

Discipline Electrical Engg.	Semester:- 6th	Name of the Teaching Faculty:- Er.M.Swain
Subject:- SWITCHGEAR AND PROTECTIVE DE VICES	No of Days/per Week Class Allotted :- 4+1{Tutorial}	Semester from date:- 16/01/2024 Todate:- 26/04/2024 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
2nd	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
3rd	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
4th	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
6th	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 brake 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 (SF ₆) circuit breaker.
	5 st	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 st	PROTECTIVE RELAYS Definition of Protective Relay. Fundamental requirement of protective relay.
9th	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) Currentsetting. c) PlugsettingMultiplier. d) TimesettingMultiplier.
	4 th	5.6Classificationoffunctionalrelays
	5 st	Tutorial
10th	1 st	5.7Induction typeovercurrent relay(Non-directional)
	2 nd	5.8Inductiontypedirectionalpower relay..
	3 rd	5.9Inductiontypedirectionalovercurrentrelay
	4 th	5.10Differential relay a) Currentdifferentialrelay b) Voltagebalanceddifferentialrelay
	5 st	Tutorial
11th	1 st	5.11Types ofprotection
	2 nd	Protectionofalternator. Differentialprotectionofalternators.
	3 rd	6.3Balancedearthfault protection.
	4 th	6.4Protectionsystems for transformer
	5 st	Tutorial
12th	1 st	6.5Buchholzrelay
	2 nd	6.6 ProtectionofBusbar. 6.7ProtectionofTransmission line.
	3 rd	6.8 Differentpilotwireprotection(Merz-pricevoltageBalance system) 6.9Explainprotection offeederbyovercurrent and earth fault relay.
	4 th	Tutorial
	5 st	Voltagesurgeand causesofovervoltage. Internalcause ofover voltage.
13th	1 st	7.3External causeofover voltage (lighting)
	2 nd	7.4Mechanismoflightningdischarge.
	3 rd	7.5 Typesoflightning strokes. 7.6Harmfuleffectof lightning.
	4 th	7.7Lightningarresters.
	5 st	Tutorial
14th	1 st	7.8 Type oflightning Arresters. a) Rod-gaplightningarrester. b) Horn-gap arrester. c) Valvetypearrester.
	2 nd	7.9SurgeAbsorber
	3 rd	STATIC RELAY
	4 th	8.1 Advantageofstatic relay.
	5 st	Tutorial
15th	1 st	8.2.1Instantaneousover current relay.
	2 nd	8.2.2Instantaneousover current relay.
	3 rd	8.3.1Principle ofIDMTrelay.
	4 th	8.3.2Principle ofIDMTrelay.
	5 st	Tutorial