Discipline: **EE**	Semester: 6th	Name of the Teaching Faculty: **SRI SUBODH KANTA BARIK**
Subject: **SWITCH GEAR AND PROTECTIVE DEVICES**	No. of Days/per week class allotted: **05**	No. of Weeks : **15**
Week	**Class Day**	**Theory Topics**
1st	01	**Unit 1: INTRODUCTION TO SWITCHGEAR** Essential Features of switchgear.
	02	Switchgear Equipment.
	03	Bus-Bar Arrangement.
	04	Switchgear Accommodation.
	05	Short Circuit.
2nd	01	Faults in a power system.
	02	Tutorials
	03	**Unit 2: FAULT CALCULATION** Symmetrical faults on 3-phase system.
	04	Limitation of fault current. .
	05	Percentage Reactance.
3rd	01	Percentage Reactance and Base KVA.
	02	Short – circuit KVA.
	03	Reactor control of short circuit currents.
	04	Location of reactors.
	05	Steps for symmetrical Fault calculations.
4th	01	Solve numerical problems on symmetrical fault.
	02	Solve numerical problems on symmetrical fault.
	03	Tutorial
	04	**Unit 3: FUSES** Desirable characteristics of fuse element.
	05	Fuse Element materials.
5th	01	Types of Fuses and important terms used for fuses.
	02	Low and High voltage fuses.
	03	Current carrying capacity of fuse element.
	04	Difference Between a Fuse and Circuit Breaker.
	05	Tutorial
6th	01	**Unit 4: CIRCUIT BREAKERS** Definition and principle of Circuit Breaker, Arc phenomenon and principle of Arc Extinction.
	02	Methods of Arc Extinction
	03	Definitions of Arc voltage, Re-striking voltage and Recovery voltage.
	04	Classification of circuit Breakers, Oil circuit Breaker and its classification, Plain brake oil circuit breaker.
	05	Arc control oil circuit breaker, Low oil circuit breaker.

7th	01	Maintenance of oil circuit breaker
	02	Air-Blast circuit breaker and its classification,Sulphur Hexa-fluoride (SF6) circuit breaker, Vacuum circuit breakers.
	03	Switchgear component.
	04	Problems of circuit interruption, Resistance switching.
	05	Circuit Breaker Rating.
8th	01	Tutorial
	02	**Unit 5: PROTECTIVE RELAYS** Definition of Protective Relay, Fundamental requirement of protective relay
	03	Basic Relay operation(Electromagnetic Attraction type, Induction type)
	04	Definition of important terms(Pick-up current, Current setting, Plug setting Multiplier, Time setting Multiplier)
	05	Classification of functional relays , Induction type over current relay (Non-directional)
9th	01	Induction type directional power relay
	02	Induction type directional over current relay
	03	Differential relay(Current differential relay, Voltage balance differential relay)
	04	Types of protection
	05	Tutorial
10th	01	**Unit 6: PROTECTION OF ELECTRICAL POWER EQUIPMENT AND LINES** Protection of alternator, Differential protection of alternators.
	02	Balanced earth fault protection
	03	Protection systems for transformer, Buchholz relay
	04	Protection of Bus bar, Protection of Transmission line.
	05	Different pilot wire protection (Merz-price voltage Balance system)
11th	01	Explain protection of feeder by over current and earth fault relay
	02	Tutorial
	03	**Unit 7: PROTECTION AGAINST OVER VOLTAGE AND LIGHTING** Voltage surge and causes of over voltage.
	04	Internal cause of over voltage.
	05	External cause of over voltage (lighting)
12th	01	Mechanism of lightning discharge.
	02	Types of lightning strokes.
	03	Harmful effect of lightning.
	04	Lightning arresters and Type of lightning Arresters
	05	Surge Absorber
13th	01	Tutorial
	02	**Unit 8: STATIC RELAY:**

		static relay.
	03	Advantage of static relay
	04	Instantaneous over current relay
	05	Instantaneous over current relay
14th	01	IDMT relay.
	02	Principle of IDMT relay
	03	Tutorial
	04	Revision, Q&A discussion, Doubt Clearing
	05	Revision, Q&A discussion, Doubt Clearing
15th	01	Revision, Q&A discussion, Doubt Clearing
	02	Revision, Q&A discussion, Doubt Clearing
	03	Revision, Q&A discussion, Doubt Clearing
	04	Revision, Q&A discussion, Doubt Clearing
	05	Revision, Q&A discussion, Doubt Clearing