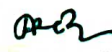


Discipline	Semester:- 6 th	Name of the Teaching Faculty:- Prabhat Rashmi Mallick
Subject:- SWITCH GEAR AND PROTECTIVE DEVICES	No of Days/per Week Class Allotted :- 4+ 1{Tutorial}	Semester From:- <u>14/02/2023</u> To:- <u>23/05/2023</u>
Week	Class Day	Theory/ Practical Topics
1 st	1 st	INTRODUCTION TO 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 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 (SF6) 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 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 st	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 st	Tutorial
11th	1 st	5.11 Types of protection
	2 nd	6.1 Protection of alternator.
	3 rd	6.2 Differential protection of alternators.
	4 th	6.3 Balanced earth fault protection.
	5 st	6.4 Protection systems for transformer
12th	1 st	Tutorial
	2 nd	6.5 Buchholz relay
	3 rd	6.6 Protection of Bus bar. 6.7 Protection of Transmission line.
	4 th	6.8 Different pilot wire protection (Merz-price voltage Balance system) 6.9 Explain protection of feeder by over current and earth fault relay.
	5 st	Tutorial
13th	1 st	7.1 Voltage surge and causes of over voltage. 7.2 Internal cause of over voltage.
	2 nd	7.3 External cause of over voltage (lighting)
	3 rd	7.4 Mechanism of lightning discharge.
	4 th	7.5 Types of lightning strokes. 7.6 Harmful effect of lightning.
	5 st	7.7 Lightning arresters.
14th	1 st	Tutorial
	2 nd	7.8 Type of lightning Arresters. a) Rod-gap lightning arrester. b) Horn-gap arrester. c) Valve type arrester.
	3 rd	7.9 Surge Absorber
	4 th	STATIC RELAY
	5 st	8.1 Advantage of static relay.
15th	1 st	Tutorial
	2 nd	8.2.1 Instantaneous over current relay.
	3 rd	8.2.2 Instantaneous over current relay.
	4 th	8.3.1 Principle of IDMT relay.
	5 st	8.3.2 Principle of IDMT relay.
	5 st	Tutorial


 Teaching Faculty
 Prabhakar Rachmi Malik


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Discipline	Semester:-6 th	Name of the Teaching Faculty:- Sandeep kumar Panigrahi
Electrical Engg.		
Subject: Electrical Installation And Estimating	No of Days/per Week Class Allotted :- 4+ 1 {Tutorial}	Semester From:- <u>14/02/2023</u> To:- <u>23/05/2023</u> No of Weeks:-15
Week	Class Day	Theory/ Practical Topics
1 st	1 st	1. INDIAN ELECTRICITY RULES 1.1 Definitions, Ampere, Apparatus, Accessible, Bare, cablew, circuit, circuit breaker,conductor voltage (low, medium, high, EH)
	2 nd	1.1 live, dead, cut-out, conduit, system,danger, Installation, earthing system, span, volt, switch gear, etc.
	3 rd	1.2 General safety precautions, rule 29, 30, 31, 32, 33, 34, 35, 36, 40, 41, 43, 44, 45, 46.
	4 th	1.3 General conditions relating to supply and use of energy : rule 47, 48, 49, 50, 51, 54, 55,
	5 th	Tutorial
	1 st	1.3 General conditions relating to supply and use of energy : rule 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 70.
2 nd	2 nd	1.4 OH lines : Rule 74, 75, 76, 77, 78, 79, 80, 86, 87, 88, 89, 90, 91
	3 rd	2. ELECTRICAL INSTALLATIONS 2. 1 Electrical installations, domestics, industrial, Wiring System, Internal distribution of Electrical Energy. Methods of wiring, systems of wiring, wire and cable, conductor materials used in cables, insulating materials mechanical protection.
	4 th	Types of cables used in internal wiring, multi-stranded cables,voltage grinding of cables, general specifications of cables.
	5 th	Tutorial
		2. 2 ACCESSORIES: Main switch and distribution boards, conduits, conduit accessories and fittings, lighting accessories and fittings, fuses, important definitions, determination of size of fuse – wire, fuse units. Earthing conductor, earthing
		IS specifications regarding earthing of electrical installations, points to be earthed
3 rd		Determination of size of earth wire and earth plate for domestic and industrial installations. Material required for GI pipe earthing.
		. 2. 3 LIGHTING SCHEME: Aspects of good lighting services. Types of lighting schemes, design of lighting schemes, factory lighting, public lighting installations, street lighting, general rules for wiring
		determination of number of points (light, fan, socket, outlets), determination of total load, determination of Number of sub-circuits
		3. INTERNAL WIRING 3 . 1 Type of internal wiring, cleat wiring, CTS wiring, wooden casing capping, metal sheathed wiring, conduit wiring, their advantage and disadvantages comparison and applications.
		Tutorial
		3 . 2 Prepare one estimate of materials required for CTS wiring for small domestic installation of one room and one verandah within 25 m ² with given light, fan & plug points.
4 th		3 . 3 Prepare one estimate of materials required for conduit wiring for small domestic installation of one room and one verandha within 25 m ² with given light, fan & plug points.
		3 . 4 Prepare one estimate of materials required for concealed wiring for domestic installation of two rooms and one latrine, bath, kitchen & verandah within 80m ² with given light, fan & plug points
		3 . 5 Prepare one estimate of materials required for erection of conduct wiring to a small workshop installation about 30m ² and load within 10 KW.
		3 . 5 Prepare one estimate of materials required for erection of conduct wiring to a
		3 . 5 Prepare one estimate of materials required for erection of conduct wiring to a

		small workshop installation about 30m ² and load within 10 KW.(Contd...)
5 th		Tutorial
		3 . 5 Prepare one estimate of materials required for erection of conduct wiring to a small workshop installation about 30m ² and load within 10 KW.
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		3 . 5 Prepare one estimate of materials required for erection of conduct wiring to a small workshop installation about 30m ² and load within 10 KW.
		Tutorial
6 th		5. OVER HEAD SERVICE LINES
		5.1 Components of service lines, service line (cables and conductors), bearer wire, lacing rod. Ariel fuse, service support, energy box and meters etc.
		5.1 Components of service lines, service line (cables and conductors), bearer wire, lacing rod. Ariel fuse, service support, energy box and meters etc
		5.2 Prepare and estimate for providing single phase supply of load of 5 KW (light, fan, socket) to a single stored residential building.
		5.2 Prepare and estimate for providing single phase supply of load of 5 KW (light, fan, socket) to a single stored residential building.
		5.3 Prepare and estimate for providing single phase supply load of 3KW to each floor of a double stored building having separate energy meter.(Contd...)
7 th		Tutorial
		5.3 Prepare and estimate for providing single phase supply load of 3KW to each floor of a double stored building having separate energy meter.
		5.3 Prepare and estimate for providing single phase supply load of 3KW to each floor of a double stored building having separate energy meter.
		5.4 Prepare one estimate of materials required for service connection to a factory building with load within 15 KW using insulated wire.
		5.4 Prepare one estimate of materials required for service connection to a factory building with load within 15 KW using insulated wire.
		5.4 Prepare one estimate of materials required for service connection to a factory building with load within 15 KW using insulated wire.(Contd....)
8 th		Tutorial
		5.4 Prepare one estimate of materials required for service connection to a factory building with load within 15 KW using insulated wire.
		5.5 Prepare one estimate of materials required for service connection to a factory building with load within 15 KW using bare conductor and insulated wire combined.
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		5.5 Prepare one estimate of materials required for service connection to a factory building with load within 15 KW using bare conductor and insulated wire combined.
		5.5 Prepare one estimate of materials required for service connection to a factory building with load within 15 KW using bare conductor and insulated wire combined.
9 th		Tutorial
		4. OVER HEAD INSTALLATION
		4.1 Main components of overhead lines, line supports, factors Governing Height of pole, conductor materials, determination of size of conductor for overhead transmission line cross arms pole brackets and clamps guys and stays

		conductors configurations, spacing and clearances, span lengths,
		overhead line insulators, types of insulators, lightning arresters, danger plates, anti-climbing devices, bird guards, beads of jumpers, jumpers, tee-offs, guarding of overhead lines.
		4.2 Prepare an estimate of materials required for LT distribution line within load of 100 KW maximum and standard spans involving calculation of the size of conductor (from conductor chart), current carrying capacity and voltage regulation consideration using ACSR.
		4.2 Prepare an estimate of materials required for LT distribution line within load of 100 KW maximum and standard spans involving calculation of the size of conductor (from conductor chart), current carrying capacity and voltage regulation consideration using ACSR.
		Tutorial
10th		4.2 Prepare an estimate of materials required for LT distribution line within load of 100 KW maximum and standard spans involving calculation of the size of conductor (from conductor chart), current carrying capacity and voltage regulation consideration using ACSR.
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		4.3. Prepare an estimate of materials required for LT distribution line within load of 100 KW maximum and standard spans involving calculation of the size of conductor (from conductor chart), current carrying capacity and voltage regulation consideration using ACSR.
		Tutorial
11th		4.3. Prepare an estimate of materials required for LT distribution line within load of 100 KW maximum and standard spans involving calculation of the size of conductor (from conductor chart), current carrying capacity and voltage regulation consideration using ACSR.
		4.3. Prepare an estimate of materials required for LT distribution line within load of 100 KW maximum and standard spans involving calculation of the size of conductor (from conductor chart), current carrying capacity and voltage regulation consideration using ACSR.
		4.3. Prepare an estimate of materials required for LT distribution line within load of 100 KW maximum and standard spans involving calculation of the size of conductor (from conductor chart), current carrying capacity and voltage regulation consideration using ACSR.
		4.3. Prepare an estimate of materials required for LT distribution line within load of 100 KW maximum and standard spans involving calculation of the size of conductor (from conductor chart), current carrying capacity and voltage regulation consideration using ACSR.
		4.4 Prepare an estimate of materials required for HT distribution line (11 KV) within 2 km and load of 2000 KVA maximum and standard spans involving calculation of the size of conductor (from conductor chart), current carrying capacity and voltage regulation of the size of conductor (from conductor chart), current carrying capacity and voltage regulation consideration using ACSR.
		Tutorial
12th		4.4 Prepare an estimate of materials required for HT distribution line (11 KV) within 2 km and load of 2000 KVA maximum and standard spans involving calculation of the size of conductor (from conductor chart), current carrying capacity and voltage regulation of the size of conductor (from conductor chart), current carrying capacity and voltage regulation consideration using ACSR.
		4.4 Prepare an estimate of materials required for HT distribution line (11 KV)

		within 2 km and load of 2000 KVA maximum and standard spans involving calculation of the size of conductor (from conductor chart), current carrying capacity and voltage regulation of the size of conductor (from conductor chart), current carrying capacity and voltage regulation consideration using ACSR.
		4.4 Prepare an estimate of materials required for IFT distribution line (11 KV) within 2 km and load of 2000 KVA maximum and standard spans involving calculation of the size of conductor (from conductor chart), current carrying capacity and voltage regulation of the size of conductor (from conductor chart), current carrying capacity and voltage regulation consideration using ACSR.
		4.4 Prepare an estimate of materials required for IFT distribution line (11 KV) within 2 km and load of 2000 KVA maximum and standard spans involving calculation of the size of conductor (from conductor chart), current carrying capacity and voltage regulation of the size of conductor (from conductor chart), current carrying capacity and voltage regulation consideration using ACSR.
		4.4 Prepare an estimate of materials required for IFT distribution line (11 KV) within 2 km and load of 2000 KVA maximum and standard spans involving calculation of the size of conductor (from conductor chart), current carrying capacity and voltage regulation of the size of conductor (from conductor chart), current carrying capacity and voltage regulation consideration using ACSR.
		Tutorial
13th		4.4 Prepare an estimate of materials required for HT distribution line (11 KV) within 2 km and load of 2000 KVA maximum and standard spans involving calculation of the size of conductor (from conductor chart), current carrying capacity and voltage regulation of the size of conductor (from conductor chart), current carrying capacity and voltage regulation consideration using ACSR.
		6. ESTIMATING FOR DISTRIBUTION SUBSTATIONS 6.1 Prepare one materials estimate for following types of transformer substations.
		6.1.1 Pole mounted substation
		6.1.1 Pole mounted substation
		6.1.1 Pole mounted substation
		Tutorial
14th		6.1.1 Pole mounted substation
		6.1.1 Pole mounted substation
		6.1.2 Plinth Mounted substation.
		6.1.2 Plinth Mounted substation.
		6.1.2 Plinth Mounted substation.
		Tutorial
15th		6.1.2 Plinth Mounted substation.
		6.1.2 Plinth Mounted substation.
		Previous year question paper discussion
		Previous year question paper discussion
	5 th	Previous year question paper discussion
	6 th	Tutorial

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Discipline :ELECTRICAL ENGINEERING	Semester :6th	Name of the Teaching Faculty: Rajasri Tripathy
Subject: RENEWABLE ENERGY SYSTEMS	No. of days/per week class allotted:05	Semester From date : 14/02/2023 To Date: 23/05/2023
Week	Class Day	Theory Topics
1 ST	1 ST	Introduction to Renewable energy and Environmental consequences of fossil fuel use.
	2 ND	Importance of renewable sources of energy.
	3 RD	Sustainable Design and development.
	4 TH	Types of RE sources and Limitations of RE sources.
	5 TH	Present Indian and international energy scenario of conventional and RE sources.
2 ND	1 ST	Introduction to Solar Energy
	2 ND	Solar photovoltaic system-Operating principle.
	3 RD	Photovoltaic cell concepts
	4 TH	Cell, module, array
	5 TH	Series and parallel connections
3 RD	1 ST	Maximum power point tracking (MPPT).
	2 ND	Classification of energy Sources.
	3 RD	Extra-terrestrial Radiation
	4 TH	Terrestrial Radiation
	5 TH	Azimuth angle, Zenith angle, Hour angle
4 TH	1 ST	Irradiance, Solar constant
	2 ND	Solar collectors
	3 RD	Types and performance characteristics
	4 TH	Applications: Photovoltaic - battery charger, domestic lighting, street lighting
	5 TH	Applications: water pumping, solar cooker, Solar Pond.
5 TH	1 ST	Introduction to Wind energy.
	2 ND	Wind energy conversion
	3 RD	Types of wind turbines
	4 TH	Aerodynamics of wind rotors.
	5 TH	Wind turbine control systems; conversion to electrical power:
6 TH	1 ST	Induction generators
	2 ND	Synchronous generators
	3 RD	Grid connected and self excited induction generator operation
	4 TH	Constant voltage and constant frequency generation with power electronic control.
	5 TH	Single output systems
7 TH	1 ST	Doubleoutput systems
	2 ND	Characteristics of wind power plant
	3 RD	Introduction to Biomass Power
	4 TH	Energy from Biomass

8 TH	5 TH	Biomass as Renewable Energy Source
	1 ST	Types of Biomass Fuels - Solid, Liquid and Gas
	2 ND	Combustion
	3 RD	Fermentation
	4 TH	Anaerobic digestion
9 TH	5 TH	Types of biogas digester
	1 ST	Wood gassifier
	2 ND	Pyrolysis
	3 RD	Applications: Bio gas
	4 TH	Applications: Bio diesel
10 TH	5 TH	Other Energy Sources
	1 ST	Tidal Energy
	2 ND	Energy from the tides
	3 RD	Barrage Tidal power systems
	4 TH	Non Barrage Tidal power systems
11 TH	5 TH	Ocean Thermal Energy Conversion (OTEC).
	1 ST	Geothermal Energy
	2 ND	Classification
	3 RD	Hybrid Energy Systems
	4 TH	Need for Hybrid Systems
12 TH	5 TH	Diesel-PV
	1 ST	Wind-PV
	2 ND	Microhydel-PV
	3 RD	Electric vehicles
	4 TH	Hybrid electric vehicles
	5 TH	Doubt clearing

Rajendra Prasad
Teaching Faculty
14/12/23

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14/12/23

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