GANDHI SCHOOL OF ENGINEERING

BHABANDHA, BERHAMPUR

BRANCH:- ELECTRICAL ENGINEERING

SEMESTER:- 6TH

SUBJECT:- SWITCH GEAR AND PROTECTIVE DEVICES

Name of the Faculty- Er.AMARESH CHOUDHURY &Er. SIBANI SENAPATI

			Topic to be taken		Actual topic taken			
Sl. No	**Topic/Module**	**No. of period**	**Details of the topics**	**Date**	**Topic No.**	**Topic Name**	**Date**	**Remark**
1.	INTRODUCTION TO SWITCH GEAR	06	1.1 Essential Features of switchgear. 1.2 Switchgear Equipment. 1.3 Bus-Bar Arrangement. 1.4 Switchgear Accommodation. 1.5 Short Circuit. 1.6 Short circuit. 1.7 Faults in a power system	13.02.2023 TO 20.02.2023	1.1 1.2 1.3 1.4 1.5 1.6 1.7	Essential Features of switchgear. Switchgear Equipment. Bus-Bar Arrangement. Switchgear Accommodation. Short Circuit. Short circuit. Faults in a power system.	13.02.2023 14.02.2023 15.02.2023 16.02.2023 17.02.2023 20.02.2023	
2.	FAULT CALCULATION	10	2.1 Symmetrical faults on 3-phase system. 2.2 Limitation of fault current. 2.3 Percentage Reactance. 2.4 Percentage Reactance and Base KVA. 2.5 Short – circuit KVA 2.6 Reactor control of short circuit currents. 2.7 Location of reactors. 2.8 Steps for symmetrical Fault calculations. 2.9 Solve numerical problems on symmetrical fault.	21.02.2023 TO 06.03.2023	2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9	Symmetrical faults on 3-phase system. Limitation of fault current. Percentage Reactance. Percentage Reactance and Base KVA. Short – circuit KVA Reactor control of short circuit currents. Location of reactors. Steps for symmetrical Fault calculations. Solve numerical problems on symmetrical fault.	21.02.2023 22.02.2023 23.02.2023 27.02.2023 28.02.2023 01.03.2023 02.02.2023 06.03.2023	

3	FUSES	06	3.1 Desirable characteristics of fuse element. 3.2 Fuse Element materials. 3.3 Types of Fuses and important terms used for fuses. 3.4 Low and High voltage fuses. 3.5 Current carrying capacity of fuse element. 3.6 Difference Between a Fuse and Circuit Breaker.	09.03.2023 TO 27.03.2023	3.1 3.2 3.3 3.4 3.5 3.6	Desirable characteristics of fuse element. Fuse Element materials. Types of Fuses and important terms used for fuses. Low and High voltage fuses. Current carrying capacity of fuse element. Difference Between a Fuse and Circuit Breaker.	09.03.2023 10.03.2023 13.03.2023 14.03.2023 15.03.2023 16.03.2023	
4	CIRCUIT BREAKERS	10	4.1 Definition and principle of Circuit Breaker. 4.2 Arc phenomenon and principle of Arc Extinction. 4.3 Methods of Arc Extinction. 4.4 Definitions of Arc voltage, Re-striking voltage and Recovery voltage. 4.5 Classification of circuit Breakers. 4.6 Oil circuit Breaker and its classification. 4.7 Plain brake oil circuit breaker 4.8 Arc control oil circuit breaker. 4.9 Low oil circuit breaker. 4.10 Maintenance of oil circuit breaker. 4.11 Air-Blast circuit breaker and its classification. 4.12 Sulphur Hexa-fluoride (SF6) circuit breaker. 4.13 Vacuum circuit breakers. 4.14 Switchgear component. 4.15 Problems of circuit interruption. 4.16 Resistance switching. 4.17 Circuit Breaker Rating.	28.03.2023 TO 17.04.2023	4.1 4.2 4.3 4.4 4.4 4.5 4.6 4.7 4.8 4.9 4.10 4.11 4.12 4.13 4.14 4.15 4.16 4.17	Definition and principle of Circuit Breaker. Arc phenomenon and principle of Arc Extinction. Methods of Arc Extinction. Definitions of Arc voltage, Re-striking voltage and Recovery voltage. Classification of circuit Breakers. Oil circuit Breaker and its classification. Plain brake oil circuit breaker Arc control oil circuit breaker. Low oil circuit breaker. Maintenance of oil circuit breaker. Air-Blast circuit breaker and its classification. Sulphur Hexa-fluoride (SF6) circuit breaker. Vacuum circuit breakers. Switchgear component. Problems of circuit interruption. 4.16	17.03.2023 20.03.2023 21.03.2023 22.03.2023 24.03.2023 27.03.2023 28.03.2023 03.04.2023 04.04.2023 05.04.2023	

						Resistance switching. Circuit Breaker Rating.		
5	PROTECTIVE RELAYS	08	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 5.4 Definition of following important terms 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. 5.6 Classification of functional relays 5.7 Induction type over current relay (Non-directional) 5.8 Induction type directional power relay. 5.9 Induction type directional over current relay. 5.10 Differential relay 5.10.1. Current differential relay 5.10.2. Voltage balance differential relay. 5.11 Types of protection	18.04.2023 TO 03.05.2023	5.1 5.2 5.3 5.3.1 5.3.2 5.4 5.5 5.5.1 5.5.2 5.5.3 5.6 5.7 5.8 5.9 5.10 5.10.1 5.10.2 5.11	Definition of Protective Relay. Fundamental requirement of protective relay. Basic Relay operation Electromagnetic Attraction type Induction type Definition of following important terms Definition of following important terms. Pick-up current. Current setting. Plug setting Multiplier. Time setting Multiplier. Classification of functional relays Induction type over current relay (Non-directional) Induction type directional power relay. Induction type directional over current relay. Differential relay Current differential relay Voltage balance differential relay. Types of protection	06.04.2023 10.04.2023 11.04.2023 12.04.2023 13.04.2023 17.04.2023 18.04.2023 19.04.2023	
6	PROTECTION OF ELECTRICAL POWER EQUIPMENT AND LINES	06	6.1 Protection of alternator. 6.2 Differential protection of alternators. 6.3 Balanced earth fault protection. 6.4 Protection systems for transformer. 6.5 Buchholz relay. 6.6 Protection of Bus bar. 6.7 Protection of Transmission line. 6.8 Different pilot wire protection (Merz-price voltage Balance system)	04.05.2023 TO 15.05.2023	6.1 6.2 6.3 6.4 6.5 6.6 6.7 6.8	Protection of alternator. Differential protection of alternators. Balanced earth fault protection. Protection systems for transformer. Buchholz relay. Protection of Bus bar.	20.04.2023 24.04.2023 25.04.2023 26.04.2023 27.04.2023 01.05.2023 02.05.2023 03.05.2023	

			6.9 Explain protection of feeder by over current and earth fault relay.		6.9	Protection of Transmission line. Different pilot wire protection (Merz-price voltage Balance system) Explain protection of feeder by over current and earth fault relay.		
7	PROTECTION AGAINST OVER VOLTAGE AND LIGHTING	08	7.1. Voltage surge and causes of over voltage. 7.2. Internal cause of over voltage. 7.3. External cause of over voltage (lighting) 7.4. Mechanism of lightning discharge. 7.5. Types of lightning strokes. 7.6. Harmful effect of lightning. 7.7. Lightning arresters and Type of lightning Arresters. 7.7.1. Rod-gap lightning arrester. 7.7.2. Horn-gap arrester. 7.7.3. Valve type arrester. 7.8. Surge Absorbe	16.05.2023 TO 23.05.2023	7.1 7.2 7.3 7.4 7.5 7.6 7.7 7.7.1 7.7.2 7.7.3 7.8	Voltage surge and causes of over voltage. Internal cause of over voltage. External cause of over voltage (lighting) Mechanism of lightning discharge. Types of lightning strokes. Harmful effect of lightning. Lightning arresters and Type of lightning Arresters. Rod-gap lightning arrester. Horn-gap arrester. Valve type arrester. Surge Absorber	04.05.2023 08.05.2023 09.05.2023 10.05.2023 11.05.2023 12.05.2023 15.05.2023 16.05.2023	
8	STATIC RELAY:	06	8. 1 Advantage of static relay. 8. 2 Instantaneous over current relay. 8. 3 Principle of IDMT relay.		8.1 8.2 8.3	Advantage of static relay. Instantaneous over current relay. Principle of IDMT relay.	18.05.2023 22.05.2023 23.05.2023 23.05.2023	

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