LESSION PLAN 4TH SEMESTER(2023-24)				
SUBJECT-Th1. ENERGY CONVERSION - I				
NAME OF THE FACULTY- Er. Chinmaya Kumar Patra				
MONTH	MODULE/UNIT	COURSE TO BE COVERED	TOTAL NO. OF CLASS	REMARK
January	**UNIT-1**	**DC GENERATORS**	**14**	
		1.1.Operating principle of generator	01	
		1.2.Constructional features of DC machine.	01	
		1.2.1. Yoke, Pole & field winding, Armature, Commutator.	01	
		1.2.2. Armature winding, back pitch, Front pitch, Resultant pitch and commutator- pitch.	01	
		1.2.3. Simple Lap and wave winding, Dummy coils.	01	
		1.3.Different types of D.C. machines (Shunt, Series and Compound)	01	
		1.4. Derivation of EMF equation of DC generators. (Solve problems)	01	
		1.5. Losses and efficiency of DC generator. Condition for maximum efficiency and numerical problems.	01	
		1.6. Armature reaction in D.C. machine.	01	
		1.7. Commutation and methods of improving commutation.	01	
		1.7.1. Role of inter poles and compensating winding in commutation.	01	
		1.8.Characteristics of D.C. Generators	01	
		1.9. Application of different types of D.C. Generators.	01	
		1.10.Concept of critical resistance and critical speed of DC shunt generator	01	
		1.11. Conditions of Build-up of emf of DC generator.	01	
		1.12. Parallel operation of D.C. Generators.	01	
		1.13.Uses of D.C generators	01	
February	**UNIT-2**	**2.D. C. MOTORS**	**15**	

		2.1.Basic working principle of DC motor	01	
		2.2. Significance of back emfin D.C. Motor.	01	
		2.3.Voltage equation of D.C. Motor and condition for maximum power output(simple problems)	02	
		2.4.Derive torque equation (solve problems)	02	
		2.5. Characteristics of shunt, series and compound motors and their application.	01	
		2.6. Starting method of shunt, series and compound motors.	01	
		2.7. Speed control of D.C shunt motors by Flux control method. Armature voltage Control method. Solve problems	01	
		2.8.Speed control of D.C. series motors by Field Flux control method, Tapped field method and series-parallel method	01	
		2.9.Determination of efficiency of D.C. Machine by Brake test method(solve numerical problems)	01	
		2.10.Determination of efficiency of D.C. Machine by Swinburne's Test method(solve numerical problems)	02	
		2.11.Losses, efficiency and power stages of D.C. motor(solve numerical problems)	01	
		2.12.Uses of D.C. motors	01	
March	**UNIT-3**	**3.SINGLE PHASE TRANSFORMER**	**20**	
		3.1 Working principle of transformer.	01	
		3.2 Constructional feature of Transformer.	01	
		3.2.1 Arrangement of core & winding in different types of transformer.	01	
		3.2.2 Brief ideas about transformer accessories such as	01	

		conservator, tank, breather, and explosion vent etc.		
		3.2.3 Explain types of cooling methods	01	
		3.3 State the procedures for Care and maintenance.	01	
		3.4 EMF equation of transformer.	01	
		3.5 Ideal transformer voltage transformation ratio	01	
		3.6 Operation of Transformer at no load, on load with phasor diagrams.	01	
		3.7 Equivalent Resistance, Leakage Reactance and Impedance of transformer.	01	
		3.8 To draw phasor diagram of transformer on load, with winding Resistance and Magnetic leakage with using pf, leading pf and lagging pf load.	01	
		3.9 To explain Equivalent circuit and solve numerical problems.	01	
		3.10 Approximate & exact voltage drop calculation of a Transformer.	01	
April		3.11 Regulation of transformer.	01	
		3.12 Different types of losses in a Transformer. Explain Open circuit and Short Circuit test.(Solve numerical problems)	01	
		3.13 Explain Efficiency, efficiency at different loads and power factors, condition for maximum efficiency (solve problems)	01	
		3.14 Explain All Day Efficiency (solve problems)	02	
		3.15 Determination of load corresponding to Maximum efficiency.	01	
		3.16 Parallel operation of single phase transformer.	01	
April	**UNIT-4**	**4. AUTOTRANSFORMER**	**03**	
		4.1. Constructional features of Auto transformer.	01	
		4.2. Working principle of single phase Auto Transformer.	01	

		4.3. Comparison of Auto transformer with an two winding transformer (saving of Copper).		
		4.4. Uses of Auto transformer. 4.5. Explain Tap changer with transformer (on load and off load condition)	01	
April	**UNIT-5**	**5.INSTRUMENT TRANSFORMERS**	05	
\		1.1Explain Current Transformer and Potential Transformer	02	
		1.2Define Ratio error, Phase angle error, Burden.	02	
		1.3Uses of C.T. and P.T.	01	

SUBJECT-Th2. ANALOG ELECTRONICS AND OP-AMP				
NAME OF THE FACULTY- Siba Prasad Panda				
MONTH	MODULE/UNIT	COURSE TO BE COVERED	TOTAL NO. OF CLASS	REMARK
January	**UNIT-1**	**1 P-N JUNCTION DIODE**	**06**	
		1. 1 P-N Junction Diode 1. 2 Working of Diode	01	
		1. 3V-1 characteristic of PN junction Diode. V-1 characteristic of PN junction Diode	01	
		1. 4 DC load line 1. 5 Important terms such as Ideal Diode, Knee voltage	01	
		1. 6Junctions break down. 1.6.1 Zener breakdown 1.6.2 Avalanche breakdown	01	
		1. 7 P-N Diode clipping Circuit.	01	
		1.8 P-N Diode clamping Circuit	01	
January	**UNIT-2**	**2.SPECIALSEMICONDUCTOR DEVICES**	**05**	
		2.1Thermistors, Sensors & barretters	02	
		2. 2 Zener Diode	01	
		2. 3 Tunnel Diode	01	
		2. 4 PIN Diode	01	
	UNIT-3	**3.RECTIFIERCIRCUITS&FILTERS**	**07**	
		3.1Classification of rectifiers	01	
		3.2 Analysis of half wave, full wave centre tapped and Bridge rectifiers	01	
		3.2.1DC output current and voltage	01	
		3.2.2 RMS output current and voltage 3.2.3 Rectifier efficiency	01	
		3.2.4Ripple factor 3.2.5Regulation	01	
		3.2.6 Transformer utilization factor 3.2.7 Peak inverse voltage	01	

		3.3 Filters: 3.3.1 Shunt capacitor filter 3.3.2 Choke input filter 3.3.3 π filter	01	
February	**UNIT-4**	**4.TRANSISTORS**	**07**	
		4.1 Principle of Bipolar junction transistor	01	
		4.2 Different modes of operation of transistor	01	
		4.3 Current components in a transistor	01	
		4.4 Transistor as an amplifier	01	
		4.5 Transistor circuit configuration & its characteristics 4.5.1 CB Configuration 4.5.2 CE Configuration 4.5.3 CC Configuration	03	
February	**UNIT-5**	**5. TRANSISTOR CIRCUITS**	**07**	
		5.1 Transistor biasing	01	
		5.2 Stabilization	01	
		5.3 Stability factor	01	
		5.4 Different method of Transistors Biasing 5.4.1 Base resistor method 5.4.2 Collector to base bias 5.4.3 Self bias or voltage divider method	04	
February	**UNIT-6**	**6.TRANSISTOR AMPLIFIERS & OSCILLATORS**	**07**	
		6.1Practical circuit of transistor amplifier 6.2DC load line and DC equivalent circuit	01	
		6.3AC load line and AC equivalent circuit 6.4Calculation of gain	01	
		6.5Phase reversal 6.6H-parameters of transistors	01	
		6.7Simplified H-parameters of transistors	01	

		6.8Generalised approximate model 6.9Analysis of CB, CE, CC amplifier using generalised approximate model	01	
		6.9 Analysis of CB, CE, CC amplifier using generalised approximate model	01	
		6.10Multi stage transistor amplifier 6.10.1R.C. coupled amplifier 6.10.2Transformer coupled amplifier	02	
March		6.11Feed back in amplifier 6.11.1General theory of feed back 6.11.2Negative feedback circuit 6.11.3Advantage of negative feed back	01	
		6.12Power amplifier and its classification 6.12.1Difference between voltage amplifier and power amplifier	01	
		6.12.2Transformer coupled class A power amplifier 6.12.3Class A push - pull amplifier 6.12.4Class B push - pull amplifier	01	
		6.13Oscillators 6.13.1Types of oscillators 6.13.2Essentials of transistor oscillator 6.13.3Principle of operation of tuned collector, Hartley, colpitt, phase shift, wein- bridge oscillator (no mathematical derivations)	02	
March	**UNIT-7**	**7.FIELDEFFECT TRANSISTOR**	**06**	
		7.1 Classification of FET	01	
		7.2 Advantages of FET over BJT 7.3 Principle of operation of BJT	02	
		7.4 FET parameters (no mathematical derivation) 7.4.1DC drain resistance 7.4.2AC drain resistance 7.4.3Trans-conductance	02	
		7.5 Biasing of FET	01	
April	**UNIT-8**	**8.PERATIONAL AMPLIFIERS**	**09Z**	
		8.1 General circuit simple of OP-AMP and IC - CA - 741 OP AMP	01	
		8.2 Operational amplifier stages 8.3Equivalent circuit of operational amplifier	01	
		8.4 Open loop OP-AMP configuration	01	

		8.5 OPAMP with fed back 8.6 Inverting OP-AMP	01	
		8.7 Non inverting OP-AMP	01	
		8.8 Voltage follower & buffer	01	
		8.9 Differential amplifier 8.9.1 Adder or summing amplifier 8.9.2 Sub tractor 8.9.3 Integrator 8.9.4 Differentiator 8.9.5 Comparator	03	

SUBJECT-TH3.ELECTRICAL MEASUREMENT & INSTRUMENTATION				
NAME OF THE FACULTY- Ranjita Kumari Sahu				
MONTH	MODULE/UNIT	COURSE TO BE COVERED	TOTAL NO. OF CLASS	REMARK
January	**UNIT-1**	**1.MEASURING INSTRUMENTS**	**05**	
		1.1 Define Accuracy, precision, Errors, Resolutions Sensitivity and tolerance	01	
		1.2Classification of measuring instruments.	01	
		1.3Explain deflecting, controlling and damping arrangements in indicating type of instruments	02	
		1.4 Calibration of instruments.	01	
February	**UNIT-2**	**2. ANALOG AMMETERS AND VOLTMETERS**	**10**	
		2.1.Describe Construction, principle of operation, errors, ranges merits and demerits of: 2.1.1Moving iron type instruments	01	
		2.1.2 Permanent Magnet Moving coil type instruments	01	
		2.1.3 Dynamometer type instruments	02	
		2.1.4 Rectifier type instruments	02	
		2.1.5 Induction type instruments	02	
		2.2 Extend the range of instruments by use of shunts and Multipliers	01	
		2.3 Solve Numerical	01	
February	**UNIT-3**	**3. WATTMETERS AND MEASUREMENT OF POWER**	**08**	
		3.1 Describe Construction, principle of working of Dynamometer type wattmeter. (LPF and UPF type)	03	
		3.2 The Errors in Dynamometer type wattmeter and methods of their correction	02	
		3.3 Discuss Induction type watt meters	03	

March	**UNIT-4**	**4. ENERGYMETERS AND MEASUREMENT OF ENERGY**	**08**	
		4.1 Introduction	02	
		4.2 Single Phase Induction type Energy meters - construction, working principle and their compensation & adjustments	06	
		4.3 Testing of Energy Meters	02	
March	**UNIT-5**	**5. MEASUREMENT OF SPEED, FREQUENCY AND POWER FACTOR**	**07**	
		5.1 Tachometers, types and working principles	02	
		5.2 Principle of operation and construction of Mechanical and Electrical resonance Type frequency meters	02	
		5.3 Principle of operation and working of Dynamometer type single phase and three phase power factor meters	03	
March	**UNIT-6**	**6. MEASUREMENT OF RESISTANCE,INDUCTANCE & CAPACITANCE**	**08**	
		6.1Classification of resistance 6.1.1. Measurement of low resistance by potentiometer method. . 6.1.2. Measurement of medium resistance by wheat Stone bridge method. 6.1.3. Measurement of high resistance by loss of charge method	02	
		6.2 Construction, principle of operations of Megger & Earth tester for insulation resistance and earth resistance measurement respectively	02	
		6.3 Construction and principles of Multimeter. (Analog and Digital)	02	
		6.4 Measurement of inductance by Maxewell's Bridge method	01	
		6.5 Measurement of capacitance by Schering Bridge method	01	

April	**UNIT-7**	**7. SENSORS AND TRANSDUCER**	**09**	
		7.1. Define Transducer, sensing element or detector element and transduction elements	01	
		7.2. Classify transducer. Give examples of various class of transducer	01	
		7.3. Resistive transducer 7.3.1 Linear and angular motion potentiometer. 7.3.2 Thermistor and Resistance thermometers. 7.3.3 Wire Resistance Strain Gauges	02	
		7.4. Inductive Transducer 7.4.1Principle of linear variable differential Transformer (LVDT) 7.4.2 Uses of LVDT	01	
		7.5. Capacitive Transducer. 7.5.1 General principle of capacitive transducer. 7.5.2 Variable area capacitive transducer. 7.5.3 Change in distance between plate capacitive	03	
		7.6. Piezoelectric Transducer and Hall Effect Transducer with their applications	01	
April	**UNIT-8**	**8. OSCILLOSCOPE**	**05**	
		8.1. Principle of operation of Cathode Ray Tube	01	
		8.2. Principle of operation of Oscilloscope (with help of block diagram).	02	
		8.3. Measurement of DC Voltage & current	01	
		8.4. Measurement of AC Voltage, current, phase & frequency	01	

SUBJECT-TH4.GENERATION TRANSMISSION & DISTRIBUTION				
NAME OF THE FACULTY- Siba Ranjana Nayak				
MONTH	MODULE/UNIT	COURSE TO BE COVERED	TOTAL NO. OF CLASS	TOTAL NO. OF CLASS
January	**UNIT-1**	**1. GENERATION OF ELECTRICITY**	**07**	
		1.1 Elementary idea on generation of electricity from Thermal, Hydel, Nuclear, Power station	03	
		1.2 Introduction to Solar Power Plant (Photovoltaic cells).	02	
		1.3 Layout diagram of generating stations	02	
January	**UNIT-2**	**2. TRANSMISSION OF ELECTRIC POWER**	**05**	
		2.1 Layout of transmission and distribution scheme	01	
		2.2 Voltage Regulation & efficiency of transmission	01	
		2.3 State and explain Kelvin's law for economical size of conductor	02	
		2.4 Corona and corona loss on transmission lines	01	
February	**UNIT-3**	**3. OVER HEAD LINES**	**07**	
		3.1 Types of supports, size and spacing of conductor	01	
		3.2 Types of conductor materials	01	
		3.3 State types of insulator and cross arms	02	
		3.4 Sag in overhead line with support at same level and different level. (approximate formula effect of wind, ice and temperature on sag)	01	
		3.5 Simple problem on sag	02	
February	**UNIT-4**	**4. PERFORMANCE OF SHORT & MEDIUM LINES**	**07**	
		4.1.Calculation of regulation and efficiency	07	
February	**UNIT-5**	**5. EHV TRANSMISSION**	**07**	
		5.1 EHV AC transmission. 5.1.1. Reasons for adoption	04	

		of EHV AC transmission. 5.1.2. Problems involved in EHV transmission		
		5.2 HV DC transmission. 5.2.1. Advantages and Limitations of HVDC transmission system	03	
March	**UNIT-6**	**6. DISTRIBUTION SYSTEMS**	**07**	
		6.1 Introduction to Distribution System	01	
		6.2 Connection Schemes of Distribution System: (Radial, Ring Main and Inter connected system)	02	
		6.3 DC distributions. 6.3.1 Distributor fed at one End. 6.3.2 Distributor fed at both the ends. 6.3.3 Ring distributors	02	
		6.4 AC distribution system. 6.4.1. Method of solving AC distribution problem. 6.4.2. Three phase four wire star connected system arrangement	02	
March	**UNIT-7**	**7. UNDERGROUND CABLES**	**06**	
		7.1 Cable insulation and classification of cables	02	
		7.2 Types of L. T. & H.T. cables with constructional features	01	
		7.3 Methods of cable lying	02	
		7.4 Localization of cable faults: Murray and Varley loop test for short circuit fault/ Earth fault	01	
March	**UNIT-8**	**8. ECONOMIC ASPECTS**	**06**	
		8.1 Causes of low power factor and methods of improvement of power factor inpower system	01	
		8.2 Factors affecting the economics of generation: (Define and explain) 8.2.1 Load curves.	03	

		8.2.2 Demand factor. 8.2.3 Maximum demand. 8.2.4 Load factor. 8.2.5 Diversity factor. 8.2.6 Plant capacity factor		
		8.3 Peak load and Base load on power station	02	
April	**UNIT-9**	**9. TYPES OF TARIFF**	**03**	
		9.1.Desirable characteristic of a tariff	01	
		9.2.Explain flat rate, block rate, two part and maximum demand tariff. (Solve Problems	02	
April	**UNIT-10**	**10. SUBSTATION**	**05**	
		10.1 Layout of LT , HT and EHT substation	02	
		10.2 Earthing of Substation, transmission and distribution lines.	03	