

SWITCH GEAR AND PROTECTIVE DEVICES (Th. 02)

Date of Commencement of classes: 14.02.2023

Date of Closing of classes: 25.05.2023

LIST OF WEEK/ MONTH WISE AVAILABLE DAYS/ PERIODS

Sl. No.	Month	Week-wise no. of academic days available					Total no. of academic days
		Week- 1	Week- 2	Week- 3	Week- 4	Week- 5	
1	February	--	--	4	6	3	13
2	March	2	5	4	4	6	21
3	April	5	4	4	5	2	20
4	May	3	6	5	--	--	14
Total		10	15	12	15	11	68

NO. OF AVAILABLE CLASSES PER WEEK/ MONTH

Sl. No.	Month	Week-wise no. of academic periods available					Total no. of academic periods
		Week- 1	Week- 2	Week- 3	Week- 4	Week- 5	
1	February	--	--	5	7	3	15
2	March	2	6	5	5	7	25
3	April	6	5	5	6	2	24
4	May	3	7	6	--	--	16
Total		11	18	15	18	12	80

TOPIC-WISE DISTRIBUTION OF PERIODS

Sl. No.	Name of the Chapter	Periods as per Syllabus	Required period	Expected Marks
01	Introduction to switchgear	06	07	10
02	Fault calculation	10	09	15
03	Fuses	06	06	10
04	Circuit breakers	10	14	15
05	Protective relays	08	08	15
06	Protection of electrical power equipment and lines	06	10	15
07	Protection against over voltage and lighting	08	06	10
08	Static relay	06	04	10
TOTAL		60	64	100

Lesson Plan By –KRUSHNA K BARAL

LESSON PLAN

Name of the Month	Week No.	Class day	Art. No.	Theory Topics	
FEBRUARY	3 rd	1 st	1.0	Chapter No.- 01 (INTRODUCTION TO SWITCHGEAR) Introduction	
		2 nd	1.1	Essential Features of switch gear	
		3 rd	1.2 1.3	Switchgear Equipment. Bus-Bar Arrangement.	
		4 th	1.3	Bus-Bar Arrangement.	
		5 th	1.4	Switchgear Accommodation.	
	4 th	1 st	1.5	Short Circuit	
		2 nd	1.6	Faults in a power system.	
		3 rd	2.1 2.2	Chapter No.-02 (FAULT CALCULATION) Symmetrical faults on 3-phase system. Limitation of fault current.	
		4 th	2.3 2.4	Percentage Reactance. Percentage Reactance and Base KVA.	
		5 th	2.5 2.6	Short – circuit KVA Reactor control of short circuit currents.	
		6 th	2.7	Location of reactors.	
		7 th	2.8	Steps for symmetrical Fault calculations.	
		1 st	2.9	2.9	Solve numerical problems on symmetrical fault.
		2 nd			Problem1
3 rd		Problem2			
MARCH	1 st	1 st	3.1 3.2	Problem3	
		2 nd		Chapter No.-03 (FUSES)	
		3 rd		Desirable characteristics of fuse element. Fuse Element materials.	
	2 nd	1 st	3.3	Types of Fuses and important terms used for fuses	
		2 nd	3.4	Low voltage fuses.	
		3 rd		High voltage fuses	
		4 th		Continue.	
		5 th	3.5 3.6	Current carrying capacity of fuse element. Difference Between a Fuse and Circuit Breaker	
	3 rd	6 th	4.1	Chapter No.-04 (CIRCUIT BREAKERS) Definition and principle of Circuit Breaker.	
		1 st	4.2 4.3	Arc phenomenon and principle of Arc Extinction. Methods of Arc Extinction.	
		2 nd	4.4	Definitions of Arc voltage, Re-striking voltage and Recovery voltage.	
		3 rd	4.5	Classification of circuit Breakers.	

			4.6	Oil circuit Breaker and its classification.	
		4 th	4.7	Plain brake oil circuit breaker.	
		5 th	4.8	Arc control oil circuit breaker	
	4 th	1 st	4.9	Low oil circuit breaker	
		2 nd	4.10	Maintenance of oil circuit breaker.	
		3 rd	4.11	Air-Blast circuit breaker and its classification.	
		4 th	4.12	Sulphur Hexa-fluoride (SF6) circuit breaker	
		5 th	4.13	Vacuum circuit breakers.	
	5 th	1 st	4.14 4.15	Switchgear component. Problems of circuit interruption.	
		2 nd	4.16	Resistance switching.	
		3 rd	4.17	Circuit Breaker Rating.	
		4 th	5.1 5.2	Chapter No.-05 (PROTECTIVE RELAYS) Definition of Protective Relay. Fundamental requirement of protective relay	
		5 th	5.3	Basic Relay operation Electromagnetic Attraction Type Induction Type	
		6 th	5.4	Definition of following important terms Pick-up current. Current setting	
		7 th	5.5	Definition of following important terms. Plug setting Multiplier. Time setting Multiplier	
	APRIL	1 st		5.6	Classification of functional relays
				5.7	Induction type over current relay (non-directional)
2 nd			5.8	Induction type directional power relay.	
			5.9	Induction type directional over current relay.	
3 rd			5.10	Differential relay	
				5.10.1. Current differential relay	
				5.10.2. Voltage balance differential relay.	
4 th		5.11	Types of protection		

		5 th	6.1	Chapter No.-06 (PROTECTION OF ELECTRICAL POWER EQUIPMENT AND LINES) Protection of alternator.	
		6 th	6.2	Differential protection of alternators	
2 nd		1 st	6.3	Balanced earth fault protection.	
		2 nd	6.4	Protection systems for transformer.	
		3 rd	6.5	Buchholz relay	
		4 th	6.6	Protection of Bus bar.	
			6.7	Protection of Transmission line.	
5 th	6.8	Different pilot wire protection (Merz-price voltage Balance system)			
1 st		Continue.			
3 rd		2 nd	6.9	Explain protection of feeder by over current	
		3 rd		and earth fault relay.	
		4 th		Chapter No.-07 (PROTECTION AGAINST OVER VOLTAGE AND LIGHTING) Voltage surge and causes of over voltage.	
	5 th	4 th	7.1	7.1	Voltage surge and causes of over voltage.
			7.2		Internal cause of over voltage.
			7.3		External cause of over voltage (lighting)
	5 th	5 th	7.4	7.4	Mechanism of lightning discharge.
7.5.			Types of lightning strokes.		
4 th	1 st	7.6	7.6	Harmful effect of lightning.	
		Lightning arresters and Type of lightning Arresters.			
	2 nd	7.7	7.7.1. Rod-gap lightning arrester		
			7.7.2. Horn-gap arrester.		
			7.7.3. Valve type arrester.		
	4 th	7.8	Surge Absorber		
5 th	5 th	8.1	Chapter No.-08 (STATIC RELAY) Advantage of static relay.		
	6 th		Cont.		
5 th	1 st	8.2	Instantaneous over current relay.		

		2 nd	8. 3	Principle of IDMT relay.
M A Y	1 st	1 st	Chapter1	Revision & Practice
		2 nd		Revision & practice of Numerical problems
		3 rd	Chapter2	Revision & practice of Numerical problems
	2 nd	1 st	Chapter3,4	Revision & Practice
		2 nd	Chapter5	Revision & Practice
		3 rd	Chapter6	Revision & Practice
		4 th	Chapter7	Revision & Practice
		5 th	Chapter8	Revision & Practice
		6 th		Previous Year Question Answer Discussion
		7 th		Previous Year Question Answer Discussion

Coverage of Chapters up to the internal assessment (2nd week of May 2022): **ALL**

Learning Resources:

Sl. No.	Name of the Book	Author Name	Publisher
01	Principle of power system	V. K. Mehta	S Chand
02	Protection and Swwitchgear	Bhavesb Bhalja R.P Maheshwari Nilesh G. Chothani	OXFORD
03	Electrical power	Soni, Gupta and Bhatnagar	Dhanpat Rai & Sons
04	Power system protection & switch gear	Bhuvanesh Oza	TMH
05	Electrical Power	S. L. Uppal	Khanna Publisher
06	Protection and Switchgear	Raghuraman	SCITECH