

# LESSION PLAN FOR ACCADEMIC SESSION 2022-2023

Discipline: Electrical Engineering	Semester:-6 <sup>th</sup>	Name Of The Teaching Faculty:- Debiprasad Pruthiraj Dhall
Subject:-Switchgear And Protective Devices	No. Of Days/Week Class Allotted:-5	No. Of Weeks:-15
Week	No. Of Class	Topic To Be Taught
1 <sup>st</sup>	1 <sup>st</sup>	<b>INTRODUCTION TO SWITCHGEAR</b> Essential Features of switchgear
	2 <sup>nd</sup>	Switchgear Equipment
	3 <sup>rd</sup>	Bus-Bar Arrangement
	4 <sup>th</sup>	Switchgear Accommodation
	5 <sup>th</sup>	Short Circuit
2 <sup>nd</sup>	1 <sup>st</sup>	Faults in a power system
	2 <sup>nd</sup>	<b>FAULT CALCULATION</b> Symmetrical faults on 3-phase system
	3 <sup>rd</sup>	Limitation of fault current
	4 <sup>th</sup>	Percentage Reactance
	5 <sup>th</sup>	Percentage Reactance and Base KVA
3 <sup>rd</sup>	1 <sup>st</sup>	Short – circuit KVA
	2 <sup>nd</sup>	Reactor control of short circuit currents
	3 <sup>rd</sup>	Location of reactors
	4 <sup>th</sup>	Steps for symmetrical Fault calculations
	5 <sup>th</sup>	Steps for symmetrical Fault calculations
4 <sup>th</sup>	1 <sup>st</sup>	Solve numerical problems on symmetrical fault
	2 <sup>nd</sup>	<b>FUSES</b> Desirable characteristics of fuse element
	3 <sup>rd</sup>	Fuse Element materials
	4 <sup>th</sup>	Types of Fuses and important terms used for fuses
	5 <sup>th</sup>	Low and High voltage fuses
5 <sup>th</sup>	1 <sup>st</sup>	<b>CIRCUIT BREAKERS</b> Definition and principle of Circuit Breaker
	2 <sup>nd</sup>	Arc phenomenon and principle of Arc Extinction
	3 <sup>rd</sup>	Methods of Arc Extinction
	4 <sup>th</sup>	Definitions of Arc voltage, Re-striking voltage and Recovery voltage
	5 <sup>th</sup>	Classification of circuit Breakers
6 <sup>th</sup>	1 <sup>st</sup>	Oil circuit Breaker and its classification
	2 <sup>nd</sup>	Plain brake oil circuit breaker
	3 <sup>rd</sup>	Arc control oil circuit breaker
	4 <sup>th</sup>	Low oil circuit breaker
	5 <sup>th</sup>	Maintenance of oil circuit breaker

# LESSON PLAN FOR ACCADEMIC SESSION 2022-2023

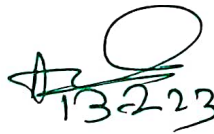
7 <sup>th</sup>	1 <sup>st</sup>	Air-Blast circuit breaker and its classification
	2 <sup>nd</sup>	Sulphur Hexa-fluoride (SF6) circuit breaker, Vacuum circuit breakers
	3 <sup>rd</sup>	Switchgear component
	4 <sup>th</sup>	Problems of circuit interruption
	5 <sup>th</sup>	Resistance switching, Circuit Breaker Rating
8 <sup>th</sup>	1 <sup>st</sup>	<b>PROTECTIVE RELAYS</b> Definition of Protective Relay Fundamental requirement of protective relay
	2 <sup>nd</sup>	Basic Relay operation
	3 <sup>rd</sup>	Electromagnetic Attraction type
	4 <sup>th</sup>	Induction type Relay operation
	5 <sup>th</sup>	Definition of following important terms Pick-up current, Current setting, Plug setting Multiplier, Time setting Multiplier
9 <sup>th</sup>	1 <sup>st</sup>	Classification of functional relays
	2 <sup>nd</sup>	Induction type over current relay (Non-directional)
	3 <sup>rd</sup>	Induction type directional power relay
	4 <sup>th</sup>	Induction type directional over current relay
	5 <sup>th</sup>	Differential relay ,Current differential relay
10 <sup>th</sup>	1 <sup>st</sup>	Voltage balance differential relay
	2 <sup>nd</sup>	Types of protection
	3 <sup>rd</sup>	<b>PROTECTION OF ELECTRICAL POWER EQUIPMENT AND LINES</b> Protection of alternator
	4 <sup>th</sup>	Differential protection of alternators
	5 <sup>th</sup>	Balanced earth fault protection
11 <sup>th</sup>	1 <sup>st</sup>	Protection systems for transformer
	2 <sup>nd</sup>	Buchholz relay
	3 <sup>rd</sup>	Protection of Bus bar
	4 <sup>th</sup>	Protection of Transmission line
	5 <sup>th</sup>	Different pilot wire protection (Merz-price voltage Balance system)
12 <sup>th</sup>	1 <sup>st</sup>	Explain protection of feeder by over current relay
	2 <sup>nd</sup>	Explain protection of feeder by earth fault relay
	3 <sup>rd</sup>	<b>PROTECTION AGAINST OVER VOLTAGE AND LIGHTING</b> Voltage surge and causes of over voltage
	4 <sup>th</sup>	Internal cause of over voltage
	5 <sup>th</sup>	External cause of over voltage (lighting)
13 <sup>th</sup>	1 <sup>st</sup>	Mechanism of lightning discharge
	2 <sup>nd</sup>	Types of lightning strokes
	3 <sup>rd</sup>	Harmful effect of lightning
	4 <sup>th</sup>	Lightning arresters and

# LESSON PLAN FOR ACCADEMIC SESSION 2022-2023

		Type of lightning Arresters Rod-gap lightning arrester
	5 <sup>th</sup>	Horn-gap lightning arrester
14 <sup>th</sup>	1 <sup>st</sup>	Valve type lightning arrester
	2 <sup>nd</sup>	Surge Absorber
	3 <sup>rd</sup>	<b>STATIC RELAY</b> Introduction to Static relay
	4 <sup>th</sup>	Advantage of static relay
	5 <sup>th</sup>	Working of static relay
15 <sup>th</sup>	1 <sup>st</sup>	Instantaneous over current relay
	2 <sup>nd</sup>	Details about IDMT Relay
	3 <sup>rd</sup>	Principle of IDMT relay
	4 <sup>th</sup>	Important questions discussion
	5 <sup>th</sup>	<b>STATIC RELAY</b> Introduction to Static relay

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13/02/2023  
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