Lesson Plan of Electrical Department of Government Polytechnic ,Berhampur

Discipline **Electrical Engg.**	Semester:- **4th**	Name of the Teaching Faculty:- **Prabhat Rashmi Mallik**
Subject:- **Energy Conversion-I**	No of Days/per Week Class Allotted :- **4+ 1(Tutorial)**	Semester From:- :- **16/01/2024** To **26/04/2024** No of Weeks:- **15**
Week	**Class Day**	**Theory/ Practical Topics**
1st	1st	1. 1D.C Generator, Explain principle of operation
	2nd	1. 2 Explain Constructional feature
	3rd	1.3 Armature winding, back pitch, Front pitch, Resultant pitch and commutator- pitch
	4th	1.4.1 Simple Lap winding (problems on winding diagram)
	5th	Tutorial
2nd	1st	1.4.2 Simple wave winding (problems on winding diagram)
	2nd	1.5.1 Explain Different types of D.C. machines Shunt, Series and Compound machine with problem solving methods.
	3rd	1.5.2 Explain Different types of D.C. machines Shunt, Series and Compound machine with problem solving methods.
	4th	1.6. Derive EMF equation of DC generators. (Solve problems)
	5th	Tutorial
3rd	1st	1.7. Explain Armature reaction in D.C. machine & commutation.
	2nd	1.8. Explain Methods of improving commutation (Resistance and emf commutation
	3rd	1.9. Explain role of inter poles and compensating winding. (solve problems)
	4th	1.10. Characteristics of D.C. Generators with problem solving methods1.11. State application of different types of D.C. Generators.
	5th	Tutorial
4th	1st	1.12. Concept of critical resistance causes of failure of development of emf.
	2nd	1.13. Explain losses and efficiency of D.C. machines, condition for maximum efficiency and numerical problems.
	3rd	1.14. Explain parallel operation of D.C. Generators.
	4th	Tutorial
	5th	2.1 Explain basic working principle of DC motor
5th	1st	2.2 State Significance of back emf in D.C. Motor.
	2nd	2.3 Derive voltage equation of Motor
	3rd	2.4 Derive torque (Equation of Armature Torque and shaft Torque) (solve problems)
	4th	Tutorial
	5th	2.5.1 Explain performance characteristics of shunt, series and compound motors and their application. (Solve problems)
6th	1st	2.5.2 Explain performance characteristics of shunt, series and compound motors and their application. (Solve problems)
	2nd	2.6.1 Explain methods of starting shunt, series and compound motors
	3rd	2.6.1 Explain methods of starting shunt, series and compound motors, (solve problems)
	4th	Tutorial
	5th	2.7 Explain speed control of D.C shunt motors by 2.7.1 Flux control method
7th	1st	2.7.2 Armature voltage (rheostatic) Control method.
	2nd	2.7.3 Solve problems
	3rd	Tutorial
	4th	2.8 Explain speed control of series motors by Flux control method and series parallel method.
	5st	2.9 Explain determination of efficiency of D.C. Machine by break test method.
8th	1st	2.10 Explain determination of efficiency of D.C. Machine by Swinburne's Test method.
	2nd	2.11.1 Explain Losses & efficiency and condition for maximum power and solve numerical problems.
	3rd	2.11.2 Explain Losses & efficiency and condition for maximum power and solve numerical problems.
	4th	Tutorial
	5st	3.1 Explain working principle of transformer.

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9th	1st	3.2 Explains Transformer Construction – Arrangement of core & winding in different types of transformer – Brief ideas about transformer accessories such as conservator, tank, breather explosion vent etc.
	2nd	3.3 Explain types of cooling methods
	3rd	3.4 State the procedures for Care and maintenance
	4th	3.5 Derive EMF equation
	5th	Tutorial
10th	1st	3.6 Ideal transformer voltage transformation ratio
	2nd	3.7 Explain Transformer on no load and on load phasor diagrams. 3.8 Explain Equivalent Resistance. Reactance and Impedance.
	3rd	3.9 Explain phasor diagram of transformer with winding Resistance and Magnetic leakage. Phasor diagram on load using upf, leading pf and lagging pf.
	4th	3.10 Explain Equivalent circuit and solve numerical problems.
	5th	Tutorial
11th	1st	3.11 Calculate Approximate & exact voltage drop of a Transformer.
	2nd	3.12 Calculate Regulation of various loads and power factor.
	3rd	3.13 Explain Different types of losses in a Transformer. (solve problems)
	4th	Tutorial
	5th	3.14 Explain Open circuit test.
12th	1st	3.15 Explain Short circuit test
	2nd	3.16 Explain Efficiency, efficiency at different loads and power factors, condition for maximum efficiency (solve problems)
	3rd	3.17 Explain All Day Efficiency (solve problems)
	4th	Tutorial
	5th	3.18 Explain determination of load corresponding to Maximum efficiency.
13th	1st	3.19 Explain parallel operation of single phase transformer.
	2nd	Tutorial
	3rd	4.1 Explain constructional features of Auto transformer
	4th	4.2 Explain Working principle of single phase Auto Transformer.
	5th	4.3 State Comparison of Auto transformer with an two winding transformer (saving of Copper)
14th	1st	4.4 State Uses of Auto transformer.
	2nd	4.5 Explain Tap changer with transformer (on load and off load condition)
	3rd	Tutorial
	4th	INSTRUMENT TRANSFORMER 5.1 Explain Current Transformer
	5th	5.1 Explain Potential Transformer.
15th	1st	5.2 Define Ratio error,Phase angle error,Burden
	2nd	5.3 Uses of C.T and P.T.
	3rd	Tutorial

Prabhat Rashmi Mallik.
Teaching Faculty
13/01/2024

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Lesson Plan of Electrical Department of Government Polytechnic, Berhampur

Discipline :- ELECTRICAL	Semester:- 4TH	Name of the Teaching Faculty:- Lipika Sandha
Subject:- ANALOG ELECTRONICS AND OP-AMP (TH-02)	No of Days/per Week Class Allotted :- 04	Semester From:- 16/01/2024 To 26/04/2024 No. Of weeks:15
Week	**Class Day**	**Theory**
1st	1st	Introduction to semiconductor and its Application
	2nd	P-N Junction Diode and its working
	3rd	V-I characteristic of PN junction Diode.
	4th	DC load line
2nd	1st	Important terms such as Ideal Diode, Knee voltage
	2nd	Junctions break down(Zener breakdown and Avalanche breakdown)
	3rd	P-N Diode clipping and Diode clamping Circuit.
	4th	**SPECIAL SEMICONDUCTOR DEVICES:** Thermistors , Sensors & barretters
3rd	1st	Zener Diode and Tunnel Diode
	2nd	PIN Diode
	3rd	**OPERATIONAL AMPLIFIERS:** General circuit simple of OP-AMP and IC – CA – 741 OP-AMP
	4th	Operational amplifier stages
4th	1st	Equivalent circuit of operational amplifier
	2nd	Open loop OP-AMP configuration and OPAMP with feed back
	3rd	Inverting OP-AMP and Non inverting OP-AMP
	4th	Voltage follower & buffer
5th	1st	Differential amplifier
	2nd	Adder or summing amplifier
	3rd	Sub tractor , integrator , differentiator and comparator
	4th	**FIELD EFFECT TRANSISTOR** Classification of FET Advantages of FET over BJT and Principle of operation of BJT
6th	1st	FET parameters
	2nd	DC drain resistance, AC drain resistance, Trans-conductance
	3rd	Biasing of FET
	4th	**RECTIFIER CIRCUITS & FILTERS:** Classification of rectifiers
7th	1st	Analysis of half wave, full wave ,centre tapped
	2nd	Bridge rectifiers and calculate
	3rd	DC output current and voltage
	4th	RMS output current and voltage
8th	1st	Rectifier efficiency and Ripple factor
	2nd	Regulation
	3rd	Transformer utilization factor
	4th	Peak inverse voltage
9th	1st	Filters
	2nd	Shunt capacitor filter
	3rd	Choke input filter
	4th	π filter
10th	1st	**TRANSISTORS:** Principle of Bipolar junction transistor
	2nd	Different modes of operation of transistor
	3rd	Current components in a transistor

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	4th	Transistor as an amplifier
11th	1st	Transistor circuit configuration & its characteristics
	2nd	CB CE CC Configuration
	3rd	**TRANSISTOR CIRCUITS** : Transistor biasing
	4th	Stabilization and Stability factor
12th	1st	Different method of Transistors Biasing
	2nd	Base resistor method
	3rd	Collector to base bias
	4th	Self bias or voltage divider method
13th	1st	**TRANSISTOR AMPLIFIERS & OSCILLATORS** Practical circuit of transistor amplifier, DC load line and DC equivalent circuit
	2nd	AC load line and AC equivalent circuit, Calculation of gain, Phase reversal
	3rd	H-parameters of transistors
	4th	Simplified H-parameters of transistors
14th	1st	Generalised approximate model
	2nd	Analysis of CB,CE,CC amplifier using generalised approximate model, Multi stage transistor amplifier
	3rd	R.C. coupled amplifier and Transformer coupled amplifier
	4th	Feed back in amplifier
15th	1st	General theory of feed back
	2nd	Negative feedback circuit
	3rd	Advantage of negative feed back
	4th	Power amplifier and its classification
16th	1st	Difference between voltage amplifier and power amplifier
	2nd	Transformer coupled class A power amplifier
	3rd	Class A push – pull amplifier
	4th	Class B push – pull amplifier
17th	1st	Types of oscillators and Essentials of transistor oscillator, Principle of operation of tuned collector, Hartley, colpitt, phase shift, wein-bridge oscillator
	2nd	Doubt Clearing Classes and Revision of Syllabus Previous Five (05) Years Semester Question Answer Discussion
	3rd	
	4th	

Teaching Faculty 13/01/2024
Lipika Sandha
Lect. (Electronics)

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Discipline **Electrical Engg.**	Semester:- **4th**	Name of the Teaching Faculty:- **Aditya Kumar Panda**
Subject: ELECTRICAL MEASUREMENT & MEASURING INSTRUMENT	No of Days/per Week Class Allotted :- **4+ 1{Tutorial)**	Semester From:- **16/01/ 2024** To:- **26/04/2024** No of Weeks:-**15**
Week	**Class Day**	**Theory/ Practical Topics**
1st	1st	1.Introduction to measuring instruments
	2nd	1.1 Define Accuracy, precision, Errors,
	3rd	Resolutions Sensitivity and tolerance.
	4th	1.2 Classification of measuring instruments
	5th	Tutorial
2nd	1st	1.3 Explain Deflecting, controlling and damping arrangements in indicating type of instruments.
	2nd	1.3 Explain Deflecting, controlling and damping arrangements in indicating type of instruments.(Contd..)
	3rd	1.4 Calibration of instruments.
	4th	2. ANALOG AMMETERS AND VOLTMETERS 2.1Describe Construction, principle of operation
	5th	Tutorial
3rd	1st	2.1Errors, ranges merits and demerits of 2.1 Moving iron type instruments.
	2nd	2.2 Permanent Magnet Moving coil type instruments
	3rd	2.3 Dynamometer type instruments
	4th	2.3 Dynamometer type instruments (Contd..)
	5th	Tutorial
4th	1st	2.4 Rectifier type instruments
	2nd	2.5 Induction type instruments
	3rd	2.5 Induction type instruments (Contd..)
	4th	2.6 Extend the range of instruments by use of shunts and Multipliers.
	5th	Tutorial
5th	1st	2.7 Solve Numerical
	2nd	3. WATTMETERS AND MEASUREMENT OF POWER
	3rd	3.1 Describe Construction, principle of working of Dynamometer type wattmeter
	4th	3.2 What are the Errors in Dynamometer type wattmeter and methods of their correction
	5th	Tutorial
6th	1st	3.3 Discuss L P F Electro – Dynamometer type wattmeter
	2nd	3.4 Discuss Induction type watt meters
	3rd	3.5 Measurement of Power in Single Phase and Three Phase Circuit
	4th	3.5 Measurement of Power in Single Phase and Three Phase Circuit
	5th	Tutorial
7th	1st	4. ENERGYMETERS AND MEASUREMENT OF ENERGY 4.1 Introduction
	2nd	4.2 Single Phase and poly phase Induction type Energy meters
	3rd	4.2Construction, working principle and their compensation and adjustments.
	4th	4.2Their compensation and adjustments.
	5th	Tutorial
8th	1st	4.3 Testing of Energy Meters
	2nd	4.3 Testing of Energy Meters (Contd..)
	3rd	5. MEASUREMENT OF SPEED; FREQUENCY AND POWER FACTOR 5.1 Tachometers, types and working principles
	4th	5.2 Principle of operation and construction of Mechanical and Electrical resonance Type frequency meters
	5th	Tutorial
	1st	5.3 Principle of operation and working of Dynamometer type single phase and three

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9th		phase power factor meters
	2nd	5.4 Synchroscopes – objectives and working.
	3rd	5.5 Phase Sequence Indicators and its working
	4th	6. INSTRUMENT TRANSFORMER 6.1 Explain Current Transformer and Potential Transformer.
	5th	Tutorial
10th	1st	6.1 Explain Current Transformer and Potential Transformer. (Contd..)
	2nd	6.2 Explain Ratio error, Phase Angle error and Burden
	3rd	6.2 Explain Ratio error, Phase Angle error and Burden (Contd..)
	4th	6.3 Clamp – On Ammeters
	5th	Tutorial
11th	1st	6.3 Clamp – On Ammeters(Contd..)
	2nd	6.4 State Use of CT and PT
	3rd	6.4 State Use of CT and PT(Contd..)
	4th	7. MEASUREMENT OF RESISTANCE 7.1 Classification of resistance
	5th	Tutorial
12th	1st	7.2 Explain Measurement of low resistance by voltage drop and potentiometer method & its use to Measure resistance
	2nd	7.3 Explain Measurement of medium resistance by wheat Stone bridge method and substitution Method.
	3rd	7.4 Explain Measurement of high resistance by loss of charge method.
	4th	7.5 Explain construction & principle of operations (meggers) insulation resistance & Earth resistance megger.
	5th	Tutorial
13th	1st	7.6 Explain construction and principles of Multimeter
	2nd	8.MEASUREMEN OF INDUCTANCEAnd CAPACITANCE
	3rd	Explain measurement of inductance by 8.1 Maxewell's Bridge method.
	4th	8.2 Owen Bridge method
	5th	Tutorial
14th	1st	Explain measurement of capacitance by 8.3 De Sauty Bridge method
	2nd	8.4 Schering Bridge method
	3rd	8.5 LCR Bridge method
	4th	9. DIGITAL INSTRUMENTS 9.1 Digital Voltmeters (DVM)
	5th	Tutorial
15th	1st	9.1 Digital Voltmeters (DVM) (Contd..)
	2nd	9.2 Characteristic of Digital Meters
	3rd	9.3 Digital Multimeters
	4th	9.3 Digital Multimeters(Contd.)
	5th	Tutorial

Aditya Kumar Panda
13.01.2024.
Teaching Faculty

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Lesson Plan of Electrical Department of Government Polytechnic ,Berhampur

Discipline Electrical Engg.	Semester:- 4th	Name of the Teaching Faculty:- Prayumna Kumar Das
Subject:- GENERATION TRANSMISSION & DISTRIBUTION	No of Days/per Week Class Allotted :- 4+ 1(Tutorial)	Semester From:- 16/01/2024 To:- 26/04/2024 No of Weeks:- 15
Week	**Class Day**	**Theory/ Practical Topics**
1st	1st	1.1.1 Give Elementary idea on generation of electricity from Thermal Power station.
	2nd	1.1.1 Give Elementary idea on generation of electricity from Thermal Power station.
	3rd	1.1.2 Give Elementary idea on generation of electricity from Hydel Power station.
	4th	1.1.3 Give Elementary idea on generation of electricity from Nuclear Power station.
	5th	Tutorial
2nd	1st	1.2.1 Draw layout of generating stations.
	2nd	1.2.1 Draw layout of generating stations.
	3rd	1.2.2 Draw layout of generating stations.
	4th	Tutorial
	5th	2.1 Draw layout of transmission and distribution scheme.
3rd	1st	2.2 Explain voltage Regulation & efficiency of transmission.
	2nd	2.3 State and explain Kelvin's law for economical size of conductor.
	3rd	Tutorial
	4th	2.4 Explain corona and corona loss on transmission lines.
	5th	2.4 Explain corona and corona loss on transmission lines.
4th	1st	OVER HEAD LINES 3.1.1 State types of supports of conductor.
	2nd	3.1.2 State size and spacing of conductor.
	3rd	3.2 Types of conductor materials.
	4th	Tutorial
	5th	3.3 State types of insulator and cross arms
5th	1st	3.4 Derive for sag in overhead line with support at same level and different level
	2nd	Tutorial
	3rd	3.4.1 Derive for sag in overhead line with support at same level (approximate formula effect of wind, ice and temperature on sag simple problem)
	4th	3.4.2 Derive for sag in overhead line with support at different level (approximate formula effect of wind, ice and temperature on sag simple problem)
	5th	3.4.2 Derive for sag in overhead line with support at different level (approximate formula effect of wind, ice and temperature on sag simple problem)
6th	1st	Tutorial
	2nd	PERFORMANCE OF SHORT & MEDIUM LINES
	3rd	4.1 Calculation of regulation and efficiency.
	4th	4.1 Calculation of regulation and efficiency.
	5th	4.1 Calculation of regulation and efficiency.
7th	1st	4.1 Calculation of regulation and efficiency.
	2nd	4.1 Calculation of regulation and efficiency.
	3rd	4.1 Calculation of regulation and efficiency.
	4th	Tutorial
	5st	5.1 Explain EHV AC transmission.
8th	1st	5.2 Explain Reasons for adoption of EHV AC transmission.
	2nd	5.3 Problems involved in EHV transmission.
	3rd	Tutorial
	4th	5.4 Explain HV DC transmission.
	5st	5.4 Explain HV DC transmission
9th	1st	5.5.1 State Advantages of HVDC transmission system.
	2nd	5.5.2 State Limitations of HVDC transmission system.
	3rd	6.1.2 Explain Connection Schemes of Distribution System – (Radial, Ring Main and Inter connected system)
	4th	6.2 Explain DC distributions (a) Distributor fed at one End (b) Distributor fed at both the ends (c) Ring distributors.
	5st	Tutorial
10th	1st	6.3.1 Explain AC distribution system.
	2nd	6.3.2 Explain Method of solving AC distribution problem.
	3rd	6.3.2 Explain Method of solving AC distribution problem.
	4th	6.4 Explain three phase four wire star connected system arrangement.
	5st	Tutorial
	1st	7. UNDERGROUND CABLES

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11th		7.1.1 Explain cable insulation of cables.
	2nd	7.1.2 Explain classification of cables.
	3rd	7.2.1 State Types of L. T. & H.T. cables with constructional features.
	4th	7.2.2 State Types of L. T. & H.T. cables with constructional features.
	5st	Tutorial
12th	1st	7.3 State and Explain Methods of cable lying.
	2nd	7.4 State methods of Localisation of cable faults – Murray and Varley loop test for short circuit fault/Earth fault
	3rd	8.1 State and explain causes of low power factor.
	4th	8.2 Explain methods of improvement of power factor.
	5st	Tutorial
13th	1st	8.3 Define & explain Load curves
	2nd	8.4 Define & explain Demand factor. 8.5 Define & explain Maximum demand.
	3rd	8.6 Define & explain Load factor. 8.7 Define & explain Diversity factor.
	4th	8.8 Define & explain Plant capacity factor. 8.9 Define & explain peak load and Base load on power station
	5th	Tutorial
14th	1st	9. TYPES OF TARIFF 9.1 Explain flat rate tariff with problems
	2nd	9.1 Explain two part tariff and block rate tariff with problems
	3rd	9.1 Explain block rate tariff with problems
	4th	Tutorial
	5th	10. SUBSTATION 10.1.1 Draw and explain layout of LT. HT and EHT substation.
15th	1st	10.1.2 Draw and explain layout of LT. HT and EHT substation.
	2nd	10.2.1 Draw and Explain Earthing of Substation
	3rd	10.2.2 Draw and Explain Earthing of transmission lines.
	4th	10.2.3 Draw and Explain Earthing of distribution lines.
	5th	Tutorial

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Lesson Plan of Electrical Department of Government Polytechnic ,Berhampur

Discipline **Electrical Engg.**	Semester:-6th	Name of the Teaching Faculty:- **Sandeep kumar Panigrahi**
Subject: Electrical Installation And Estimating	No of Days/per Week Class Allotted :- **4+ 1 (Tutorial)**	Semester From:- **16/01/2024** To:- **26/04/2024** No of Weeks:-**15**
Week	**Class Day**	**Theory/ Practical Topics**
1st	1st	1. INDIAN ELECTRICITY RULES 1.1 Definitions, Ampere, Apparatus, Accessible, Bare, cablew, circuit, circuit breaker,conductor voltage (low, medium, high, EH)
	2nd	1.1 live, dead, cut-out, conduit, system,danger, Installation, earthing system, span, volt, switch gear, etc.
	3rd	1.2 General safety precautions, rule 29, 30, 31, 32, 33, 34, 35, 36, 40, 41, 43, 44, 45, 46.
	4th	1.3 General conditions relating to supply and use of energy : rule 47, 48, 49, 50, 51, 54, 55,
	5th	Tutorial
	1st	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.
2nd	2nd	1.4 OH lines : Rule 74, 75, 76, 77, 78, 79, 80, 86, 87, 88, 89, 90, 91
	3rd	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.
	4th	Types of cables used in internal wiring, multi-stranded cables,voltage grinding of cables, general specifications of cables.
	5th	Tutorial
	1st	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
	2nd	IS specifications regarding earthing of electrical installations, points to be earthed
3rd	3rd	Determination of size of earth wire and earth plate for domestic and industrial installations. Material required for GI pipe earthing.
	4th	. 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
	5th	determination of number of points (light, fan, socket, outlets), determination of total load, determination of Number of sub-circuits
	1st	3. INTERNAL WIRING 3 . 1 Type of internal wiring, cleat wiring, CTS wiring, wooden casing capping,
	2nd	metal sheathed wiring, conduit wiring, their advantage and disadvantages comparison and applications.
	3rd	Tutorial
4th	4th	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.
	5th	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.
	1st	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
	2nd	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.
	3rd	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...)
	4th	Tutorial
5th	5th	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.
	1st	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.
	2nd	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.
	3rd	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.
	4th	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.
	5th	Tutorial
6th	1st	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.
	2nd	5.1 Components of service lines, service line (cables and conductors), bearer wire, lacing rod. Ariel fuse, service support, energy box and meters etc
	3rd	5.2 Prepare and estimate for providing single phase supply of load of 5 KW (light, fan, socket) to a single stored residential building.
	4th	5.2 Prepare and estimate for providing single phase supply of load of 5 KW (light, fan, socket) to a single stored residential building.
	5th	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...)
	1st	Tutorial
7th	2nd	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.
	3rd	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.
	4th	5.4 Prepare one estimate of materials required for service connection to a factory building with load within 15 KW using insulated wire.
	5th	5.4 Prepare one estimate of materials required for service connection to a factory building with load within 15 KW using insulated wire.
	1st	5.4 Prepare one estimate of materials required for service connection to a factory building with load within 15 KW using insulated wire.(Contd....)
	2nd	Tutorial
8th	3rd	5.4 Prepare one estimate of materials required for service connection to a factory building with load within 15 KW using insulated wire.
	4th	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.
	5th	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.
	1st	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.
	2nd	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.
	3rd	Tutorial
9th	4th	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
	5th	transmission line, cross arms, pole brackets and clamps, guys and stays.

		conductors configurations, spacing and clearances, span lengths,
	1st	overhead line insulators, types of insulators, lighting arresters, danger plates, anti-climbing devices, bird guards, beads of jumpers, jumpers, tee-offs, guarding of overhead lines.
	2nd	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.
	3rd	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.
	4th	Tutorial
10th	5th	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.
	1st	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.
	2nd	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.
	3rd	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.
	4th	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.
	5th	Tutorial
11th	1st	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.
	2nd	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.
	3rd	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.
	4th	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.
	5th	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.
	1st	Tutorial

12th	2nd	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.
	3rd	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.
	4th	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.
	5th	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.
	1st	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.
	2nd	Tutorial
13th	3rd	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.
	4th	6. ESTIMATING FOR DISTRIBUTION SUBSTATIONS 6.1 Prepare one materials estimate for following types of transformer substations. 6.1.1 Pole mounted substation
	5th	6.1.1 Pole mounted substation
	1st	6.1.1 Pole mounted substation
	2nd	6.1.1 Pole mounted substation
	3rd	Tutorial
14th	4th	6.1.1 Pole mounted substation
	5th	6.1.1 Pole mounted substation
	1st	6.1.2 Plinth Mounted substation.
	2nd	6.1.2 Plinth Mounted substation.
	3rd	6.1.2 Plinth Mounted substation.
	4th	Tutorial
15th	5th	6.1.2 Plinth Mounted substation.
	1st	6.1.2 Plinth Mounted substation.
	2nd	Previous year question paper discussion
	3rd	Previous year question paper discussion
	4th	Previous year question paper discussion
	5th	Tutorial

Sri Sandeep Kr. Panigrahi
Teaching Faculty
16.01.24.

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Discipline **Electrical Engg.**	Semester:- **6th**	Name of the Teaching Faculty:- **Prabhat Rashmi Mallik**
Subject:- **SWITCH GEAR AND PROTECTIVE DEVICES**	No of Days/per Week Class Allotted :- **4+ 1(Tutorial)**	Semester From:- **16/01/2024** To:- **26/04/2024** No of Weeks:- **15**
Week	**Class Day**	**Theory/ Practical Topics**
1st	1st	INTRODUCTION TO SWITCHGEAR 1.1 Essential Features of switchgear.
	2nd	1.2 Switchgear Equipment.
	3rd	1.3 Bus-Bar Arrangement.
	4th	1.4 Switchgear Accommodation.
	5th	Tutorial
2nd	1st	1.5 Short Circuit.
	2nd	1.6 Faults in a power system.
	3rd	FAULT CALCULATION 2.1 Symmetrical faults on 3-phase system.
	4th	2.2 Limitation of fault current.
	5th	Tutorial
3rd	1st	2.3 Percentage Reactance.
	2nd	2.4 Percentage Reactance and Base KVA.
	3rd	2.5 Short – circuit KVA
	4th	2.6 Reactor control of short circuit currents.
	5th	Tutorial
4th	1st	2.7 Location of reactors.
	2nd	2.8 Steps for symmetrical Fault calculations.
	3rd	2.9 Solve numerical problems on symmetrical fault.
	4th	2.9 Solve numerical problems on symmetrical fault.
	5th	Tutorial
5th	1st	FUSES 3.1 Desirable characteristics of fuse element.
	2nd	3.2 Fuse Element materials.
	3rd	3.3 Types of Fuses and important terms used for fuses.
	4th	3.4 Low and High voltage fuses. 3.5 Current carrying capacity of fuse element.
	5th	Tutorial
6th	1st	3.6 Difference Between a Fuse and Circuit Breaker.
	2nd	CIRCUIT BREAKERS 4.1 Definition and principle of Circuit Breaker.
	3rd	4.2 Arc phenomenon and principle of Arc Extinction. 4.3 Methods of Arc Extinction.
	4th	4.4 Definitions of Arc voltage, Re-striking voltage and Recovery voltage. 4.5 Classification of circuit Breakers.
	5th	Tutorial
7th	1st	4.6 Oil circuit Breaker and its classification. 4.7 Plain brake oil circuit breaker.
	2nd	4.8 Arc control oil circuit breaker.
	3rd	4.9 Low oil circuit breaker. 4.10 Maintenance of oil circuit breaker.
	4th	4.11 Air-Blast circuit breaker and its classification. 4.12 Sulphur Hexa-fluoride (SF6) circuit breaker.
	5st	Tutorial
8th	1st	4.13 Vacuum circuit breakers. 4.14 Switchgear component.
	2nd	4.15 Problems of circuit interruption.
	3rd	4.16 Resistance switching. 4.17 Circuit Breaker Rating.
	4th	Tutorial
	5st	PROTECTIVE RELAYS 5.1 Definition of Protective Relay. 5.2 Fundamental requirement of protective relay.
9th	1st	5.3 Basic Relay operation a) Electromagnetic Attraction type b) Induction type

	2nd	5.4 Definition of following important terms
	3rd	5.5 Definition of following important terms. a) Pick-up current. b) Current setting. c) Plug setting Multiplier. d) Time setting Multiplier.
	4th	5.6 Classification of functional relays
	5st	Tutorial
10th	1st	5.7 Induction type over current relay (Non-directional)
	2nd	5.8 Induction type directional power relay..
	3rd	5.9 Induction type directional over current relay
	4th	5.10 Differential relay a) Current differential relay b) Voltage balance differential relay
	5st	Tutorial
11th	1st	5.11 Types of protection
	2nd	6.1 Protection of alternator. 6.2 Differential protection of alternators.
	3rd	6.3 Balanced earth fault protection.
	4th	6.4 Protection systems for transformer
	5st	Tutorial
12th	1st	6.5 Buchholz relay
	2nd	6.6 Protection of Bus bar. 6.7 Protection of Transmission line.
	3rd	6.8 Different pilot wire protection (Merz-price voltage Balance system) 6.9 Explain protection of feeder by over current and earth fault relay.
	4th	Tutorial
	5st	7.1 Voltage surge and causes of over voltage. 7.2 Internal cause of over voltage.
13th	1st	7.3 External cause of over voltage (lighting)
	2nd	7.4 Mechanism of lightning discharge.
	3rd	7.5 Types of lightning strokes. 7.6 Harmful effect of lightning.
	4th	7.7 Lightning arresters.
	5st	Tutorial
14th	1st	7.8 Type of lightning Arresters. a) Rod-gap lightning arrester. b) Horn-gap arrester. c) Valve type arrester.
	2nd	7.9 Surge Absorber
	3rd	STATIC RELAY
	4th	8.1 Advantage of static relay.
	5st	Tutorial
15th	1st	8.2.1 Instantaneous over current relay.
	2nd	8.2.2 Instantaneous over current relay.
	3rd	8.3.1 Principle of IDMT relay.
	4th	8.3.2 Principle of IDMT relay.
	5st	Tutorial

Prabhat Rashmi Mallik.
Teaching Faculty 13/01/2024

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Lesson Plan of Electrical Department of Government Polytechnic ,Berhampur

Discipline **Electrical Engg.**	Semester:- 6th	Name of the Teaching Faculty:- **Prayumna Kumar Das**
Subject:- **CONTROL SYSTEM ENGINEERING**	No of Days/per Week Class Allotted :- 4	Semester From:- **16/01/ 2024** To:- **26/04/2024** No of Weeks:- **15**
Week	**Class Day**	**Theory/ Practical Topics**
1st	1st	SIGNAL FLOW GRAPH.
	2nd	1.1.1 Review of block diagrams and transfer functions of multivariable systems.
	3rd	1.1.2 Review of block diagrams and transfer functions of multivariable systems.
	4th	1.2.1 Construction of signal flow graph.
2nd	1st	1.2.2 Construction of signal flow graph.
	2nd	1.3.1 Basic properties of signal flow graph.
	3rd	1.3.2 Basic properties of signal flow graph.
	4th	1.4.1 Signal flow graph algebra
3rd	1st	1.4.2 Signal flow graph algebra
	2nd	1.5.1 Construction of signal flow graph for control system.
	3rd	1.5.2 Construction of signal flow graph for control system.
	4th	TIME RESPONSE ANALYSIS. 2 . 1 Time response of control system. 2 . 2 Standard Test signal. 2.2.1. Step signal, 2.2.2. Ramp Signal 2.2.3. Parabolic Signal 2.2.4. Impulse Signal
4th	1st	2 . 3 Time Response of first order system with: 2.3.1. Unit step response
	2nd	2.3.2. Unit impulse response.
	3rd	2 . 4 Time response of second order system to the unit step input. 2.4.1. Time response specification.
	4th	2.4.2. Derivation of expression for rise time, peak time, peak overshoot, settling time and steady state error.
5th	1st	2.4.2. Derivation of expression for rise time, peak time, peak overshoot, settling time and steady state error.
	2nd	2.4.3. Steady state error and error constants.
	3rd	2 . 5 Types of control system.[Steady state errors in Type-0, Type-1, Type-2 system]
	4th	2 . 6 Effect of adding poles and zero to transfer function.
6th	1st	2 . 7.1 Response with P, PI, PD and PID controller.
	2nd	2 . 7.2 Response with P, PI, PD and PID controller.
	3rd	ANALYSIS OF STABILITY BY ROOT LOCUS TECHNIQUE. 3 . 1 Root locus concept.
	4th	3 . 1 Root locus concept.
7th	1st	3 . 2 Construction of root loci.
	2nd	3 . 2 Construction of root loci.
	3rd	3 . 2 Construction of root loci.
	4th	3 . 3 Rules for construction of the root locus.
8th	1st	3 . 3 Rules for construction of the root locus.
	2nd	3 . 3 Rules for construction of the root locus.
	3rd	3 . 3 Rules for construction of the root locus.
	4th	3 . 4 Effect of adding poles and zeros to G(s) and H(s).
9th	1st	3 . 4 Effect of adding poles and zeros to G(s) and H(s).
	2nd	3 . 4 Effect of adding poles and zeros to G(s) and H(s).
	3rd	FREQUENCY RESPONSE ANALYSIS. 4 . 1 Correlation between time response and frequency response
	4th	4 . 2 Polar plots.
10th	1st	4 . 2 Polar plots.
	2nd	4 . 2 Polar plots.
	3rd	4 . 3 Bode plots.
	4th	4 . 3 Bode plots.
11th	1st	4 . 3 Bode plots.
	2nd	4 . 4 All pass and minimum phase system.
	3rd	4 . 5 Computation of Gain margin and phase margin.
	4th	4 . 5 Computation of Gain margin and phase margin.

Lesson Plan of Electrical Department of Government Polytechnic ,Berhampur

12th	1st	4 . 6 Log magnitude versus phase plot.
	2nd	4 . 6 Log magnitude versus phase plot.
	3rd	4 . 7 Closed loop frequency response.
	4th	4 . 7 Closed loop frequency response.
13th	1st	NYQUIST PLOT 5.1 Principle of argument.
	2nd	5.2 Nyquist stability criterion.
	3rd	5.2 Nyquist stability criterion.
	4th	5.2 Nyquist stability criterion.
14th	1st	5.3 Niquist stability criterion applied to inverse polar plot.
	2nd	5.3 Niquist stability criterion applied to inverse polar plot.
	3rd	5.4 Effect of addition of poles and zeros to G(S) H(S) on the shape of Niquist plot.
	4th	5.4 Effect of addition of poles and zeros to G(S) H(S) on the shape of Niquist plot.
15th	1st	5.5 Assessment of relative stability.
	2nd	5.6 Constant M and N circle
	3rd	5.6 Constant M and N circle
	4th	5.7 Nicholas chart.

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DAYS

GOVT. POLYTECHNIC

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 : 16/01/2024 To Date: 26/04/2024
Week	**Class Day**	**Theory Topics**
1ST	1ST	Introduction to Renewable energy and Environmental consequences of fossil fuel use.
	2ND	Importance of renewable sources of energy.
	3RD	Sustainable Design and development.
	4TH	Types of RE sources and Limitations of RE sources.
	5TH	Present Indian and international energy scenario of conventional and RE sources.
2ND	1ST	Introduction to Solar Energy
	2ND	Solar photovoltaic system-Operating principle.
	3RD	Photovoltaic cell concepts
	4TH	Cell, module, array
	5TH	Series and parallel connections
3RD	1ST	Maximum power point tracking (MPPT).
	2ND	Classification of energy Sources.
	3RD	Extra-terrestrial Radiation
	4TH	Terrestrial Radiation
	5TH	Azimuth angle, Zenith angle, Hour angle
4TH	1ST	Irradiance, Solar constant
	2ND	Solar collectors
	3RD	Types and performance characteristics
	4TH	Applications: Photovoltaic - battery charger, domestic lighting, street lighting
	5TH	Applications: water pumping, solar cooker, Solar Pond.
5TH	1ST	Introduction to Wind energy.
	2ND	Wind energy conversion
	3RD	Types of wind turbines
	4TH	Aerodynamics of wind rotors.
	5TH	Wind turbine control systems; conversion to electrical power:
6TH	1ST	Induction generators
	2ND	Synchronous generators
	3RD	Grid connected and self excited induction generator operation
	4TH	Constant voltage and constant frequency generation with power electronic control.
	5TH	Single output systems
7TH	1ST	Doubleoutput systems
	2ND	Characteristics of wind power plant
	3RD	Introduction to Biomass Power
	4TH	Energy from Biomass

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

Rajasree Tripathy 13/01/24
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