

Discipline Electrical Engg.	Semester:- 6 th	Name of the Teaching Faculty:- Lect. NIRMALA KUMAR SAHU
Subject:- SWITCH GEAR AND PROTECTIVE DEVICES	No of Days/per Week Class Allotted :- 4+ 1(Tutorial)	Semester From:- <u>10.03.2022</u> To:- <u>30.06.2022</u> No of Weeks:- 15
Week	Class Day	Theory/ Practical Topics
1 st	1 st	INTRODUCTION TO SWITCHGEAR 1.1 Essential Features of switchgear.
	2 nd	1.2 Switchgear Equipment.
	3 rd	1.3 Bus-Bar Arrangement.
	4 th	1.4 Switchgear Accommodation.
	5 th	Tutorial
2 nd	1 st	1.5 Short Circuit.
	2 nd	1.6 Faults in a power system.
	3 rd	FAULT CALCULATION 2.1 Symmetrical faults on 3-phase system.
	4 th	2.2 Limitation of fault current.
	5 th	Tutorial
3 rd	1 st	2.3 Percentage Reactance.
	2 nd	2.4 Percentage Reactance and Base KVA.
	3 rd	2.5 Short – circuit KVA
	4 th	2.6 Reactor control of short circuit currents.
	5 th	Tutorial
4 th	1 st	2.7 Location of reactors.
	2 nd	2.8 Steps for symmetrical Fault calculations.
	3 rd	2.9 Solve numerical problems on symmetrical fault.
	4 th	2.9 Solve numerical problems on symmetrical fault.
	5 th	Tutorial
5 th	1 st	FUSES 3.1 Desirable characteristics of fuse element.
	2 nd	3.2 Fuse Element materials.
	3 rd	3.3 Types of Fuses and important terms used for fuses.
	4 th	3.4 Low and High voltage fuses. 3.5 Current carrying capacity of fuse element.
	5 th	Tutorial
6 th	1 st	3.6 Difference Between a Fuse and Circuit Breaker.
	2 nd	CIRCUIT BREAKERS 4.1 Definition and principle of Circuit Breaker.
	3 rd	4.2 Arc phenomenon and principle of Arc Extinction. 4.3 Methods of Arc Extinction.
	4 th	4.4 Definitions of Arc voltage, Re-striking voltage and Recovery voltage. 4.5 Classification of circuit Breakers.
	5 th	Tutorial
7 th	1 st	4.6 Oil circuit Breaker and its classification. 4.7 Plain break oil circuit breaker.
	2 nd	4.8 Arc control oil circuit breaker.
	3 rd	4.9 Low oil circuit breaker. 4.10 Maintenance of oil circuit breaker.
	4 th	4.11 Air-Blast circuit breaker and its classification. 4.12 Sulphur Hexa-fluoride (SF6) circuit breaker.
	5 th	Tutorial
8 th	1 st	4.13 Vacuum circuit breakers. 4.14 Switchgear component.
	2 nd	4.15 Problems of circuit interruption.
	3 rd	4.16 Resistance switching. 4.17 Circuit Breaker Rating.
	4 th	Tutorial
	5 th	PROTECTIVE RELAYS 5.1 Definition of Protective Relay. 5.2 Fundamental requirement of protective relay.
9 th	1 st	5.3 Basic Relay operation a) Electromagnetic Attraction type b) Induction type
	2 nd	5.4 Definition of following important terms
	3 rd	5.5 Definition of following important terms. a) Pick-up current. b) Current setting.

		c) Plug setting Multiplier. d) Time setting Multiplier.
	4 th	5.6 Classification of functional relays
	5 th	Tutorial
10th	1 st	5.7 Induction type over current relay (Non-directional)
	2 nd	5.8 Induction type directional power relay..
	3 rd	5.9 Induction type directional over current relay
	4 th	5.10 Differential relay a) Current differential relay b) Voltage balance differential relay
	5 th	Tutorial
11th	1 st	5.11 Types of protection
	2 nd	6.1 Protection of alternator. 6.2 Differential protection of alternators.
	3 rd	6.3 Balanced earth fault protection.
	4 th	6.4 Protection systems for transformer
	5 th	Tutorial
12th	1 st	6.5 Buchholz relay
	2 nd	6.6 Protection of Bus bar. 6.7 Protection of Transmission line.
	3 rd	6.8 Different pilot wire protection (Merz-price voltage Balance system) 6.9 Explain protection of feeder by over current and earth fault relay.
	4 th	Tutorial
	5 th	7.1 Voltage surge and causes of over voltage. 7.2 Internal cause of over voltage.
13th	1 st	7.3 External cause of over voltage (lighting)
	2 nd	7.4 Mechanism of lightning discharge.
	3 rd	7.5 Types of lightning strokes. 7.6 Harmful effect of lightning.
	4 th	7.7 Lightning arresters.
	5 th	Tutorial
14th	1 st	7.8 Type of lightning Arresters. a) Rod-gap lightning arrester. b) Horn-gap arrester. c) Valve type arrester.
	2 nd	7.9 Surge Absorber
	3 rd	STATIC RELAY
	4 th	8.1 Advantage of static relay.
	5 th	Tutorial
15th	1 st	8.2.1 Instantaneous over current relay.
	2 nd	8.2.2 Instantaneous over current relay.
	3 rd	8.3.1 Principle of IDMT relay.
	4 th	8.3.2 Principle of IDMT relay.
	5 th	Tutorial