential relay a) Current differential relay b) Voltage balance differential relay.
	3rd	5.11 Types of protection
	4th	**6. PROTECTION OF ELECTRICAL POWER EQUIPMENT AND LINES** 6.1 Protection of alternator
	5th	Tutorial

Week	Class Da	Theory / Practical Topics
12th	1st	6.2 Differential protection of alternators. 6.3 Balanced earth fault protection.
	2nd	6.4 Protection systems for transformer. 6.5 Buchholz relay.
	3rd	6.6 Protection of Bus bar. 6.7 Protection of Transmission line.
	4th	6.8 Different pilot wire protection (Merz-price voltage Balance system)
	5th	Tutorial
13th	1st	6.9 Explain protection of feeder by over current and earth fault relay.
	2nd	6.9 Explain protection of feeder by over current and earth fault relay.
	3rd	**7. PROTECTION AGAINST OVER VOLTAGE AND LIGHTING** 7.1 Voltage surge and causes of over voltage.
	4th	7.2 Internal cause of over voltage. 7.3 External cause of over voltage (lighting)
	5th	Tutorial
14th	1st	7.4 Mechanism of lightning discharge.
	2nd	7.5 Types of lightning strokes.
	3rd	7.6 Harmful effect of lightning.
	4th	7.7 Lightning arresters.
	5th	Tutorial
15th	1st	7.8 Type of lightning Arresters. a) Rod-gap lightning arrester. b) Horn-gap arrester. c) Valve type arrester.
	2nd	7.9 Surge Absorber
	3rd	**8. STATIC RELAY** 8.1 Advantage of static relay.
	4th	8.2 Instantaneous over current relay.
	5th	Tutorial
16	1st	8.2 Instantaneous over current relay.
	2nd	8.3 Principle of IDMT relay.
	3rd	8.3 Principle of IDMT relay.
	4th	8.3 Principle of IDMT relay.

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