GOVERNMENT POLYTECHNIC, PURI

DEPARTMENT OF ELECTRICAL ENGINEERING

Discipline: ELECTRICAL ENGG	Semester:6TH	Name of the Teaching Faculty: MR JASOBANTA BARIK, PTGF IN ELECTRICAL ENGG.
Subject: SWITCH GEAR AND PROTECTIVE DEVICES	No. of classes allotted per week : 05	Semester From date: 16.01.2024 To Date: 26.04.2024 No. of weeks:15
PRE- REQUISITE	Knowledge of electrical drawing Specification of different wires, cables,accessories etc. Components used in Substations(HT,LT)	
COURSE OUTCOMES	On successful completion, a student will be able to: 1. Develop an understanding of switch gear apparatus and perform symmetrical fault calculations. 2. Gain knowledge about the working principles, characteristics and operations of fuses and circuit breakers. 3. Develop an understanding about the basic principles of protection of alternator, Transformer and Feeders. 4. Develop familiarity with Protective & Static relays 5. Develop an understanding of protection against over-voltage and lightning.	

Week	Class Day	Theory / Practical Topics	DELIVERY METHOD
1st	1st	INTRODUCTION TO SWITCHGEAR	whiteboard
	2nd	1.1 Essential Features of switchgear.	whiteboard
	3rd	1.2 Switchgear Equipment.	whiteboard
	4th	1.3 Bus-Bar Arrangement.	whiteboard
	5th	1.4 Switchgear Accommodation.	whiteboard
2nd	1st	1.5 Short Circuit.	whiteboard
	2nd	1.6 Short circuit.	whiteboard
	3rd	FAULT CALCULATION	whiteboard
	4th	2.1 Symmetrical faults on 3-phase system.	whiteboard
	5th	2.2 Limitation of fault current.	whiteboard
3rd	1st	2.3 Percentage Reactance.	whiteboard
	2nd	2.4 Percentage Reactance and Base KVA.	whiteboard
	3rd	2.5 Short – circuit KVA.	whiteboard
	4th	2.6 Reactor control of short circuit currents.	whiteboard
	5th	2.7 Location of reactors.	whiteboard
4th	1st	2.8 Steps for symmetrical Fault calculations.	whiteboard
	2nd	2.9 Solve numerical problems on symmetrical fault.	whiteboard
	3rd	2.9 Solve numerical problems on symmetrical fault.	whiteboard
	4th	**Class Test**	Online/Offline
	5th	FUSES	whiteboard
5th	1st	3.1 Desirable characteristics of fuse element.	whiteboard
	2nd	3.2 Fuse Element materials.	whiteboard
	3rd	3.3 Types of Fuses and important terms used for fuses.	whiteboard
	4th	3.4 Low and High voltage fuses.	whiteboard
	5th	3.5 Current carrying capacity of fuse element.	whiteboard
6th	1st	3.6 Difference Between a Fuse and Circuit Breaker.	whiteboard
	2nd	CIRCUIT BREAKERS 4.1 Definition and principle of Circuit Breaker. 4.2 Arc phenomenon and principle of Arc Extinction. 4.3 Methods of Arc Extinction.	whiteboard
	3rd	4.4 Definitions of Arc voltage, Re-striking voltage and Recovery voltage.	whiteboard
	4th	4.5 Classification of circuit Breakers.	whiteboard
	5th	4.6 Oil circuit Breaker and its classification.	whiteboard
7th	1st	4.7 Plain brake oil circuit breaker.	whiteboard
	2nd	4.8 Arc control oil circuit breaker.	whiteboard
	3rd	4.9 Low oil circuit breaker.	whiteboard
	4th	4.10 Maintenance of oil circuit breaker.	whiteboard
	5th	4.11 Air-Blast circuit breaker and its classification.	whiteboard
8th	1st	4.12 Sulphur Hexa-fluoride (SF6) circuit breaker.	whiteboard
	2nd	4.13 Vacuum circuit breakers.	whiteboard
	3rd	4.14 Switchgear component.	whiteboard
	4th	4.15 Problems of circuit interruption.	whiteboard
	5th	4.16 Resistance switching. 4.17 Circuit Breaker Rating.	whiteboard

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	1st	**Assignment & class test**	Online/Offline
9th	2nd	5.1 Definition of Protective Relay. 5.2 Fundamental requirement of protective relay. 5.3 Basic Relay operation 5.3.1. Electromagnetic Attraction type 5.3.2. Induction type	whiteboard
	3rd	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.	whiteboard
	4th	5.6 Classification of functional relays 5.7 Induction type over current relay (Non-directional)	whiteboard
	5th	5.8 Induction type directional power relay.	whiteboard
10th	1st	5.9 Induction type directional over current relay.	whiteboard
	2nd	5.10 Differential relay	whiteboard
	3rd	5.10.1. Current differential relay	whiteboard
	4th	5.10.2. Voltage balance differential relay.	whiteboard
	5th	**Assignment & class test**	Online/Offline
11th	1st	PROTECTION OF ELECTRICAL POWER EQUIPMENT AND LINES 6.1 Protection of alternator. 6.2 Differential protection of alternators.	whiteboard
	2nd	6.3 Balanced earth fault protection.	whiteboard
	3rd	6.4 Protection systems for transformer.	whiteboard
	4th	6.5 Buchholz relay.	whiteboard
	5th	6.6 Protection of Bus bar. 6.7 Protection of Transmission line.	whiteboard
12th	1st	6.8 Different pilot wire protection (Merz-price voltage Balance system)	whiteboard
	2nd	6.9 Explain protection of feeder by over current and earth fault relay.	whiteboard
	3rd	PROTECTION AGAINST OVER VOLTAGE AND LIGHTING 7.1. Voltage surge and causes of over voltage.	whiteboard
	4th	7.2. Internal cause of over voltage.	whiteboard
	5th	7.3. External cause of over voltage (lighting)	whiteboard
13th	1st	7.4. Mechanism of lightning discharge.	whiteboard
	2nd	7.5. Types of lightning strokes.	whiteboard
	3rd	7.6. Harmful effect of lightning.	whiteboard
	4th	7.7. Lightning arresters and Type of lightning Arresters.	whiteboard
	5th	7.7.1. Rod-gap lightning arrester.	whiteboard
14th	1st	7.7.2. Horn-gap arrester.	whiteboard
	2nd	7.7.3. Valve type arrester.	whiteboard
	3rd	7.8. Surge Absorber	whiteboard
	4th	STATIC RELAY. 8. 1 Advantage of static relay.	whiteboard
	5th	8. 2 Instantaneous over current relay. 8. 3 Principle of IDMT relay.	whiteboard

LEARNING RESOURCES:

1.Principle of power system,V. K. Mehta, S Chand
2.Protection and Swwitchgear,Bhavesh Bhalja R.P Maheshwari Nilesh G. Chothani,OXFORD
3.Electrical power Soni, Gupta and Bhatnagar Dhanpat Rai & Sons
4.Power system protection & switch gear,Bhuvanesh Oza,TMH
5.Electrical Power,S. L. Uppal,Khanna Publisher
6.Protection and Switchgear, Raghuraman,SCITECH

WEBSITE RESOURCES:

1.https://www.youtube.com/watch?v=o8-Nq6g3ME4&list=PL_mruqjnuVd9Xq-JBDZ0M8dHk8VRbBgYJ
2.https://www.youtube.com/watch?v=0RmqapF6P30&list=PLm_MSClsnwm_MGFxcos9bQ1BPujUF7YEx

10/01/2024
Sign. of Faculty concerned

10.1.24
Principal
G.P Puri

10/01/24
Sign. of HOD

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