Discipline Electrical Engg.  Subject: Berring- Conversion-1  Week Class Week Class  The Class Day  1		Lesson Plan of	Electrical Department of Government Polytechnic ,Berhampur
Subject: Energy Conversion-1  Week  Class Day  I**  I**    1.1   1.2   1.2   1.3   1.3   1.3   1.4   1.5   1	Discipline		Name of the Teaching Faculty:-
Subjects Energy Week Class Allotted No of Days/per Week Class Allotted No of Weeks: 15  Week Class Day 1.1.1D.C Generator, Explain principle of operation 12  1" 1.2 Explain Constructional feature 13			
No of Days/per   Semester From: : 16/01/2024 To 26/04/2024	Electrical	4th	Prabhat Rashmi Mallik
No of Weeks: 15	Engg.		
No of Weeks: 15			16/01/2024 To 26/04/2024
Conversion-1			Semester From:- :- <u>10/01/2024</u> To <u>20/04/2024</u>
Veck   Class Day   Theory Practical Topics			
Veck   Class Day	Conversion-I		No of Weeks:- 15
1.10.C Generator, Explain principle of operation   2nd   2nd   1.2 Explain Constructional feature   1.3 Armature winding, back pitch, Front pitch, Resultant pitch and commutator-pitch   4nd   1.4.1 Simple Lap winding (problems on winding diagram)   5nd   1.4.2 Simple wave winding (problems on winding diagram)   2nd   1.4.2 Simple wave winding (problems on winding diagram)   2nd   1.4.2 Simple wave winding (problems on winding diagram)   2nd   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.   2nd	Wook		
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2nd   2.6.1 Explain methods of starting shunt, series and compound motors   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   2.7.2 Armature voltage (rheostatic) Control method.   2nd   2.7.3 Solve problems   3rd   Tutorial   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.   2.10 Explain determination of efficiency of D.C. Machine by Swinburne's   Test method.   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   Tutorial   4th   Tutorial   4t			motors and their application. (Solve problems)
3rd   2.6.1 Explain methods of starting shunt, series and compound motors, (solve problems)   4th	6th	2 <sup>nd</sup>	2.6.1 Explain methods of starting shunt, series and compound motors
Tutorial  5th  2.7 Explain speed control of D.C shunt motors by 2.7.1 Flux control method  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.  1st  2.10 Explain determination of efficiency of D.C. Machine by Swinburne's Test method.  2nd  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.		3 <sup>rd</sup>	2.6.1 Explain methods of starting shunt, series and compound motors, (solve
2.7 Explain speed control of D.C shunt motors by 2.7.1 Flux control method  2.7.2 Armature voltage (rheostatic) Control method.  2.nd 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.  2.10 Explain determination of efficiency of D.C. Machine by Swinburne's Test method.  2.nd 2.nd 2.nd 2.nd 2.nd 2.nd 2.nd 2			
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1st   2.7.2 Armature voltage (rheostatic) Control method.   2nd   2.7.3 Solve problems   2.7.3 Solve problems   2.8 Explain speed control of series motors by Flux control method and series parallel method.   2.9 Explain determination of efficiency of D.C. Machine by break test method.   2.10 Explain determination of efficiency of D.C. Machine by Swinburne's Test method.   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		5'''	
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3rd			
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2.9 Explain determination of efficiency of D.C. Machine by break test method.  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		4	parallel method
method.  2.10 Explain determination of efficiency of D.C. Machine by Swinburne's  Test method.  2.10 Explain determination of efficiency of D.C. Machine by Swinburne's  Test method.  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		5 <sup>st</sup>	2.9 Explain determination of efficiency of D.C. Machine by break test
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2 2.11.1 Explain Losses & efficiency and condition for maximum power and solve numerical problems.  2.11.2 Explain Losses & efficiency and condition for maximum power and solve numerical problems.  4th Tutorial		1 <sup>st</sup>	2.10 Explain determination of efficiency of D.C. Machine by Swinburne's
8th  3rd  2.11.2 Explain Losses & efficiency and condition for maximum power and solve numerical problems.  4th  Tutorial		nd (.1.7	Test method. 15 19 19 19 19 19 19 19 19 19 19 19 19 19
2.11.2 Explain Losses & efficiency and condition for maximum power and solve numerical problems.  Tutorial	oth	2	solve numerical problems.
numerical problems.  4 <sup>th</sup> Tutorial	8	3 <sup>rd</sup>	2.11.2 Explain Losses & efficiency and condition for maximum power and solve
4 <sup>th</sup> Tutorial			numerical problems.
5 <sup>st</sup> 3.1 Explain working principle of transformer.		4 <sup>th</sup>	Tutorial
1 A 1 Kr. Britain Carrent and	1	5 <sup>st</sup>	3.1 Explain working principle of transformer.

Lesson Plan of Electrical Department of Government Polytechnic ,Berhampur 3.2 Explains Transformer Construction - Arrangement of core & winding in different 9th types of transformer - Brief ideas about transformer accessories such as conservator, tank, breather explosion vent etc. 2<sup>nd</sup> 3.3 Explain types of cooling methods 3<sup>rd</sup> 3.4 State the procedures for Care and maintenance 4th 3.5 Derive EMF equation 5<sup>th</sup> **Tutorial** 1 st 3.6 Ideal transformer voltage transformation ratio 2<sup>nd</sup> 3.7 Explain Transformer on no load and on load phasor diagrams. 10th 3.8 Explain Equivalent Resistance. Reactance and Impedance. 3.9 Explain phasor diagram of transformer with winding Resistance and Magnetic 3<sup>rd</sup> leakage. Phasor diagram on load using upf, leading pf and lagging pf. 3.10 Explain Equivalent circuit and solve numerical problems. 5<sup>th</sup> **Tutorial** 3.11 Calculate Approximate & exact voltage drop of a Transformer.  $2^{nd}$ 3.12 Calculate Regulation of various loads and power factor. 3<sup>rd</sup> 3.13 Explain Different types of losses in a Transformer. (solve problems) 11th 4<sup>th</sup> Tutorial 5<sup>th</sup> 3.14 Explain Open circuit test. 151 3.15 Explain Short circuit test 3.16 Explain Efficiency, efficiency at different loads and power factors, condition for 2<sup>nd</sup> 12th maximum efficiency (solve problems) 3<sup>rd</sup> 3.17 Explain All Day Efficiency (solve problems) 4<sup>th</sup> 5<sup>th</sup> 3.18 Explain determination of load corresponding to Maximum efficiency. 1<sup>st</sup> 3.19 Explain parallel operation of single phase transformer. 2<sup>nd</sup> 3<sup>rd</sup> 13th 4.1 Explain constructional features of Auto transformer 4<sup>th</sup> 4.2 Explain Working principle of single phase Auto Transformer. 5<sup>th</sup> 4.3 State Comparison of Auto transformer with an two winding transformer (saving of Copper) 4.4 State Uses of Auto transformer. 2<sup>nd</sup> 4.5 Explain Tap changer with transformer (on load and off load condition) 3<sup>rd</sup> Tutorial 14th 4<sup>th</sup> INSTRUMENT TRANSFORMER 5.1 Explain Current Transformer 5.1 Explain Potential Transformer. 5<sup>th</sup> 5.2 Define Ratio error, Phase angle error, Burden 1<sup>st</sup> 2<sup>nd</sup> 5.3 Uses of C.T and P.T. 3<sup>rd</sup> Tutorial 15th

Probhot Rashoni Mauik.
Teaching Faculty 13/01/2029

Ac2

Discipline :- ELECTRICAL	Semester:-	Name of the Teaching Faculty:-		
	7	**************************************		
Subject:-	No of Day 1	Lipika Sandha		
ANALOG ELECTRONICS	No of Days/per Week Class Allotted:-	Semester From:- <u>16/01/2024</u> To 2 <u>6/04/2024</u>		
AND OP-AMP				
(TH-02)	i i			
Week	Class Day	Theory		
	1 <sup>st</sup>	Introduction to semiconductor and its Application		
	2 <sup>nd</sup>	P-N Junction Diode and its working		
1 <sup>st</sup>	3 <sup>rd</sup>	V-I characteristic of PN junction Diode.		
	4 <sup>th</sup>	DC load line		
	1 <sup>st</sup>	Important terms such as Ideal Diode, Knee voltage		
	2 <sup>nd</sup>	Junctions break down( Zener breakdown and Avalanche breakdown)		
2 <sup>nd</sup>	3 <sup>rd</sup>	P-N Diode clipping and Diode clamping Circuit.		
	4 <sup>th</sup>	SPECIAL SEMICONDUCTOR DEVICES: Thermistors, Sensors & barretters		
	1 <sup>st</sup>	Zener Diode and Tunnel Diode		
	. 2 <sup>nd</sup>	PIN Diode		
3 <sup>rd</sup>	3 <sub>Lq</sub>	OPERATIONAL AMPLIFIERS: General circuit simple of OP-AMP and IC - CA -		
-	4 <sup>th</sup>	741 OP-AMP		
	4"	Operational amplifier stages		
1	_	Equivalent circuit of operational amplifier		
4 <sup>th</sup>	2 <sup>nd</sup>	Open loop OP-AMP configuration and OPAMP with feed back		
-4	3 <sup>rd</sup>	Inverting OP-AMP and Non inverting OP-AMP		
	4 <sup>th</sup>	Voltage follower & buffer		
	1 <sup>st</sup>	Differential amplifier		
	2 <sup>nd</sup>	Adder or summing amplifier		
5 <sup>th</sup>	3 <sup>rd</sup>	Sub tractor, integrator, differentiator and comparator		
	4 <sup>th</sup>	FIELD EFFECT TRANSISTOR Classification of FET		
	*	Advantages of FET over BJT and Principle of operation of BJT		
	1 <sup>st</sup>	FET parameters		
	2 <sup>nd</sup>	DC drain resistance, AC drain resistance, Trans-conductance		
6 <sup>th</sup>	3 <sup>rd</sup>	Biasing of FET		
	4 <sup>th</sup>	RECTIFIER CIRCUITS & FILTERS: Classification of rectifiers		
	1 <sup>st</sup>	Analysis of half wave, full wave ,centre tapped		
7 <sup>th</sup>		2 <sup>nd</sup> Bridge rectifiers and calculate		
	3 <sup>rd</sup>	DC output current and voltage		
	4 <sup>th</sup>	RMS output current and voltage		
	1 <sup>st</sup>	Rectifier efficiency and Ripple factor		
-	2 <sup>nd</sup>	Regulation		
8 <sup>th</sup>	/ 3 <sup>rd</sup>	Transformer utilization factor		
•	4 <sup>th</sup>	Peak inverse voltage		
~ /	1 <sup>st</sup>	Filters Reg February 1991 and 1		
	2 <sup>nd</sup>	Shunt capacitor filter		
oth	3 <sup>rd</sup>	180 Choke input filter   1818 Choke input filter		
9 <sup>th</sup>		mi.		
	4 <sup>th</sup>			
	-	Different modes of operation of transistor		
	2 <sup>nd</sup>	Current components in a transistor		
10 <sup>th</sup>	3 <sup>rd</sup>	Current components in a transition		

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

Teaching Faculty 12024
LEpika Sandha
Lect. (Filedronics)

Discipline		of Electrical Department of Government Polytechnic, Berhampur
	Semesto	Name of the Teaching Faculty:-
Electrical Engi	3. 4th	Aditya Kumar Panda
Subject:		
ELECTRICAL	No of Days	Semester From:- <u>16/01/2024</u> To:- <u>26/04/2024</u>
MEASUREMEN	Week Cla	lss
& MEASURING		
INSTRUMENT	4+ 1{Tutor	rial)
MOTROMENT		
Week	Class	No of Weeks:-15
cen	Class Da	I Heory/ Practical Lobics
	2 <sup>nd</sup>	1.Introduction to measuring instruments
1 <sup>st</sup>	3 <sup>rd</sup>	1.1 Define Accuracy, precision, Errors,
	4 <sup>th</sup>	Resolutions Sensitivity and tolerance.
	5 <sup>th</sup>	1.2 Classification of measuring instruments
-	1 <sup>st</sup>	Tutorial
	,	1.3 Explain Deflecting, controlling and damping arrangements in indicating type of
	2 <sup>nd</sup>	mistraliterits.
2nd	2	1.3 Explain Deflecting, controlling and damping arrangements in indicating type of
	3 <sup>rd</sup>	mistruments.(Conta)
	4 <sup>th</sup>	1.4 Calibration of instruments.
	4	2. ANALOG AMMETERS AND VOLTMETERS
	5 <sup>th</sup>	2.1Describe Construction, principle of operation
	1 <sup>st</sup>	Tutorial
	1	2.1Errors, ranges merits and demerits of 2.1 Moving iron type instruments.
	2 <sup>nd</sup>	mistruments.
3rd	3 <sub>rd</sub>	2.2 Permanent Magnet Moving coil type instruments
	4 <sup>th</sup>	2.3 Dynamometer type instruments
	5 <sup>th</sup>	2.3 Dynamometer type instruments (Contd) Tutorial
	1 <sup>st</sup>	2.4 Rectifier type instruments
	2 <sup>nd</sup>	2.5 Induction type instruments
	3 <sup>rd</sup>	2.5 Induction type instruments 2.5 Induction type instruments (Contd)
4th	4 <sup>th</sup>	2.6 Extend the range of instruments by use of shunts and Multipliers.
	5 <sup>th</sup>	Tutorial Tutorial
	1 <sup>st</sup>	2.7 Solve Numerical
5 <sup>th</sup>	2 <sup>nd</sup>	3. WATTMETERS AND MEASUREMENT OF POWER
		The stability of tower
3	3 <sup>rd</sup>	3.1 Describe Construction, principle of working of D
<b>3</b>		3.1 Describe Construction, principle of working of Dynamometer time
<b>3</b> "	3 <sup>rd</sup>	3.1 Describe Construction, principle of working of Dynamometer type wattmeter
<b>3</b>	4 <sup>th</sup>	3.1 Describe Construction, principle of working of Dynamometer type wattmeter  3.2 What are the Errors in Dynamometer type wattmeter and methods of their correction
5"	4 <sup>th</sup>	3.1 Describe Construction, principle of working of Dynamometer type wattmeter  3.2 What are the Errors in Dynamometer type wattmeter and methods of their correction  Tutorial
3"	4 <sup>th</sup> 5 <sup>th</sup>	3.1 Describe Construction, principle of working of Dynamometer type wattmeter  3.2 What are the Errors in Dynamometer type wattmeter and methods of their correction  Tutorial
	4 <sup>th</sup>	3.1 Describe Construction, principle of working of Dynamometer type wattmeter  3.2 What are the Errors in Dynamometer type wattmeter and methods of their correction  Tutorial  3.3 Discuss L P F Electro – Dynamometer type wattmeter
6th	4 <sup>th</sup> 5 <sup>th</sup>	3.1 Describe Construction, principle of working of Dynamometer type wattmeter  3.2 What are the Errors in Dynamometer type wattmeter and methods of their correction  Tutorial  3.3 Discuss L P F Electro – Dynamometer type wattmeter  3.4 Discuss Induction type watt meters
	4 <sup>th</sup> 5 <sup>th</sup> 1 <sup>st</sup> 2 <sup>nd</sup> 3 <sup>rd</sup>	3.1 Describe Construction, principle of working of Dynamometer type wattmeter  3.2 What are the Errors in Dynamometer type wattmeter and methods of their correction  Tutorial  3.3 Discuss L P F Electro – Dynamometer type wattmeter  3.4 Discuss Induction type watt meters  3.5 Measurement of Power in Single Phase and Three Phase Circuit
	4 <sup>th</sup> 5 <sup>th</sup> 1 <sup>st</sup> 2 <sup>nd</sup> 3 <sup>rd</sup> 4 <sup>th</sup>	3.1 Describe Construction, principle of working of Dynamometer type wattmeter 3.2 What are the Errors in Dynamometer type wattmeter and methods of their correction Tutorial 3.3 Discuss L P F Electro – Dynamometer type wattmeter 3.4 Discuss Induction type watt meters 3.5 Measurement of Power in Single Phase and Three Phase Circuit 3.5 Measurement of Power in Single Phase and Three Phase Circuit
	4 <sup>th</sup> 5 <sup>th</sup> 1 <sup>st</sup> 2 <sup>nd</sup> 3 <sup>rd</sup> 4 <sup>th</sup> 5 <sup>th</sup>	3.1 Describe Construction, principle of working of Dynamometer type wattmeter 3.2 What are the Errors in Dynamometer type wattmeter and methods of their correction Tutorial 3.3 Discuss L P F Electro – Dynamometer type wattmeter 3.4 Discuss Induction type watt meters 3.5 Measurement of Power in Single Phase and Three Phase Circuit Tutorial
	4 <sup>th</sup> 5 <sup>th</sup> 1 <sup>st</sup> 2 <sup>nd</sup> 3 <sup>rd</sup> 4 <sup>th</sup>	3.1 Describe Construction, principle of working of Dynamometer type wattmeter 3.2 What are the Errors in Dynamometer type wattmeter and methods of their correction Tutorial 3.3 Discuss L P F Electro – Dynamometer type wattmeter 3.4 Discuss Induction type watt meters 3.5 Measurement of Power in Single Phase and Three Phase Circuit 3.5 Measurement of Power in Single Phase and Three Phase Circuit Tutorial 4. ENERGYMETERS AND MEASUREMENT OF ENERGY
	4 <sup>th</sup> 5 <sup>th</sup> 1 <sup>st</sup> 2 <sup>nd</sup> 3 <sup>rd</sup> 4 <sup>th</sup> 5 <sup>th</sup>	3.1 Describe Construction, principle of working of Dynamometer type wattmeter  3.2 What are the Errors in Dynamometer type wattmeter and methods of their correction  Tutorial  3.3 Discuss L P F Electro – Dynamometer type wattmeter  3.4 Discuss Induction type watt meters  3.5 Measurement of Power in Single Phase and Three Phase Circuit  3.5 Measurement of Power in Single Phase and Three Phase Circuit  Tutorial  4. ENERGYMETERS AND MEASUREMENT OF ENERGY  4.1 Introduction
	4 <sup>th</sup> 5 <sup>th</sup> 1 <sup>st</sup> 2 <sup>nd</sup> 3 <sup>rd</sup> 4 <sup>th</sup> 5 <sup>th</sup> 1 <sup>st</sup>	3.1 Describe Construction, principle of working of Dynamometer type wattmeter 3.2 What are the Errors in Dynamometer type wattmeter and methods of their correction  Tutorial 3.3 Discuss L P F Electro – Dynamometer type wattmeter 3.4 Discuss Induction type watt meters 3.5 Measurement of Power in Single Phase and Three Phase Circuit 3.5 Measurement of Power in Single Phase and Three Phase Circuit  Tutorial  4. ENERGYMETERS AND MEASUREMENT OF ENERGY 4.1 Introduction  4.2 Single Phase and poly phase Induction type Energy meters
6th	4 <sup>th</sup> 5 <sup>th</sup> 1 <sup>st</sup> 2 <sup>nd</sup> 3 <sup>rd</sup> 4 <sup>th</sup> 5 <sup>th</sup>	3.1 Describe Construction, principle of working of Dynamometer type wattmeter 3.2 What are the Errors in Dynamometer type wattmeter and methods of their correction Tutorial 3.3 Discuss L P F Electro – Dynamometer type wattmeter 3.4 Discuss Induction type watt meters 3.5 Measurement of Power in Single Phase and Three Phase Circuit 3.5 Measurement of Power in Single Phase and Three Phase Circuit Tutorial 4. ENERGYMETERS AND MEASUREMENT OF ENERGY 4.1 Introduction 4.2 Single Phase and poly phase Induction type Energy meters 4.2Construction, working principle and their compensation and
6th	4 <sup>th</sup> 5 <sup>th</sup> 1 <sup>st</sup> 2 <sup>nd</sup> 3 <sup>rd</sup> 4 <sup>th</sup> 5 <sup>th</sup> 1 <sup>st</sup>	3.1 Describe Construction, principle of working of Dynamometer type wattmeter 3.2 What are the Errors in Dynamometer type wattmeter and methods of their correction  Tutorial 3.3 Discuss L P F Electro – Dynamometer type wattmeter 3.4 Discuss Induction type watt meters 3.5 Measurement of Power in Single Phase and Three Phase Circuit 3.5 Measurement of Power in Single Phase and Three Phase Circuit  Tutorial 4. ENERGYMETERS AND MEASUREMENT OF ENERGY 4.1 Introduction 4.2 Single Phase and poly phase Induction type Energy meters 4.2Construction, working principle and their compensation and adjustments.
6th	4 <sup>th</sup> 5 <sup>th</sup> 1 <sup>st</sup> 2 <sup>nd</sup> 3 <sup>rd</sup> 4 <sup>th</sup> 5 <sup>th</sup> 1 <sup>st</sup>	3.1 Describe Construction, principle of working of Dynamometer type wattmeter 3.2 What are the Errors in Dynamometer type wattmeter and methods of their correction  Tutorial 3.3 Discuss L P F Electro – Dynamometer type wattmeter 3.4 Discuss Induction type watt meters 3.5 Measurement of Power in Single Phase and Three Phase Circuit  3.5 Measurement of Power in Single Phase and Three Phase Circuit  Tutorial 4. ENERGYMETERS AND MEASUREMENT OF ENERGY 4.1 Introduction 4.2 Single Phase and poly phase Induction type Energy meters 4.2 Construction, working principle and their compensation and adjustments. 4.2 Their compensation and adjustments.
6th	4 <sup>th</sup> 5 <sup>th</sup> 1 <sup>st</sup> 2 <sup>nd</sup> 3 <sup>rd</sup> 4 <sup>th</sup> 5 <sup>th</sup> 1 <sup>st</sup> 2 <sup>nd</sup> 3 <sup>rd</sup> 4 <sup>th</sup> 5 <sup>th</sup>	3.1 Describe Construction, principle of working of Dynamometer type wattmeter  3.2 What are the Errors in Dynamometer type wattmeter and methods of their correction  Tutorial  3.3 Discuss L P F Electro – Dynamometer type wattmeter  3.4 Discuss Induction type watt meters  3.5 Measurement of Power in Single Phase and Three Phase Circuit  Tutorial  4. ENERGYMETERS AND MEASUREMENT OF ENERGY  4.1 Introduction  4.2 Single Phase and poly phase Induction type Energy meters  4.2Construction, working principle and their compensation and adjustments.  4.2Their compensation and adjustments.
6th	4 <sup>th</sup> 5 <sup>th</sup> 1 <sup>st</sup> 2 <sup>nd</sup> 3 <sup>rd</sup> 4 <sup>th</sup> 5 <sup>th</sup> 1 <sup>st</sup> 2 <sup>nd</sup> 3 <sup>rd</sup> 1 <sup>st</sup>	3.1 Describe Construction, principle of working of Dynamometer type wattmeter  3.2 What are the Errors in Dynamometer type wattmeter and methods of their correction  Tutorial  3.3 Discuss L P F Electro – Dynamometer type wattmeter  3.4 Discuss Induction type watt meters  3.5 Measurement of Power in Single Phase and Three Phase Circuit  Tutorial  4. ENERGYMETERS AND MEASUREMENT OF ENERGY  4.1 Introduction  4.2 Single Phase and poly phase Induction type Energy meters  4.2Construction, working principle and their compensation and adjustments.  4.2Their compensation and adjustments.
6th	4 <sup>th</sup> 5 <sup>th</sup> 1 <sup>st</sup> 2 <sup>nd</sup> 3 <sup>rd</sup> 4 <sup>th</sup> 5 <sup>th</sup> 1 <sup>st</sup> 2 <sup>nd</sup> 3 <sup>rd</sup> 1 <sup>st</sup>	3.1 Describe Construction, principle of working of Dynamometer type wattmeter  3.2 What are the Errors in Dynamometer type wattmeter and methods of their correction  Tutorial  3.3 Discuss L P F Electro – Dynamometer type wattmeter  3.4 Discuss Induction type watt meters  3.5 Measurement of Power in Single Phase and Three Phase Circuit  Tutorial  4. ENERGYMETERS AND MEASUREMENT OF ENERGY  4.1 Introduction  4.2 Single Phase and poly phase Induction type Energy meters  4.2 Construction, working principle and their compensation and adjustments.  4.2 Their compensation and adjustments.  Tutorial  4.3 Testing of Energy Meters
6th	4 <sup>th</sup> 5 <sup>th</sup> 1 <sup>st</sup> 2 <sup>nd</sup> 3 <sup>rd</sup> 4 <sup>th</sup> 5 <sup>th</sup> 1 <sup>st</sup> 2 <sup>nd</sup> 3 <sup>rd</sup> 1 <sup>st</sup> 2 <sup>nd</sup> 3 <sup>rd</sup> 4 <sup>th</sup> 5 <sup>th</sup> 1 <sup>st</sup>	3.1 Describe Construction, principle of working of Dynamometer type wattmeter  3.2 What are the Errors in Dynamometer type wattmeter and methods of their correction  Tutorial  3.3 Discuss L P F Electro – Dynamometer type wattmeter  3.4 Discuss Induction type watt meters  3.5 Measurement of Power in Single Phase and Three Phase Circuit  Tutorial  4. ENERGYMETERS AND MEASUREMENT OF ENERGY  4.1 Introduction  4.2 Single Phase and poly phase Induction type Energy meters  4.2 Construction, working principle and their compensation and adjustments.  4.2 Their compensation and adjustments.  Tutorial  4.3 Testing of Energy Meters  4.3 Testing of Energy Meters (Contd)
6th	4 <sup>th</sup> 5 <sup>th</sup> 1 <sup>st</sup> 2 <sup>nd</sup> 3 <sup>rd</sup> 4 <sup>th</sup> 5 <sup>th</sup> 1 <sup>st</sup> 2 <sup>nd</sup> 3 <sup>rd</sup> 3 <sup>rd</sup> 4 <sup>th</sup> 5 <sup>th</sup> 1 <sup>st</sup> 2 <sup>nd</sup> 3 <sup>rd</sup> 3 <sup>rd</sup> 3 <sup>rd</sup>	3.1 Describe Construction, principle of working of Dynamometer type wattmeter  3.2 What are the Errors in Dynamometer type wattmeter and methods of their correction  Tutorial  3.3 Discuss L P F Electro – Dynamometer type wattmeter  3.4 Discuss Induction type watt meters  3.5 Measurement of Power in Single Phase and Three Phase Circuit  Tutorial  4. ENERGYMETERS AND MEASUREMENT OF ENERGY  4.1 Introduction  4.2 Single Phase and poly phase Induction type Energy meters  4.2 Construction, working principle and their compensation and adjustments.  Tutorial  4.3 Testing of Energy Meters  4.3 Testing of Energy Meters (Contd)  5. MEASUREMENT OF SPEED: FREQUENCY AND POWER PAGEOR
6th	4 <sup>th</sup> 5 <sup>th</sup> 1 <sup>st</sup> 2 <sup>nd</sup> 3 <sup>rd</sup> 4 <sup>th</sup> 5 <sup>th</sup> 1 <sup>st</sup> 2 <sup>nd</sup> 3 <sup>rd</sup> 3 <sup>rd</sup> 3 <sup>rd</sup> 3 <sup>rd</sup> 3 <sup>rd</sup> 3 <sup>rd</sup>	3.1 Describe Construction, principle of working of Dynamometer type wattmeter  3.2 What are the Errors in Dynamometer type wattmeter and methods of their correction  Tutorial  3.3 Discuss L P F Electro – Dynamometer type wattmeter  3.4 Discuss Induction type watt meters  3.5 Measurement of Power in Single Phase and Three Phase Circuit  Tutorial  4. ENERGYMETERS AND MEASUREMENT OF ENERGY  4.1 Introduction  4.2 Single Phase and poly phase Induction type Energy meters  4.2 Construction, working principle and their compensation and adjustments.  4.2 Their compensation and adjustments.  Tutorial  4.3 Testing of Energy Meters  4.3 Testing of Energy Meters (Contd)  5. MEASUREMENT OF SPEED; FREQUENCY AND POWER FACTOR  5.1 Tachometers, types and working principles
6th	4 <sup>th</sup> 5 <sup>th</sup> 1 <sup>st</sup> 2 <sup>nd</sup> 3 <sup>rd</sup> 4 <sup>th</sup> 5 <sup>th</sup> 1 <sup>st</sup> 2 <sup>nd</sup> 3 <sup>rd</sup> 3 <sup>rd</sup> 4 <sup>th</sup> 5 <sup>th</sup> 1 <sup>st</sup> 2 <sup>nd</sup> 3 <sup>rd</sup> 4 <sup>th</sup> 5 <sup>th</sup> 1 <sup>st</sup> 2 <sup>nd</sup> 3 <sup>rd</sup>	3.1 Describe Construction, principle of working of Dynamometer type wattmeter  3.2 What are the Errors in Dynamometer type wattmeter and methods of their correction  Tutorial  3.3 Discuss L P F Electro – Dynamometer type wattmeter  3.4 Discuss Induction type watt meters  3.5 Measurement of Power in Single Phase and Three Phase Circuit  Tutorial  4. ENERGYMETERS AND MEASUREMENT OF ENERGY  4.1 Introduction  4.2 Single Phase and poly phase Induction type Energy meters  4.2 Construction, working principle and their compensation and adjustments.  4.2 Their compensation and adjustments.  Tutorial  4.3 Testing of Energy Meters  4.3 Testing of Energy Meters (Contd)  5. MEASUREMENT OF SPEED: FREQUENCY AND POWER BACKERS

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

Aditya Kumar Panda 13.01.2024. Teaching Faculty

Camactan	Electrical Department of Government Polytechnic ,Berhampur Name of the Teaching Faculty:-		
Semester:-	Traine of the Feature of		
414	Prayumna Kumar Das		
No of Days/per	Semester From:- 16/01/2024 To:- 26/04/2024		
Week Class			
Allotted:-	No contain 15		
4+ 1 (Tutorial)	No of Weeks:- 15		
OI D	Theory/ Practical Topics		
Class Day	1.1.1 Give Elementary idea on generation of electricity from Thermal Power station.		
	1.1.1 Give Elementary idea on generation of electricity from Thermal Power station.		
	1.1.2 Give Elementary idea on generation of electricity from Hydel Power station.		
4 <sup>th</sup>	1.1.3 Give Elementary idea on generation of electricity from Nuclear Power station.		
5 <sup>th</sup>	Tutorial		
l st	1.2.1 Draw layout of generating stations.		
	1.2.1 Draw layout of generating stations.		
	1.2.2 Draw layout of generating stations.		
	Tutorial		
	2.1 Draw layout of transmission and distribution scheme.		
	2.2 Explain voltage Regulation & efficiency of transmission.      2.3 State and explain Kelvin's law for economical size of conductor.		
	Tutorial		
	2.4 Explain corona and corona loss on transmission lines.		
	2.4 Explain corona and corona loss on transmission lines.		
151	OVER HEAD LINES		
	3.1.1 State types of supports of conductor.		
2 <sup>nd</sup>	3.1.2 State size and spacing of conductor.		
	3.2 Types of conductor materials.		
	Tutorial		
-	3.3 State types of insulator and cross arms		
	3.4 Derive for sag in overhead line with support at same level and different level		
2 <sup>nd</sup>	Tutorial		
3 <sup>rd</sup>	3.4.1 Derive for sag in overhead line with support at same level (approximate formula		
- 0	effect of wind, ice and temperature on sag simple problem)		
4"	3.4.2 Derive for sag in overhead line with support at different level (approximate formula effect of		
s th	wind, ice and temperature on sag simple problem)  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)		
1 <sup>st</sup>	Tutorial		
2 <sup>nd</sup>	PERFORMANCE OF SHORT & MEDIUM LINES		
3 rd	4.1 Calculation of regulation and efficiency.		
1			
· ·	4.1 Calculation of regulation and efficiency.  4.1 Calculation of regulation and efficiency.		
	4.1 Calculation of regulation and efficiency.		
•	4.1 Calculation of regulation and efficiency.		
_			
1	4.1 Calculation of regulation and efficiency.		
1 - 4 · 4 · ·	Tutorial		
. 5 <sup>st</sup>	5.1 Explain EHV AC transmission.		
Ist	5.2 Explain Reasons for adoption of EHV AC transmission.		
2 <sup>nd</sup>	5.3 Problems involved in EHV transmission.		
_			
1 -			
	5.4 Explain HV DC transmission.		
5 <sup>st</sup>	5.4 Explain HV DC transmission		
l st	5.5.1 State Advantages of HVDC transmission system.		
2 <sup>nd</sup>	5.5.2 State Limitations of HVDC transmission system.		
3 <sup>rd</sup>	6.1.2 Explain Connection Schemes of Distribution System –		
	(Radial, Ring Main and Inter connected system)		
4 <sup>th</sup>	6.2 Explain DC distributions (a) Distributor fed at one End (b) Distributor fed at both		
	the ends (c) Ring distributors.		
	Tutorial		
1 <sup>st</sup>	6.3.1 Explain AC distribution system.		
2 <sup>nd</sup>	6.3.2 Explain Method of solving AC distribution problem.		
3 <sup>rd</sup>			
_	6.3.2 Explain Method of solving AC distribution problem. 6.4 Explain three phase four wire star connected system arrangement.		
	4th  No of Days/per Week Class Allotted:- 4+1(Tutorial)  Class Day  131 2nd 3rd 4th 5th 1s1 2nd 3rd 4th 5th 5th 1s1 2nd 3rd 4th 5th 5th 1s1		

	Lesson Plan	of Electrical Department of Government Polytechnic ,Bernampur
		7.1.1 Explain cable insulation of cables.
	2 <sup>nd</sup>	7.1.2 Explain classification of cables.
11th	317	7.2.1 State Types of L. T. & H.T. cables with constructional features.
	41h	7.2.2 State Types of L. T. & H.T. cables with constructional features.
	531	Tutorial
	1,,	7.3 State and Explain Methods of cable lying.
12th	2 <sup>nd</sup>	7.4 State methods of Localisation of cable faults – Murray and Varley loop test for short circuit fault/Earth fault
	3 <sup>rd</sup>	8.1 State and explain causes of low power factor.
	4 <sup>th</sup>	8.2 Explain methods of improvement of power factor.
	551	Tutorial
a a th	151	8.3 Define & explain Load curves
13 <sup>th</sup>	2 <sup>nd</sup>	8.4 Define & explain Demand factor.
	And	8.5 Define & explain Maximum demand.
	3 <sup>rd</sup>	8.6 Define & explain Load factor.
	4 <sup>th</sup>	8.7 Define & explain Diversity factor.
	*	8.8 Define & explain Plant capacity factor.
	5 <sup>th</sup>	8.9 Define & explain peak load and Base load on power station  Tutorial
	1 51	9. TYPES OF TARIFF
		9.1 Explain flat rate tariff with problems
14 <sup>th</sup>	2 <sup>nd</sup>	9.1 Explain two part tariff and block rate tariff with problems
	3 <sup>rd</sup>	9.1 Explain block rate tariff with problems
	4 <sup>th</sup>	Tutorial
4.	5 <sup>th</sup>	10. SUBSTATION
		10.1.1 Draw and explain layout of LT. HT and EHT substation.
15 <sup>th</sup>	Isı	10.1.2 Draw and explain layout of LT. HT and EHT substation.
	2 <sup>nd</sup>	10.2.1 Draw and Explain Earthing of Substation
	3 <sup>rd</sup>	10.2.2 Draw and Explain Earthing of transmission lines.
	4 <sup>th</sup>	10.2.3 Draw and Explain Earthing of distribution lines.
Ī	5 <sup>th</sup>	Tutorial

Teaching Faculty

Discipline	Semester:-6th	Name of the Teaching Faculty:- Sandeep kumar Panigrahi
Discipline	30	Sandeep Rumm 1 amg.
Electrical		- 10 1/2024
Engg.	No of Days/par	Semester From:- <u>16/01/2024</u> To:- <u>26/04/2024</u>
Subject: Electrical	No of Days/per Week Class	
nstallation And	Allotted :-	No of Weeks:-15
Estimating	4+ 1{Tutorial)	No 01 WCCK313
		Theory/ Practical Topics
Week	Class Day	
51 0		1 1 Definitions Ampere, Apparatus, Accessible, Date, Casto,
1st	A n	breaker, conductor voltage (low, medium, high, EH)
	2 <sup>nd</sup>	1.1 live, dead, cut-out, conduit, system, danger, first affactor, cut-out, c
		switch gear, etc. 22, 23, 24, 25, 36, 40, 41, 43, 44, 45, 46.
	3 <sup>rd</sup>	1.2 General safety precautions, rule 29, 30, 31, 32, 33, 34, 35, 36, 10, 13, 13, 13, 13, 13, 13, 13, 13, 13, 13
	4 <sup>th</sup>	1.3 General conditions relating to supply and use of the E.S.
	5 <sup>th</sup>	
	1 <sup>st</sup>	Tutorial  1.3 General conditions relating to supply and use of energy: rule 56, 57, 58, 59, 60, 61,
		1 62 62 64 65 66 67 68 70
	2 <sup>nd</sup>	1.4 OH lines: Rule 74, 75, 76, 77, 78, 79, 80, 86, 87, 88, 89, 90, 91
	3 <sup>rd</sup>	2. ELECTRICAL INSTALLATIONS 2. 1 Electrical installations, domestics, industrial, Wiring System, Internal 2. 1 Electrical installations, domestics, industrial, Wiring Systems of wiring, wire
	- Jan	
2nd		and cable, conductor materials used in cables, insulating materials mechanical
	and the second	
	4 <sup>th</sup>	Types of cables used in internal wiring, multi-stranded cables, voltage
		grinding of cables, general specifications of cables.
	5 <sup>th</sup>	Tutorial  2. 2 ACCESSORIES: Main switch and distribution boards, conduits, conduit accessories
	1"	and fittings, lighting accessories and fittings, fuses, important definitions, determined
		- Caing of fugg. using fugg units. Farthing conductor, earthing
	2 <sup>nd</sup>	IS specifications regarding earthing of electrical installations, points to be
	2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	earthed     Determination of size of earth wire and earth plate for domestic and industrial
	3 <sup>rd</sup>	installations. Material required for GI pine earthing.
	4 <sup>th</sup>	. 2. 3 LIGHTING SCHEME: Aspects of good lighting services. Types of
3rd		lighting
	1 1 19 19	schemes, design of lighting schemes, factory lighting, public lighting installations, street lighting, general rules for wiring
	5 <sup>th</sup>	determination of number
	3	of points (light, fan, socket, outlets), determination of total load,
		determination
	attachment of	of Number of sub-circuits
	1 <sup>st</sup>	3. INTERNAL WIRING 3. I Type of internal wiring, cleat wiring, CTS wiring, wooden casing capping,
	2 <sup>nd</sup>	metal sheathed wiring, conduit wiring, their advantage and disadvantages
		comparison and applications.
L. Landerson	3 <sup>rd</sup>	Tutorial
	4 <sup>th</sup>	3. 2 Prepare one estimate of materials required for CTS wiring for small
		domestic installation of one room and one verandah within 25 m <sup>2</sup> with given light, fan
4th		&
4111		plug points.
	5 <sup>th</sup>	3.3 Prepare one estimate of materials required for conduit wiring for small
	The second second	domestic installation of one room and one verandha within 25 m <sup>2</sup> with given light, fan & plug points.
	1 st	3.4 Prepare one estimate of materials required for concealed wiring for
		domestic
_	-	installation of two rooms and one latrine, bath, kitchen & verandah within
A.10 Ed 5	4 = -7	80m <sup>2</sup>
-	2 <sup>nd</sup>	with given light, fan & plug points  3.5 Prepare one estimate of materials required for erection of conduct wiring
	2	to a
=	- X	small workshop installation about 30m <sup>2</sup> and load within 10 KW.
	3 <sup>rd</sup>	3.5 Prepare one estimate of materials required for erection of conduct wiring
1		to a

		small workshop installation about 30m <sup>2</sup> and load within 10 KW.(Contd)
	4 <sup>th</sup>	Tutorial  3 . 5 Prepare one estimate of materials required for erection of conduct wiring
	5 <sup>th</sup>	ton
5 <sup>th</sup>		small workshop installation about 30m <sup>2</sup> and load within 10 KW.
	l st	3 . 5 Prepare one estimate of materials required for erection of conduct wiring
		to a
·  -	2 <sup>nd</sup>	small workshop installation about 30m <sup>2</sup> and load within 10 KW.  3.5 Prepare one estimate of materials required for erection of conduct wiring
	2	to a
		small workshop installation about 30m <sup>2</sup> and load within 10 KW.
	3 <sup>rd</sup>	3.5 Prepare one estimate of materials required for erection of conduct wiring
		to a
-	4 <sup>th</sup>	small workshop installation about 30m <sup>2</sup> and load within 10 KW.
1	7	3.5 Prepare one estimate of materials required for erection of conduct wiring to a
L		small workshop installation about 30m <sup>2</sup> and load within 10 KW.
	5 <sup>th</sup>	Tutorial
	1 <sup>st</sup>	5. OVER HEAD SERVICE LINES
6th		5.1 Components of service lines, service line (cables and conductors), bearer
oui		Wire,
	2 <sup>nd</sup>	lacing rod. Ariel fuse, service support, energy box and meters etc.  5.1 Components of service lines, service line (cables and conductors), bearer
1		wire,
	e rd	lacing rod. Ariel fuse, service support, energy box and meters etc
	3 <sup>rd</sup>	5.2 Prepare and estimate for providing single phase supply of load of 5 KW
		(light, fan, socket) to a single stored residential building.
	4 <sup>th</sup>	5.2 Prepare and estimate for providing single phase supply of load of 5 KW
		(light,
The Armster	-th	fan, socket) to a single stored residential building.
	5 <sup>th</sup>	5.3 Prepare and estimate for providing single phase supply load of 3KW to each
1	1 <sup>st</sup>	floor of a double stored building having separate energy meter.(Contd)  Tutorial
	2 <sup>nd</sup>	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.
- 1	3 <sup>rd</sup>	5.3 Prepare and estimate for providing single phase supply load of 3KW to
7 <sup>th</sup>		each
}	4 <sup>th</sup>	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.
3	5 <sup>th</sup>	5.4 Prepare one estimate of materials required for service connection to a
4 : 1		factory
some for college	1 st	building with load within 15 KW using insulated wire.
4.4	ALT IN IT	5.4 Prepare one estimate of materials required for service connection to a factory building with load within 15 KW using insulated wire.(Contd)
	2 <sup>nd</sup>	Tutorial
	3 <sup>rd</sup>	5.4 Prepare one estimate of materials required for service connection to a factory
4		building with load within 15 KW using insulated wire.
ŀ	4 <sup>th</sup>	5.5 Prepare one estimate of materials required for service connection to a factory
8 <sup>th</sup>	B 10 3 10 10 1	building with load within 15 KW using bare conductor and insulated wire
		combined.
	5 <sup>th</sup>	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
ļ	1 <sup>st</sup>	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.
greeld	2 <sup>nd</sup>	5.5 Prepare one estimate of materials required for service connection to a factory
l	-	building with load within 15 KW using bare conductor and insulated wire
		combined.
T 7	3 <sup>rd</sup>	Tutorial
	4 <sup>th</sup>	4. OVER HEAD INSTALLATION
9th	7	4.1 Main components of overhead lines, line supports, factors Governing Height of
		pole, conductor materials, determination of size of conductor for overhead
-	5 <sup>th</sup>	transmission line cross arms, note brackets and clamps, guys and stays.

	11	Conduct
	l si	conductors configurations, spacing and clearances, span lengths,
-		overhead line
_		insulators, types of insulators, lighting arresters, danger plates, anti-climbing devices, bird guards, beads of impages impages to a effective control of
=		devices, bird guards, beads of jumpers, jumpers, tee-offs, guarding of
-		lines.
	2 <sup>nd</sup>	
		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
-		1 stradetor (from conductor chart), current carrying capacity and voltage
	3 <sup>rd</sup>	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
}	.15	regulation consideration using ACSR.
	4 <sup>th</sup>	Tutorial
1	5 <sup>th</sup>	4.2 Prepare an estimate of materials required for LT distribution line within
10th		load of
Total		100 KW maximum and standard spans involving calculation of the size of
		conductor (from conductor chart), current carrying capacity and voltage
	• 4	regulation consideration using ACSR.
	1 <sup>st</sup>	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
	2 <sup>nd</sup>	regulation consideration using ACSR.  4.2 Prepare an estimate of materials required for LT distribution line within load of
	2	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.
	3 <sup>rd</sup>	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
	- th	regulation consideration using ACSR.
	4 <sup>th</sup> ·	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
	5 <sup>th</sup>	regulation consideration using ACSR.  Tutorial
	1 <sup>st</sup>	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
11th	m gran a se	regulation consideration using ACSR.
	2 <sup>nd</sup>	4.3. Prepare an estimate of materials required for LT distribution line within load of
1		100 KW maximum and standard spans involving calculation of the size of
- 24.		conductor (from conductor chart), current carrying capacity and voltage
-	And the second	regulation consideration using ACSR.
	3 <sup>rd</sup>	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
	- 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1	regulation consideration using ACSR.
_===	4 <sup>th</sup>	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
1	the second	regulation consideration using ACSR.
1	5 <sup>th</sup>	4.4 Prepare an estimate of materials required for HT distribution line (11 KV)
27.87	- 7	within 2 km and load of 2000 KVA maximum and standard spans involving
1	* "/"	calculation of the size of conductor (from conductor chart), current carrying
	V-	capacity and voltage regulation of the size of conductor (from conductor chart)
		current carrying capacity and voltage regulation consideration using ACSR.
	1 st	Tutorial
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		Simple Cont. Porchadions (ATO) Porchadions (ATO)
		(847): 9190.
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6.1 Prepare one materials estimate for following types of transformer substations.  5th 6.1.1 Pole mounted substation  1st 6.1.1 Pole mounted substation  2nd 6.1.1 Pole mounted substation  3rd Tutorial  4th 6.1.1 Pole mounted substation  5th 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  5th 6.1.2 Plinth Mounted substation.  1st 6.1.2 Plinth Mounted substation.  4th Tutorial  5th 6.1.2 Plinth Mounted substation.  1st 6.1.2 Plinth Mounted substation.  4th Tutorial  7th 6.1.2 Plinth Mounted substation.  1st 6.1.3 Previous year question paper discussion  4th Previous year question paper discussion  4th Previous year question paper discussion		f current carrying capacity and voltage regulation consideration as
14th  14th  15th  6.1.1 Pole mounted substation  1st 6.1.1 Pole mounted substation  2nd 6.1.1 Pole mounted substation  3rd Tutorial  4th 6.1.1 Pole mounted substation  5th 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.  2nd 6.1.2 Plinth Mounted substation.  3rd 6.1.2 Plinth Mounted substation.  1st 6.1.2 Plinth Mounted substation.  4th Tutorial  5th 6.1.2 Plinth Mounted substation.  1st 6.1.2 Plinth Mounted substation.  1st 6.1.2 Plinth Mounted substation.  1re 6.1.2 Plinth Mounted substation.  2nd Previous year question paper discussion  3rd Previous year question paper discussion  4th Previous year question paper discussion		O DOTATING FOR DISTRIBITION SUBSTATIONS
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Gar Jangre Teaching Faculty

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Principal
Govt. Polytechnic
BERHAMPUR (GM.)

HODE 54

Discipline	Semester:-	Name of the Teaching Faculty:- Prabhat Rashmi Mallik	
Electrical Engg.	6 <sup>th</sup>	Prabhat Rashmi Manik	
0.11		Semester From:- 16/01/2024 To:- 26/04/2024	
Subject:- SWITCH GEAR	No of Days/per	Semester From:- <u>16/01/2024</u> To:- <u>26/04/2024</u>	
AND	Week Class Allotted:-		
PROTECTIVE	4+ 1{Tutorial)	No of Weeks:- 15	
DEVICES		TI / Duratical Tomics	
Week	Class Day	Theory/ Practical Topics INTRODUCTION TO SWITCHGEAR	
	•	1.1 Essential Features of switchgear.	
1 <sup>st</sup>	2 <sup>nd</sup>	1.2 Switchgear Equipment.	
	3 <sup>rd</sup>	1.3 Bus-Bar Arrangement.	
	4 <sup>th</sup>	1.4 Switchgear Accommodation.	
	5 <sup>th</sup>	Tutorial	
	1 <sup>st</sup>	1.5 Short Circuit.	
	2 <sup>nd</sup> 3 <sup>rd</sup>	1.6 Faults in a power system.	
2nd	3	FAULT CALCULATION	
	4 <sup>th</sup>	2.1 Symmetrical faults on 3-phase system.  2.2 Limitation of fault current.	
	5 <sup>th</sup>	Tutorial	
	1 <sup>st</sup>	2.3 Percentage Reactance.	
	2 <sup>nd</sup>	2.4 Percentage Reactance and Base KVA.	
	3 <sup>rd</sup>	2.5 Short – circuit KVA	
3rd	4 <sup>th</sup>	2.6 Reactor control of short circuit currents.	
	5 <sup>th</sup>	Tutorial	
	1 <sup>st</sup> 2 <sup>nd</sup>	2.7 Location of reactors.	
	3 <sup>rd</sup>	2.8 Steps for symmetrical Fault calculations.	
4th	4 <sup>th</sup>	2.9 Solve numerical problems on symmetrical fault.     2.9 Solve numerical problems on symmetrical fault.	
	5 <sup>th</sup>	Tutorial	
	l <sup>51</sup>	FUSES	
5 <sup>th</sup>	2 <sup>nd</sup>	3.1 Desirable characteristics of fuse element.	
3	_	3.2 Fuse Element materials.	
	3 <sup>rd</sup>	3.3 Types of Fuses and important terms used for fuses.	
e	4 <sup>th</sup>	3.4 Low and High voltage fuses.	
	5 <sup>th</sup>	3.5 Current carrying capacity of fuse element.  Tutorial	
	151	3.6 Difference Between a Fuse and Circuit Breaker.	
	-		
6th	2 <sup>nd</sup>	CIRCUIT BREAKERS 4.1 Definition and principle of Circuit Breaker.	
	3 <sup>rd</sup>	4.1 Definition and principle of Circuit Bleaker.  4.2 Arc phenomenon and principle of Arc Extinction.	
		4.3 Methods of Arc Extinction.	
	4 <sup>th</sup>	4.4 Definitions of Arc voltage, Re-striking voltage and Recovery voltage.	
	1	4.5 Classification of circuit Breakers.	
	5 <sup>th</sup>	Tutorial	
	] <sup>51</sup>	4.6 Oil circuit Breaker and its classification.	
	2 <sup>nd</sup>	4.7 Plain brake oil circuit breaker.  4.8 Arc control oil circuit breaker.	
7 <sup>th</sup>	3 <sup>rd</sup>		
	3,4	4.9 Low oil circuit breaker. 4.10 Maintenance of oil circuit breaker.	
	4 <sup>th</sup>	4.11 Air-Blast circuit breaker and its classification.	
	- 2-	4.12 Sulphur Hexa-fluoride (SF6) circuit breaker.	
	5 <sup>s1</sup>	Tutorial	
	I st	4.13 Vacuum circuit breakers.	
-		4.14 Switchgear component.	
	2 <sup>nd</sup>	4.15 Problems of circuit interruption.	
8 <sup>th</sup>	3 <sup>rd</sup>	4.16 Resistance switching.	
	x to the	4.17 Circuit Breaker Rating.	
	4 <sup>th</sup>	Tutorial ( ) See Sell Of Sell	
	5 <sup>si</sup>	PROTECTIVE RELAYS	
		5.1 Definition of Protective Relay.	
	1 si	5.2 Fundamental requirement of protective relay.	
9th	1	5.3 Basic Relay operation	
· · · · ·		a) Electromagnetic Attraction type b) Induction type	

	2 <sup>nd</sup>	5.4 Definition of following important terms
		5.5 Definition of following impor ant terms.
	3 <sup>rd</sup>	5.5 Definition of following important controls
		a) Pick-up current. b) Current setting.
		c) Plug setting Multiplier.
		d) Time setting Multiplier.
-	4 <sup>th</sup>	5.6 Classification of functional relays
_	5 <sup>st</sup>	Tutorial
	1 <sup>st</sup>	5.7 Induction type over current relay (Non-directional)
-	2 <sup>nd</sup>	5.8 Induction type directional power relay
10th -	3 <sup>rd</sup>	5.9 Induction type directional over current relay
-	4 <sup>th</sup>	5 10 Differential relay
	,	a) Current differential relay
1		b) Voltage balance differential relay
Ī	5 <sup>st</sup>	Tutorial
	1 <sup>st</sup>	5.11 Types of protection
Ì	2 <sup>nd</sup>	6.1 Protection of alternator. 6.2 Differential protection of alternators.
		6.2 Differential protection of alternations.  6.3 Balanced earth fault protection.
11th	3 <sup>rd</sup>	6.3 Balanced earth fault protections
,	4 <sup>th</sup>	6.4 Protection systems for transformer
	5 <sup>si</sup>	Tutorial
	1 <sup>st</sup>	6.5 Buchholz relay
	2 <sup>nd</sup>	6.6 Protection of Bus bar.
12th		6.7 Protection of Transmission line.
•=	3 <sup>rd</sup>	6.8 Different pilot wire protection (Merz-price Voltage Balance 5) 6.9 Explain protection of feeder by over current and earth fault relay.
	5-1,	6.9 Explain protection of feeder by 6.5.
	4 <sup>th</sup>	Tutorial 7.1 Voltage surge and causes of over voltage.
	5 <sup>s1</sup>	
		7.2 Internal cause of over voltage (lighting)  7.3 External cause of over voltage (lighting)
	l <sup>st</sup>	7.4 Mechanism of lightning discharge.
13th	2 <sup>nd</sup>	7.4 Mechanism of lightning discharge.
	3 <sup>rd</sup>	7.5 Types of lightning strokes.
		7.5 Types of lightning. 7.6 Harmful effect of lightning. 7.7 Lightning arresters.
	4 <sup>th</sup>	
	5 <sup>s1</sup>	Tutorial
	1 51	7.8 Type of lightning Arresters.
14th		a) Rod-gap lightning arrester.
		b) Horn-gap arrester. c) Valve type arrester.
	- 204	7.9 Surge Absorber
	2 <sup>nd</sup>	STATIC RELAY
	3 <sup>rd</sup>	STATIC RELAT
	4 <sup>th</sup>	8.1 Advantage of static relay.
	5 <sup>s1</sup>	Tutorial
	1 <sup>st</sup>	8.2.1 Instantaneous over current relay.
15th	2 <sup>nd</sup>	8.2.2 Instantaneous over current relay.
15ui	3 <sup>rd</sup>	8 3 1 Principle of IDMT relay.
		8.3.2 Principle of IDMT relay.
	4 <sup>th</sup>	0.5.2 11110/10 22

Preaching Faculty 13/01/224

H.O.D E.E2

BERHAMPUR (GM.)

D: 1 II	Lesson	Plan of Electrical Department of Government Polytechnic ,Berhampur
Discipline	Semest	er:- Name of the Teaching Faculty:-
Electrical En	6 <sup>th</sup>	value of the reaching raculty;-
Servical Eli	gg.	Prayumna Kumar Das
Subject:-	No of Day	4.1
CONTROL	Week C	Semester From:- 16/01/2024 To:- 26/04/2024
SYSTEM	Allottad	1;-
ENGINEERIN	\G   4	
	. ·	
Week	Clark	No of Weeks:- 15
i cen	Class D	TI (1)
		SIGIAL FLOW GRAPH
1 21	2 <sup>nd</sup>	1.1.1 Review of block diagrams and transfer functions of multivariable systems.  1.1.2 Review of block diagrams and transfer functions of multivariable systems.
	3 <sup>rd</sup>	1.1.2 Review of block diagrams and transfer functions of multivariable systems.  1.2.1 Construction of signal flow graph.
	4 <sup>th</sup>	1.2.1 Construction of signal flow graph.
	1 <sup>st</sup>	1.2.2 Construction of signal flow graph.  1.3.1 Basic properties of signal flow graph.  1.3.2 Position
	2 <sup>nd</sup>	1.5.2 Dasic properties of signal flavores 1
2nd	3 <sup>rd</sup> 4 <sup>th</sup>	Title Signal How graph algebra
	151	1.4.2 Signal flow graph algebra
	2 <sup>nd</sup>	1.3.1 Construction of signal flow graph for any to the
	3 <sup>rd</sup>	
3rd		
	4 <sup>th</sup>	2 . 1 Time response of control system. 2 . 2 Standard Test signal.
		2.2.1. Step signal,
		2.2.2. Ramp Signal
	1	2.2.3. Parabolic Signal
	1 st	2.2.4. Impulse Signal
		2 . 3 Time Response of first order system with:
	2 <sup>nd</sup>	1 2.3.1. Offit step response
4th /	3 <sup>rd</sup>	2.3.2. Unit impulse response.
	1 1 3 3 1	2 . 4 Time response of second order system to the unit step input. 2.4.1. Time response specification.
	4 <sup>th</sup>	2.4.2. Derivation of expression for size time
	151	
	1 st	2.4.2. Derivation of expression for rise time
5 <sup>th</sup>	2 <sup>nd</sup>	
	3 <sup>rd</sup>	2.4.3. Steady state error and error constants
	3.0	2 . 5 Types of control system. [Steady state errors in Type-0, Type-1, Type-2 system]
	4 <sup>th</sup>	system] 3. 6 Effect of additional state errors in Type-0, Type-1, Type-2
	l si	2 . 6 Effect of adding poles and zero to transfer function.
	2 <sup>nd</sup>	2 . 7.1 Response with P, PI, PD and PID controller.
6th		2 . 7.2 Response with P, PI, PD and PID controller.
	3 <sup>rd</sup>	ANALYSIS OF STABILITY BY POOT LOCKS TROUBLES
	4 <sup>th</sup>	
	I <sub>st</sub>	3 . 1 Root locus concept.
1		3.2 Construction of root loci.
angra e	2 <sup>nd</sup>	3.2 Construction of root loci.
7 <sup>th</sup>	3 <sup>rd</sup>	3.2 Construction of root loci.
	4 <sup>th</sup>	3.3 Rules for construction of the root locus.
	1 si	3 . 3 Rules for construction of the root locus.
	2 <sup>nd</sup>	2.2 Pulse Construction of the root locus.
		3.3 Rules for construction of the root locus.
8 <sup>th</sup>	3 <sup>rd</sup>	3.3 Rules for construction of the root locus.
	4 <sup>th</sup>	3 . 4 Effect of adding poles and zeros to G(s) and H(s).
= -4	] si	3.4 Effect of adding poles and zeros to G(s) and H(s).
9th	2 <sup>nd</sup>	3 . 4 Effect of adding poles and zeros to G(s) and H(s).
	3 <sup>rd</sup>	EDECLIENCY DESIDENCE AND
		FREQUENCY RESPONSE ANALYSIS.
1-5	4 <sup>th</sup>	4 . 1 Correlation between time response and frequency response 4 . 2 Polar plots.
	1 st	
	2 <sup>nd</sup>	4 . 2 Polar plots.
10th	_	4.2 Polar plots.
	3 <sup>rd</sup>	4.3 Bode plots.
	4 th	4 . 3 Bode plots.
<b></b>	2 <sup>nd</sup>	4.3 Bode plots.
-	3 <sup>rd</sup>	4 . 4 All pass and minimum phase system.
1		1 (1 3 ( ) ) ) ) ) ) ) ) ) ) ) ) ) ) ) ) ) )
11th	4 <sup>th</sup>	4 . 5 Computation of Gain margin and phase margin.  4 . 5 Computation of Gain margin and phase margin.

		of Electrical Department of Government Polytechnic ,Berhampur	
l	esson Plan	4 . 6 Log magnitude versus phase plot.	
	1 51	4 . 6 Log magnitude versus phase plot	10
	2 <sup>nd</sup>	4 . 6 Log magnitude versus phase plot.	
12th —	3 <sup>rd</sup>	4.7 Closed loop frequency response.	Limit .
	4 <sup>th</sup>	4.7 Closed loop frequency response.	
-447	1 21	NYQUIST PLOT	
	•	5.1 Principle of argument.	
13th	2 <sup>nd</sup>	5.2 Nyquist stability criterion.	
-	3 <sup>rd</sup>	5.2 Nyquist stability criterion.	
	4 <sup>th</sup>	5.2 Nyquist stability criterion.	
	1 st	5.3 Niquist stability criterion applied to inverse polar plot.	
14th	2 <sup>nd</sup>	and the state of t	
-	3 <sup>rd</sup> ·	5.3 Niquist stability criterion applied to inverse policy policy on the shape of Niquist 5.4 Effect of addition of poles and zeros to G(S) H(S) on the shape of Niquist	
	3	plot	
_	4 <sup>th</sup>	plot.  5.4 Effect of addition of poles and zeros to G(S) H(S) on the shape of Niquist	
	4	nlot.	
	1 <sup>st</sup>	5.5 Assessment of relative stability.	
15th	2 <sup>nd</sup>	5.6 Constant M and N circle	
F	3 <sup>rd</sup>	5.6 Constant M and N circle	
-	4 <sup>th</sup>	5.7 Nicholas chart.	

Teaching Faculty

Discipline :ELECTRICAL ENGINEERING	Semester :6th	Name of the Teaching Faculty:Rajasri Tripathy
Subject:	No. of	Semester From date: 16/01/2024 To Date: 26/04/2024
RENEWABLE ENERGY SYSTEMS	days/per week class allotted:05	
Week	Class	Theory Topics
Week	Day	Theory Topics
181	181	Introduction to Renewable energy and Environmental
		consequences of fossil fuel use.
	2 <sup>ND</sup>	Importance of renewable sources of energy.
	3 <sup>RD</sup>	Sustainable Design and development.
	4 <sup>TH</sup>	Types of RE sources and Limitations of RE sources.
	5 <sup>TH</sup>	Present Indian and international energy scenario of conventional and RE sources.
2 <sup>ND</sup>	151	Introduction to Solar Energy
_	2 <sup>ND</sup>	Solar photovoltaic system-Operating principle.
	3 <sup>RD</sup>	Photovoltaic cell concepts
	4 <sup>TH</sup>	Cell, module, array
	5 <sup>TH</sup>	Series and parallel connections
3 <sup>RD</sup>	1 <sup>ST</sup>	Maximum power point tracking (MPPT).
	2 <sup>ND</sup>	Classification of energy Sources.
	3 <sup>RD</sup>	Extra-terrestrial Radiation
	4 <sup>TH</sup>	Terrestrial Radiation
	5 <sup>TH</sup>	Azimuth angle, Zenith angle, Hour angle
4 <sup>TH</sup>	181	Irradiance, Solar constant
	2 <sup>ND</sup>	Solar collectors
	3 <sup>RD</sup>	Types and performance characteristics 1 7 முழ்ந்து வாட்டு
	4 <sup>TH</sup>	Applications: Photovoltaic - battery charger, domestic lighting, street lighting
	5 <sup>TH</sup>	Applications: water pumping, solar cooker, Solar Pond.
5 <sup>TH</sup>	181	Introduction to Wind energy.
	2 <sup>ND</sup>	Wind energy conversion
	3 <sup>RD</sup>	Types of wind turbines
	4 <sup>TH</sup>	Aerodynamics of wind rotors.
	5 <sup>TH</sup>	Wind turbine control systems; conversion to electrical power:
6 <sup>TH</sup>	1 <sup>ST</sup>	Induction generators
U	2 <sup>ND</sup>	Synchronous generators
	3 <sup>RD</sup>	Grid connected and self excited induction generator operation
	4 <sup>TH</sup>	Constant voltage and constant frequency generation with power electronic control.
	5 <sup>TH</sup>	Single output systems
7 <sup>TH</sup>	181	Doubleoutput systems
1	2 <sup>ND</sup>	Characteristics of wind power plant
	3 <sup>RD</sup>	Introduction to Biomass Power
	4 <sup>TH</sup>	Energy from Biomass

	. 5 <sup>TH</sup>	Biomass as Renewable Energy Source	
8 <sup>TH</sup>	1 <sup>ST</sup>	Types of Biomass Fuels - Solid, Liquid and Gas	
	2 <sup>ND</sup>	Combustion	
	3 <sup>RD</sup>	Fermentation	
	4 <sup>TH</sup>	Anaerobic digestion	
	5 <sup>TH</sup>	Types of biogas digester	
9 <sup>TH</sup>	181	Wood gassifier	
	2 <sup>ND</sup>	Pyrolysis	
	3 <sup>RD</sup>	Applications: Bio gas	
	4 <sup>TH</sup>	Applications: Bio diesel	
	5 <sup>TH</sup>	Other Energy Sources	
10 <sup>TH</sup>	1 <sup>ST</sup>	Tidal Energy	
	2 <sup>ND</sup>	Energy from the tides	
	3 <sup>RD</sup>	Barrage Tidal power systems	
	4 <sup>TH</sup>	Non Barrage Tidal power systems	
	5 <sup>TH</sup>	Ocean Thermal Energy Conversion (OTEC).	
11 <sup>TH</sup>	181	Geothermal Energy	
	2 <sup>ND</sup>	Classification	
A 14 1	3 <sup>RD</sup>	Hybrid Energy Systems	
	4 <sup>TH</sup>	Need for Hybrid Systems	
	5 <sup>TH</sup>	Diesel-PV	
12 <sup>TH</sup>	181	Wind-PV	
	2 <sup>ND</sup>	Microhydel-PV	
	3 <sup>RD</sup>	Electric vehicles	
	4 <sup>TH</sup>	Hybrid electric vehicles	
	5 <sup>TH</sup>	Doubt clearing	

Rajaske Trepatty
12/01/24
Teaching Faculty

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