

# LESSON PLAN

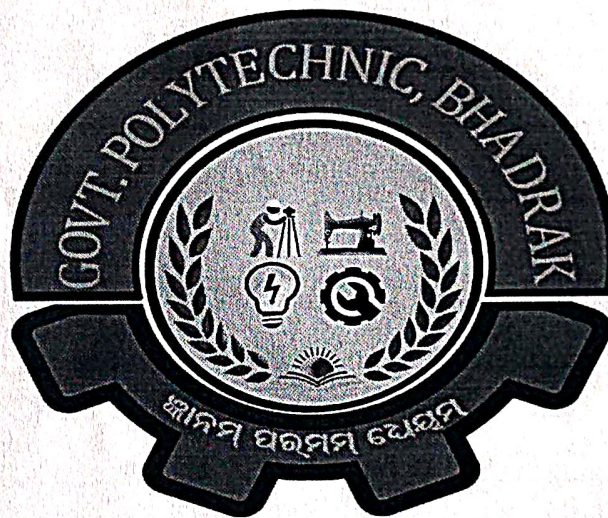


**SUB: SWITCH GEAR AND PROTECTIVE DEVICES**

**BRANCH:- ELECTRICAL ENGG.**

**SEMESTER: 6<sup>th</sup>**

**NAME OF FACULTY: NIBEDITA HO**



**GOVERNMENT POLYTECHNIC,  
BHADRAK**

**SESSION: 2024-25**

Hod. Electrical

HOD (ELECT.)  
G.P. BHADRAK

Academic Co-ordinator

Academic Co-ordinator

Principal

Govt. Polytechnic, Bhadrak

Principal  
Govt. Polytechnic  
Bhadrak



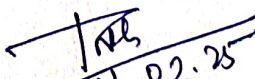
<b>Discipline:</b> Electrical Engg.	<b>Semester:</b> 6 <sup>th</sup>	<b>Name of the Teaching Faculty :</b> NIBEDITA HO
<b>Subject:</b> Switch Gear & Protective Devices	<b>No. of Days/per week class allotted:</b> 5	<b>Semester from date:</b> 04.02.2025 – 17.05.2025
		<b>No. of Weeks:</b> 15
<b>Week</b>	<b>Class Day</b>	<b>Theory</b>
1 <sup>st</sup>	1 <sup>st</sup>	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>	Short circuit.
	2 <sup>nd</sup>	Faults in a power system.
	3 <sup>rd</sup>	FAULT CALCULATION Symmetrical faults on 3-phase system. Limitation of fault current.
	4 <sup>th</sup>	Percentage Reactance. Percentage Reactance and Base KVA.
	5 <sup>th</sup>	Short – circuit KVA.
3 <sup>rd</sup>	1 <sup>st</sup>	Reactor control of short circuit currents.
	2 <sup>nd</sup>	Location of reactors.
	3 <sup>rd</sup>	Steps for symmetrical Fault calculations.
	4 <sup>th</sup>	Solve numerical problems on symmetrical fault.
	5 <sup>th</sup>	FUSES Desirable characteristics of fuse element.
4 <sup>th</sup>	1 <sup>st</sup>	<i>Fuse Element materials.</i> <i>Types of Fuses and important terms used for fuses.</i>
	2 <sup>nd</sup>	Low and High voltage fuses.
	3 <sup>rd</sup>	Current carrying capacity of fuse element. Difference Between a Fuse and Circuit Breaker.
	4 <sup>th</sup>	CIRCUIT BREAKERS Definition and principle of Circuit Breaker.
	5 <sup>th</sup>	Arc phenomenon and principle of Arc Extinction.
5 <sup>th</sup>	1 <sup>st</sup>	Methods of Arc Extinction
	2 <sup>nd</sup>	Definitions of Arc voltage, Re-striking voltage and Recovery voltage. Classification of circuit Breakers.
	3 <sup>rd</sup>	Oil circuit Breaker and its classification.
	4 <sup>th</sup>	Plain break oil circuit breaker.
	5 <sup>th</sup>	Plain break oil circuit breaker.
6 <sup>th</sup>	1 <sup>st</sup>	Arc control oil circuit breaker.
	2 <sup>nd</sup>	Low oil circuit breaker.



	4 <sup>th</sup>	Maintenance of oil circuit breaker.
	5 <sup>th</sup>	QUESTION DISCUSSION
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.
	3 <sup>rd</sup>	Vacuum circuit breakers.
	4 <sup>th</sup>	Switchgear component.
	5 <sup>th</sup>	QUESTION DISCUSSION
8 <sup>th</sup>	1 <sup>st</sup>	Problems of circuit interruption.
	2 <sup>nd</sup>	Resistance switching. Circuit Breaker Rating.
	3 <sup>rd</sup>	PROTECTIVE RELAYS Definition of Protective Relay.
	4 <sup>th</sup>	Fundamental requirement of protective relay. Basic Relay operation.
	5 <sup>th</sup>	QUESTION DISCUSSION.
9 <sup>th</sup>	1 <sup>st</sup>	Electromagnetic Attraction type Induction type
	2 <sup>nd</sup>	Definition of following important terms Pick-up current, Current setting. Plug setting Multiplier, Time setting Multiplier.
	3 <sup>rd</sup>	Classification of functional relays.
	4 <sup>th</sup>	Induction type over current relay (Non-directional).
	5 <sup>th</sup>	QUESTION DISCUSSION
10 <sup>th</sup>	1 <sup>st</sup>	Induction type directional power relay.
	2 <sup>nd</sup>	Induction type directional over current relay.
	3 <sup>rd</sup>	Differential relay Current differential relay
	4 <sup>th</sup>	Voltage balance differential relay.
	5 <sup>th</sup>	QUESTION DISCUSSION
11 <sup>th</sup>	1 <sup>st</sup>	Types of protection
	2 <sup>nd</sup>	PROTECTION OF ELECTRICAL POWER EQUIPMENT AND LINES Protection of alternator.
	3 <sup>rd</sup>	Differential protection of alternators.
	4 <sup>th</sup>	Balanced earth fault protection.
	5 <sup>th</sup>	QUESTION DISCUSSION



12 <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>	QUESTION DISCUSSION
13 <sup>th</sup>	1 <sup>st</sup>	Different pilot wire protection (Merz-price voltage Balance system)
	2 <sup>nd</sup>	Explain protection of feeder by over current and earth fault relay.
	3 <sup>rd</sup>	Voltage surge and causes of over voltage.
	4 <sup>th</sup>	Internal cause of over voltage.
	5 <sup>th</sup>	QUESTION DISCUSSION
14 <sup>th</sup>	1 <sup>st</sup>	External cause of over voltage (lightning)
	2 <sup>nd</sup>	Mechanism of lightning discharge.
	3 <sup>rd</sup>	Types of lightning strokes. Harmful effect of lightning.
	4 <sup>th</sup>	Lightning arresters and Type of lightning Arresters. Rod-gap lightning arrester. Horn-gap arrester. Valve type arrester.
	5 <sup>th</sup>	QUESTION DISCUSSION
15 <sup>th</sup>	1 <sup>st</sup>	Surge Absorber.
	2 <sup>nd</sup>	Static relay. Advantage of static relay.
	3 <sup>rd</sup>	Instantaneous over current relay.
	4 <sup>th</sup>	Principle of IDMT relay.
	5 <sup>th</sup>	QUESTION DISCUSSION

  
Signature of Faculty

Lect.in Elect.Engg.  
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