



R. K. Institute of Engineering and Technology

Approved by AICTE, New Delhi and Affiliated to SCTE&VT, Odisha

ELECTRICAL ENGINEERING

SEMESTER : 5th (SEC-A)

FROM :01/07/2026 TO :05/11/2026

NAME OF THE FACULTY : Er. ROJALIN BISWAL

SUBJECT : SWITCHGEAR AND PROTECTION

TOTAL CLASS AVAILABLE IN SEMESTER: 45 nos

NO. OF PERIODS : 03/ WEEK

Class No.	Unit	Topic / Sub-topic	Teaching Method	Learning Outcome
1	I	Course Introduction, Necessity & Functions of Protection System	Lecture + PPT	Explain the importance of protection systems
2	I	Normal & Abnormal Operating Conditions	Lecture	Differentiate normal and fault conditions
3	I	Types of Electrical Faults & Their Causes	Lecture + Discussion	Classify various electrical faults
4	I	Protection Zones & Backup Protection	Lecture + Diagram	Explain protection zones and backup schemes
5	I	Short-Circuit Fault Calculations in Generator-Transformer Fed Lines	Lecture + Numerical	Calculate short-circuit fault currents
6	I	Current Limiting Reactors: Need & Arrangements	Lecture	Explain the application of current-limiting reactors
7	I	Revision & Unit Test-I	Tutorial + Test	Assess Unit-I learning
8	II	Introduction to Circuit Interruption Devices	Lecture	Explain the role of switching devices
9	II	Isolators: Vertical Break, Horizontal Break & Pantograph Type	Lecture + Diagram	Compare different types of isolators
10	II	HRC Fuse: Construction & Working	Lecture + Demonstration	Explain HRC fuse operation
11	II	HRC Fuse Characteristics & Applications	Lecture	Select suitable fuse applications
12	II	Arc Formation & Arc Extinction Methods	Lecture	Explain arc interruption principles
13	II	Arc Voltage, Recovery Voltage, Restriking Voltage & RRRV	Lecture	Differentiate voltage terms in circuit breaking



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14	II	SF ₆ Circuit Breaker	Lecture + Video	Explain construction and operation of SF ₆ CB
15	II	Vacuum Circuit Breaker (VCB)	Lecture	Explain VCB operation
16	II	Low Voltage Circuit Breakers: ACB, MCB, MCCB & ELCB	Lecture + Demonstration	Compare LT circuit breakers
17	II	Selection of LT & HT Circuit Breakers, MCCB Selection for Motors	Lecture + Numerical	Select appropriate circuit breakers
18	II	Gas Insulated Switchgear (GIS)	Lecture	Explain GIS construction and advantages
19	II	Revision & Practice Problems	Tutorial	Reinforce Unit-II concepts
20	II	Unit Test-II	Test	Assess Unit-II learning
21	III	Fundamentals of Protective Relays	Lecture	Explain relay characteristics
22	III	Relay Terminology: Pickup, Reset, Plug Setting & Time Multiplier	Lecture + Numerical	Interpret relay settings
23	III	Electromagnetic Relays: Attracted Armature, Solenoid & Watt-Hour Type	Lecture	Compare electromagnetic relays
24	III	Thermal Relay & Static Relay	Lecture	Explain relay operation
25	III	Overcurrent Relay & Time-Current Characteristics	Lecture + Graph	Analyze relay characteristics
26	III	Microprocessor-Based Overcurrent Relay	Lecture	Explain digital relay operation
27	III	Distance Relay & Directional Relay	Lecture	Explain distance and directional protection
28	III	Current Differential & Voltage Differential Relays	Lecture	Describe differential protection
29	III	Revision & Unit Test-III	Tutorial + Test	Assess Unit-III learning
30	IV	Alternator Faults & Protection	Lecture	Identify alternator faults
31	IV	Differential, Overcurrent, Earth Fault & Field Failure Protection	Lecture	Explain alternator protection schemes
32	IV	Reverse Power Protection	Lecture	Explain reverse power relay operation
33	IV	Transformer Faults & Protection	Lecture	Identify transformer faults



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Class No.	Unit	Topic / Sub-topic	Teaching Method	Learning Outcome
34	IV	Differential, Overcurrent & Earth Fault Protection of Transformer	Lecture	Explain transformer protection methods
35	IV	Buchholz Relay: Construction, Operation, Merits & Demerits	Lecture + Diagram	Explain Buchholz relay operation
36	IV	Revision & Unit Test-IV	Test	Assess Unit-IV learning
37	V	Motor Faults & Protection	Lecture	Explain motor protection requirements
38	V	Short-Circuit Protection, Overload Protection & Single-Phasing Preventer	Lecture	Apply motor protection methods
39	V	Bus-Bar Faults & Protection	Lecture + Diagram	Explain bus-bar protection schemes
40	V	Differential & Fault Bus Protection	Lecture	Compare bus-bar protection methods
41	V	Transmission Line Faults	Lecture	Classify transmission line faults
42	V	Overcurrent, Distance & Pilot Wire Protection	Lecture	Explain transmission line protection
43	V	Case Studies & Numerical Problems	Tutorial	Solve protection-related problems
44	All Units	Overall Revision & Model Test	Written Test	Evaluate complete syllabus
45	All Units	Model Test Discussion & Doubt Clearing	Interactive Session	Strengthen concepts for examinations

R.D.

Sign of Faculty

R.K. Institute of Engg. & Tech
Sign of HOD
R.K. Institute of Engg. & Tech
Kantapada, Niali, Cuttack

Sign of Principal

Principal
R.K. INSTITUTE OF ENGG & TECH
KANTAPADA, NIALI
CUTTACK