ACADEMIC LESSION PLAN FOR SESSION - 2021-22 .

DEPT. OF ELECTRICAL ENGG, GOVT. POLYTECHNIC , BALASORE.

NAME OF THE FACULTY: ANITA SHIAL [LECT. (EE)]

SWITCHGEAR & PROTECTIVE DEVICE

Course Code : Th-5
Theory : 5 P/W
Total Period s : 75 P/ Sem
Examination : 3 Hours
Seme : 6TH EE

Class Test : 20 Marks
End Semester Exam : 80marks
TOTAL MARKS : 100 Marks
START : 14th March 2022

WEEK	PERIOD	TOPIC
1st	1st	**INTRODUCTION TO SWITCHGEAR** Essential Features of switchgear.
	2nd	Switchgear Equipment.
	3rd	Bus-Bar Arrangement
	4th	Switchgear Accommodation.
	5th	Short Circuit.
2nd	1st	Faults in a power system.
	2nd	**FAULT CALCULATION** Symmetrical faults on 3-phase system.
	3rd	Limitation of fault current
	4th	Percentage Reactance.
	5th	Percentage Reactance and Base KVA.
3rd	1st	Short – circuit KVA.
	2nd	Reactor control of short circuit currents.
	3rd	Location of reactors.
	4th	Steps for symmetrical Fault calculations.
	5th	Solve numerical problems on symmetrical fault.
4th	1st	Solve numerical problems on symmetrical fault.
	2nd	**FUSES** Desirable characteristics of fuse element.
	3rd	Fuse Element materials. Types of Fuses and important terms used for fuses.
	4th	Low and High voltage fuses
	5th	Low and High voltage fuses Current carrying capacity of fuse element.
5th	1st	Difference Between a Fuse and Circuit Breaker.
	2nd	**CIRCUIT BREAKERS** Definition and principle of Circuit Breaker.
	3rd	Arc phenomenon and principle of Arc Extinction.
	4th	Methods of Arc Extinction

	5th	Definitions of Arc voltage, Re-striking voltage and Recovery voltage.
6th	1st	Classification of circuit Breakers.
	2nd	Oil circuit Breaker and its classification.
	3rd	Plain brake oil circuit breaker.
	4th	Arc control oil circuit breaker
	5th	Low oil circuit breaker
7th	1st	Maintenance of oil circuit breaker
	2nd	Air-Blast circuit breaker and its classification.
	3rd	Sulphur Hexa-fluoride (SF6) circuit breaker
	4th	Vacuum circuit breakers.
	5th	Switchgear component
8th	1st	Problems of circuit interruption
	2nd	Resistance switching.
	3rd	Circuit Breaker Rating
	4th	**PROTECTIVE RELAYS** Definition of Protective Relay.
	5th	Fundamental requirement of protective relay.
9th	1st	Basic Relay operation a) Electromagnetic Attraction type
	2nd	b) Induction type
	3rd	Definition of following important terms
	4th	Definition of following important terms. a) Pick-up current. b) Current setting.
	5th	c) Plug setting Multiplier. d) Time setting Multiplier.
10th	1st	Classification of functional relays
	2nd	Induction type over current relay (Non-directional)
	3rd	Induction type directional power relay.
	4th	Induction type directional over current relay.
	5th	Differential relay a) Current differential relay
11th	1st	b) Voltage balance differential relay.
	2nd	Types of protection
	3rd	**PROTECTION OF ELECTRICAL POWER EQUIPMENT AND LINES** Protection of alternator.
	4th	Differential protection of alternators.
	5th	Balanced earth fault protection.
12th	1st	Protection systems for transformer
	2nd	Buchholz relay.
	3rd	Protection of Bus bar.
	4th	Protection of Transmission line
	5th	Different pilot wire protection (Merz-price voltage

		Balance system)
13th	1st	Explain protection of feeder by over current and earth fault relay.
	2nd	**PROTECTION AGAINST OVER VOLTAGE AND LIGHTING** Voltage surge and causes of over voltage.
	3rd	Internal cause of over voltage.
	4th	Internal cause of over voltage.
	5th	External cause of over voltage (lighting)
14th	1st	Mechanism of lightning discharge
	2nd	Types of lightning strokes.
	3rd	Harmful effect of lightning
	4th	Lightning arresters
	5th	Type of lightning Arresters. a) Rod-gap lightning arrester. b) Horn-gap arrester
15th	1st	c) Valve type arrester. Surge Absorber
	2nd	**STATIC RELAY** Advantage of static relay
	3rd	Instantaneous over current relay.
	4th	Principle of IDMT relay.
	5th	Tutorial