

ASIAN SCHOOL OF TECHNOLOGY ,KHORDHA

ACADEMIC LESSON PLAN (SUMMER-2026)

TH: 1 ELECTRICAL INSTALLATION&ESTIMATING

Discipline Electrical Engg.	Semester:- 6th	Name of the Teaching Faculty:- PRADOSH MOHAPATRA
Subject: TH-1 (ELECTRICAL INSTALLATION AND ESTIMATING)	No. of days/per week class allotted: 4p/week Tutorial: 1p/week	SemesterFrom: 05 TH Jan 2026 to 18 th April2026 No.ofweeks: 15 weeks
Week	ClassDay	TheoryTopics
1 st		1. INDIANELECTRICITYRULES 1.1 Definitions,Ampere,Apparatus,Accessible,Bare,cable w, circuit, circuit breaker,conductor voltage (low, medium, high, EH), live, dead, cut-out, conduit, system,danger, Installation, earthingsystem,span,volt,switchgear,etc.
		1.2 Generalsafetyprecautions,rule 29,30,31,32,33,34,35, 36,40, 41, 43, 44,45, 46.
		1.3 General conditions relating to supply and use of energy : rule47,48,49,50,51,54,55,56,57,58,59,60,61,62,63,64, 65,66, 67, 68, 70..(cont..)
		1.3 General conditions relating to supply and use of energy : rule47,48,49,50,51,54,55,56,57,58,59,60,61,62,63,64, 65, 66, 67, 68,70
		Tutorial
2 nd		1.4OHlines:Rule74, 75,76, 77, 78,79, 80,86,87, 88,89, 90,91.(cont..)
		1.4OHlines:Rule74, 75,76, 77,78,79, 80,86,87, 88,89, 90,91
		2. ELECTRICALINSTALLATIONS 2.1 Electrical installations, domestics, industrial, Wiring System, InternaldistributionofElectricalEnergy. Methodsof wiring,systemsofwiring,wireandcable,conductormaterials used in cables, insulating materials mechanical protection. Typesofcablesused ininternalwiring, multi-strandedcables, voltage grinding of cables, general specifications of cables. .(cont..)
		2. 1 Electrical installations, domestics, industrial, Wiring System, InternaldistributionofElectricalEnergy. Methodsof wiring,systemsofwiring,wireandcable,conductormaterials used in cables, insulating materials mechanical protection. Typesofcablesused ininternalwiring, multi-strandedcables, voltage grinding of cables, general specifications of cables. .(cont..)

3 rd		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. Types of cables used in internal wiring, multi-stranded cables, voltage grinding of cables, general specifications of cables. (cont..)
		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. Types of cables used in internal wiring, multi-stranded cables, voltage grinding of cables, general specifications of cables.
		2. 2 ACCESSORIES: Main switch and distribution boards, conduits, conduit accessories and fittings, lighting accessories and fittings, fuses, important definitions, determination of size of fuse – wire, fuse units. Earthing conductor, earthing, IS specifications regarding earthing of electrical installations, points to be earthed. Determination of size of earth wire and earth plate for domestic and industrial installations. Material required for GI pipe earthing(cont..)
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		Tutorial
4 th		2. 2 ACCESSORIES: Main switch and distribution boards, conduits, conduit accessories and fittings, lighting accessories and fittings, fuses, important definitions, determination of size of fuse – wire, fuse units. Earthing conductor, earthing, IS specifications regarding earthing of electrical installations, points to be earthed. Determination of size of earth wire and earth plate for domestic and industrial installations. Material required for GI pipe earthing(cont..)
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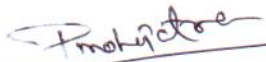
		2. 3 LIGHTING SCHEME: Aspects of good lighting services. Types of lighting schemes, design of lighting schemes, factory lighting, public lighting installations, street lighting, general rules for wiring, determination of number of points (light, fan, socket, outlets), determination of total load, determination of Number of sub-circuits. (cont..)
		2. 3 LIGHTING SCHEME: Aspects of good lighting services. Types of lighting schemes, design of lighting schemes, factory lighting, public lighting installations, street lighting, general rules for wiring, determination of number of points (light, fan, socket, outlets), determination of total load, determination of Number of sub-circuits. (cont..)
		Tutorial
5 th		2. 3 LIGHTING SCHEME: Aspects of good lighting services. Types of lighting schemes, design of lighting schemes, factory lighting, public lighting installations, street lighting, general rules for wiring, determination of number of points (light, fan, socket, outlets), determination of total load, determination of Number of sub-circuits. (cont..)
		2. 3 LIGHTING SCHEME: Aspects of good lighting services. Types of lighting schemes, design of lighting schemes, factory lighting, public lighting installations, street lighting, general rules for wiring, determination of number of points (light, fan, socket, outlets), determination of total load, determination of Number of sub-circuits.
		3. INTERNAL WIRING
		3 . 1 Type of internal wiring, cleat wiring, CTS wiring, wooden casing capping, metal sheathed wiring, conduit wiring, their advantage and disadvantages comparison and applications.(cont..)
		3 . 1 Type of internal wiring, cleat wiring, CTS wiring, wooden casing capping, metal sheathed wiring, conduit wiring, their advantage and disadvantages comparison and applications.(cont..)
		Tutorial
6 th		3 . 1 Type of internal wiring, cleat wiring, CTS wiring, wooden casing capping, metal sheathed wiring, conduit wiring, their advantage and disadvantages comparison and applications.
		3 . 2 Prepare one estimate of materials required for CTS wiring for small domestic installation of one room and one verandah within 25 m2 with given light, fan & plug points.(cont..).
		3 . 2 Prepare one estimate of materials required for CTS wiring for small domestic installation of one room and one verandah within 25 m2 with given light, fan & plug points.(cont..).
		3 . 2 Prepare one estimate of materials required for CTS wiring

		for small domestic installation of one room and one verandah within 25 m2 with given light, fan & plug points.
7 th		Tutorial
		3 . 3 Prepare one estimate of materials required for conduit wiring for small domestic installation of one room and one verandha within 25 m2 with given light, fan & plug points.(cont..)
		3 . 3 Prepare one estimate of materials required for conduit wiring for small domestic installation of one room and one verandha within 25 m2 with given light, fan & plug points.
		3 . 4 Prepare one estimate of materials required for concealed wiring for domestic installation of two rooms and one latrine, bath, kitchen & verandah within 80m2 with given light, fan & plug points. .(cont..)
		3 . 4 Prepare one estimate of materials required for concealed wiring for domestic installation of two rooms and one latrine, bath, kitchen & verandah within 80m2 with given light, fan & plug points.
8 th		Tutorial
		3 . 5 Prepare one estimate of materials required for erection of conduct wiring to a small workshop installation about 30m2 and load within 10 KW. .(cont..)
		3 . 5 Prepare one estimate of materials required for erection of conduct wiring to a small workshop installation about 30m2 and load within 10 KW.
		4. OVER HEAD INSTALLATION
		4.1 Main components of overhead lines, line supports, factors Governing Height of pole, conductor materials, determination of size of conductor for overhead transmission line, cross arms, pole brackets and clamps, guys and stays, conductors configurations, spacing and clearances, span lengths, overhead line insulators, types of insulators, lighting arresters, danger plates, anti-climbing devices, bird guards, beads of jumpers, jumpers, tee-offs, guarding of overhead lines.(cont..)
9 th		4.1 Main components of overhead lines, line supports, factors Governing Height of pole, conductor materials, determination of size of conductor for overhead transmission line, cross arms, pole brackets and clamps, guys and stays, conductors configurations, spacing and clearances, span lengths, overhead line insulators, types of insulators, lighting arresters, danger plates, anti-climbing devices, bird guards, beads of jumpers, jumpers, tee-offs, guarding of overhead lines.(cont..)
		Tutorial
		4.1 Main components of overhead lines, line supports, factors

		Governing Height of pole, conductor materials, determination of size of conductor for overhead transmission line, cross arms, pole brackets and clamps, guys and stays, conductors configurations, spacing and clearances, span lengths, overhead line insulators, types of insulators, lighting arresters, danger plates, anti-climbing devices, bird guards, beads of jumpers, jumpers, tee-offs, guarding of overhead lines.(cont..)
		4.1 Main components of overhead lines, line supports, factors Governing Height of pole, conductor materials, determination of size of conductor for overhead transmission line, cross arms, pole brackets and clamps, guys and stays, conductors configurations, spacing and clearances, span lengths, overhead line insulators, types of insulators, lighting arresters, danger plates, anti-climbing devices, bird guards, beads of jumpers, jumpers, tee-offs, guarding of overhead lines.
		4.2 Prepare an estimate of materials required for LT distribution line within load of 100 KW maximum and standard spans involving calculation of the size of conductor (from conductor chart), current carrying capacity and voltage regulation consideration using ACSR. .(cont..)
10 th		
		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. .(cont..)
		Tutorial
		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.
11 th		4.3. Prepare an estimate of materials required for LT distribution line within load of 100 KW maximum and standard spans involving calculation of the size of conductor (from conductor chart), current carrying capacity and voltage regulation consideration using ACSR.
		4.3. Prepare an estimate of materials required for LT distribution line within load of 100 KW maximum and standard spans involving calculation of the size of conductor (from conductor chart), current carrying capacity and voltage regulation consideration using ACSR.

		4.4 Prepare an estimate of materials required for HT distribution line (11 KV) within 2 km and load of 2000 KVA maximum and standard spans involving calculation of the size of conductor (from conductor chart), current carrying capacity and voltage regulation of the size of conductor (from conductor chart), current carrying capacity and voltage regulation consideration using ACSR. .(cont..)
		Tutorial
		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. .(cont..)
12 th		
		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.
		5. OVER HEAD SERVICE LINES 5.1 Components of service lines, service line (cables and conductors), bearer wire, lacing rod. Ariel fuse, service support.(cont..)
		5.1 Components of service lines, service line (cables and conductors), bearer wire, lacing rod. Ariel fuse, service support.(cont..)
13 th		Tutorial
		5.1 Components of service lines, service line (cables and conductors), bearer wire, lacing rod. Ariel fuse, service support.
		5.2 Prepare and estimate for providing single phase supply of load of 5 KW (light, fan, socket) to a single stored residential building.(cont..)
		5.2 Prepare and estimate for providing single phase supply of load of 5 KW (light, fan, socket) to a single stored residential building.(cont..)
		5.2 Prepare and estimate for providing single phase supply of load of 5 KW (light, fan, socket) to a single stored residential building.
14 th	Extra Class	Tutorial

	ExtraClass	5.3 Prepare and estimate for providing single phase supply load of 3 KW to each floor of a double storey building having separate energy meter. (cont..)
	ExtraClass	5.3 Prepare and estimate for providing single phase supply load of 3 KW to each floor of a double storey building having separate energy meter
	ExtraClass	5.4 Prepare one estimate of materials required for service connection to a factory building with load within 15 KW using insulated wire. (cont..)
	ExtraClass	5.4 Prepare one estimate of materials required for service connection to a factory building with load within 15 KW using insulated wire
15 th	ExtraClass	Tutorial
	ExtraClass	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. (cont..)
	ExtraClass	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
	ExtraClass	6. ESTIMATING FOR DISTRIBUTION SUBSTATIONS 6.1 Prepare one material estimate for following types of transformers substations. (cont..)
	ExtraClass	6.1 Prepare one material estimate for following types of transformers substations


 Signature of Teaching Faculty

ASIAN SCHOOL OF TECHNOLOGY
ACADEMIC LESSON PLAN (SUMMER 2026)
TH:2 ELECTRICAL SWITCH GEAR AND PROTECTIVE DEVICES

Discipline: Electrical Engineering	Semester :6 TH	No. of periods available:	Name of the Teaching Faculty: JAYANTA PANDA
Subject: TH:2 Electrical Switch Gear And Protective Devices	No. of Days/per week class allotted: 04 p/week		Semester From: 05 th Jan 2026 to 18 th April 2026 No.of Weeks:15
week	class day		Topic to be covered
1st	1	1	Introduction about SWITCHGEAR
	2	1	1.1. Essential Features of switchgear. 1.2. Switchgear Equipment.
	3	1	1.3 Bus-Bar Arrangement. 1.4. Switchgear Accommodation 1.5 Short Circuit. 1.6. Faults in a power system
	4	1	Introduction about FAULT CALCULATION 2.1 Symmetrical faults on 3-phase system 2.2 Limitation of fault current. 2.3 Percentage Reactance.
			2.4 Percentage Reactance and Base KVA. 2.5 Short – circuit KVA. 2.6 Reactor control of short circuit currents. 2.7 Location of reactors.
2nd	1	1	2.8 Steps for symmetrical Fault calculations. 2.9 Solve numerical problems on symmetrical fault.
	2	1	Introduction about FUSES 3.1 Desirable characteristics of fuse element. 3.2 Fuse Element materials. 3.3 Types of Fuses and important terms used for fuses.
	3	1	3.4 Low and High voltage fuses. 3.5 Current carrying capacity of fuse element.
	4	1	3.6 Difference Between a Fuse and Circuit Breaker
3rd	1	1	Introduction about CIRCUIT BREAKERS 4.1 Definition and principle of Circuit Breaker. 4.2. Arc phenomenon and principle of Arc Extinction. 4.3. Methods of Arc Extinction.
	2	1	4.4. Definitions of Arc voltage, Re-striking voltage and Recovery voltage. 4.5. Classification of circuit Breakers.
	3	1	4.6. Oil circuit Breaker and its classification. 4.7. Plain brake oil circuit breaker.
	4	1	4.8. Arc control oil circuit breaker.
4th	1	1	4.9. Low oil circuit breaker.
	2	1	4.10. Maintenance of oil circuit breaker
	3	1	

5th	1	1	4.13 Vacuum circuit breakers
	2	1	4.14 Switchgear component.
	3	1	4.15 Problems of circuit interruption.
	4	1	4.16 Resistance switching.
6th	1	1	4.17 Circuit Breaker Rating.
	2	1	Introduction about PROTECTIVE RELAYS
	3	1	5.1 Definition of Protective Relay
	4	1	5.2 Fundamental requirement of protective relay.
7th	1	1	5.3.1. Basic Relay operation Electromagnetic Attraction type
	2	1	5.3.2. Basic Relay operation induction type
	3	1	5.4. Definition of following important terms. Pick-up current Current setting.
	4	1	5.5. Definition of following important terms. Plug setting Multiplier. Time setting Multiplier.
8th	1	1	5.6 Classification of functional relays
	2	1	5.7. Induction type over current relay (Non-directional)
	3	1	5.8. Induction type directional power relay.
	4	1	5.9 Induction type directional over current relay.
9th	1	1	5.10.1. Current differential relay
	2	1	5.10.2. Voltage balance differential relay.
	3	1	5.11 Types of protection
	4	1	Introduction about PROTECTION OF ELECTRICAL POWER EQUIPMENT AND LINES
10th	1	1	6.1 Protection of alternator.
	2	1	6.2 Differential protection of alternators
	3	1	6.3 Balanced earth fault protection.
	4	1	6.4 Protection systems for transformer.
11th	1	1	6.5 Buchholz relay.
	2	1	6.6 Protection of Bus bar.
	3	1	6.7 Protection of Transmission line.
	4	1	6.8 Different pilot wire protection (Merz-price voltage Balance system)
12th	1	1	6.9 Explain protection of feeder by over current and earth fault relay.
	2	1	Introduction about PROTECTION AGAINST OVER VOLTAGE AND LIGHTING
	3	1	7.1. Voltage surge and causes of over voltage.
	4	1	7.2. Internal cause of over voltage
13th	1	1	7.3. External cause of over voltage (lighting)
	2	1	7.4. Mechanism of lightning discharge.
	3	1	7.5. Types of lightning strokes.
	4	1	7.6. Harmful effect of lightning.
14th	1	1	7.7. Rod-gap lightning arrester.
	2	1	7.8. Horn-gap arrester.
	3	1	7.9. Valve type arrester.
	4	1	7.10. Surge Absorber

15th	1	1	Introduction about STATIC RELAY:
	2	1	8. 1 Advantage of static relay.
	3	1	8. 2 Instantaneous over current relay. 8. 3 Principle of IDMT relay.
	4	1	CLASS TEST

Jayanta Panda.

Signature of Teaching Faculty

ASIAN SCHOOL OF TECHNOLOGY, KHORDHA

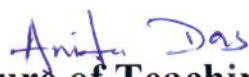
ACADEMIC LESSON PLAN (SUMMER-2026)

TH-3 CONTROL SYSTEM ENGINEERING

Discipline: Electrical Engineering	Semester: 6 th	Name of the Teaching Faculty : ANITA DAS
Subject: TH-3 (Control System Engineering)	No. of days/per week class allotted: 4p/week Tutorial: 1p/week	Semester From : 05 th Jan 2026 to 18 th April 2026 No of Week-15
Week	Class Day	Theory Topics
1 st	1 st	1. FUNDAMENTAL OF CONTROL SYSTEM 1.1. Classification of Control system 1.2. Open loop system & Closed loop system and its comparison
	2 nd	1.3. Effect of Feedback 1.4. Standard test Signals (Step, Ramp, Parabolic, Impulse Functions)
	3 rd	1.5. Servomechanism
	4 th	2. MATHEMATICAL MODEL OF A SYSTEM 2.1. Transfer Function & Impulse response, 2.2. Properties, Advantages & Disadvantages of Transfer Function
	5 th	Tutorial
2 nd	1 st	2.3. Poles & Zeros of transfer Function 2.4. Simple problems of transfer function of network.
	2 nd	2.5. Mathematical modeling of Electrical Systems (R, L, C, Analogous systems)
	3 rd	Tutorial
	4 th	3. CONTROL SYSTEM COMPONENTS 3.1. Components of Control System
	5 th	3.2. Gyroscope, Synchros, Tachometer, DC servomotors, AC servomotors. (Contd)
3 rd	1 st	3.2. Gyroscope, Synchros, Tachometer, DC servomotors, AC servomotors. (Contd)
	2 nd	3.2. Gyroscope, Synchros, Tachometer, DC servomotors, AC servomotors.
	3 rd	Tutorial
	4 th	4. BLOCK DIAGRAM ALGEBRA & SIGNAL FLOW GRAPHS 4.1. Definition: Basic Elements of Block Diagram
	5 th	4.2. Canonical Form of Closed loop Systems 4.3. Rules for Block diagram reduction (Contd)
	1 st	4.3. Rules for Block diagram reduction (Contd) 4.4. Procedure for reduction of Block Diagram
	2 nd	4.5. Simple Problem for equivalent transfer function (Contd.)
	3 rd	Tutorial
	4 th	4.5. Simple Problem for equivalent transfer function 4.6. Basic Definition in Signal Flow Graph & properties

4 th	5 th	4.7. Construction of Signal Flow graph from Block diagram 4.8. Mason's Gain formula
	1 st	4.9. Simple problems in Signal flow graph for network (Contd.)
	2 nd	4.9. Simple problems in Signal flow graph for network.
5 th	3 rd	Tutorial
	4 th	5. TIMERESPONSE ANALYSIS. 5.1 Time response of control system. 5.2 Standard Test signal. 5.2.1. Step signal, 5.2.2. Ramp Signal 5.2.3. Parabolic Signal 5.2.4. Impulse Signal 5.3 Time Response of first order system with: 5.3.1. Unit step response
	5 th	5.3.2. Unit impulse response. 5.4 Time response of second order system to the unit step input. 5.4.1. Time response specification. (Contd.)
6 th	1 st	5.4.1. Time response specification. 5.4.2. Derivation of expression for rise time, peak time, peak overshoot, settling time and steady state error. (Contd.)
	2 nd	5.4.2. Derivation of expression for rise time, peak time, peak overshoot, settling time and steady state error.
	3 rd	Tutorial
	4 th	5.4.3. Steady state error and error constants (cont.)
	5 th	5.4.3. Steady state error and error constants
7 th	1 st	5.5 Types of control system. [Steady state errors in Type-0, Type-1, Type-2 system]
	2 nd	5.6 Effect of adding poles and zeros to transfer function.
	3 rd	Tutorial
	4 th	5.7 Response with P, PI, PD and PID controller (Contd.)
	5 th	5.7 Response with P, PI, PD and PID controller
8 th	1 st	6. ANALYSIS OF STABILITY BY ROOT LOCUS TECHNIQUE. 6.1 Root locus concept. (cont.)
	2 nd	6.1 Root locus concept.
	3 rd	Tutorial
	4 th	6.2 Construction of root loci. (cont.)
	5 th	6.2 Construction of root loci.
9 th	1 st	6.3 Rules for construction of the root locus. (cont.)
	2 nd	6.3 Rules for construction of the root locus. (cont.)
	3 rd	Tutorial
	4 th	6.3 Rules for construction of the root locus. (cont.)
	5 th	6.3 Rules for construction of the root locus. (cont.)
	1 st	6.3 Rules for construction of the root locus.
	2 nd	6.4 Effect of adding poles and zeros to $G(s)$ and $H(s)$.
	3 rd	Tutorial

10 th	4 th	7. FREQUENCY RESPONSE ANALYSIS. 7.1 Correlation between time response and frequency response.
	5 th	7.2 Polar plots. (cont.)
11 th	1 st	7.2 Polar plots. (cont.)
	2 nd	7.2 Polar plots. (cont.)
	3 rd	Tutorial
	4 th	7.3 Bode plots. (cont.)
	5 th	7.3 Bode plots. (cont.)
12 th	1 st	7.3 Bode plots. (cont.)
	2 nd	7.4 All pass and minimum phase system. 7.5 Computation of Gain margin and phase margin (contd.)
	3 rd	7.4 All pass and minimum phase system. 7.5 Computation of Gain margin and phase margin
	4 th	Tutorial
13 th	5 th	7.6 Log magnitude versus phase plot.
	1 st	7.7 Closed loop frequency response.
	2 nd	8. NYQUIST PLOT 8.1 Principle of argument
	3 rd	8.2 Nyquist stability criterion. (cont.)
	4 th	Tutorial
	5 th	8.3 Nyquist stability criterion applied to inverse polar plot. (cont.)
14 th	1 st	8.3 Nyquist stability criterion applied to inverse polar plot. (cont.)
	2 nd	8.3 Nyquist stability criterion applied to inverse polar plot.
	3 rd	8.4 Effect of addition of poles and zeros to $G(S)H(S)$ on the shape of Nyquist plot.
	4 th	Tutorial
	5 th	8.5 Assessment of relative stability.
15 th	1 st	8.6 Constant M and N circle. (cont.)
	2 nd	8.6 Constant M and N circle
	3 rd	8.7 Nicholas chart. (contd.)
	4 th	8.7 Nicholas chart.
	5 th	CLASS TEST


Signature of Teaching faculty

ASIAN SCHOOL OF TECHNOLOGY, KHORDHA
ACADEMIC LESSON PLAN (SUMMER-2026)
TH-4 RENEWABLE ENERGY

Discipline: Electrical Engineering	Semester: th 6	Name of the Teaching Faculty: BHABANI SHANKAR BEHERA
Subject: TH-4 Renewable Energy	No. of days/per week class allotted: 4p/week Tutorial: 1p/week	Semester From : 05 th Jan 2026 to 18 th April 2026 No Of Week-15
Week	Class/week	Theory Topics
1 st	1 st	1.1.Environmental consequences of fossil fuel use.
	2 nd	1.2.Importance of renewable sources of energy.
	3 rd	1.3 Sustainable Design and development.
	4 th	1.4.Types of RE sources.
	5 th	Tutorial
2 nd	1 st	1.5.Limitations of RE sources
	2 nd	1.6.Present Indian and international energy scenario of conventional and RE sources
	3 rd	2.1.Solar photovoltaic system-Operating principle.
	4 th	2.2.Photovoltaic cell concepts
	5 th	Tutorial
3 rd	1 st	2.2.1. Cell, module, array, Series and parallel connections.
	2 nd	2.3.Classification of energy Sources.
	3 rd	2.4.Extra-terrestrial and terrestrial Radiation.
	4 th	2.5.Azimuth angle, Zenith angle, Hour angle, Irradiance, Solar constant.
	5 th	Tutorial
4 th	1 st	2.6.Solar collectors, Types, and performance characteristics,
	2 nd	2.6.Solar collectors, Types, and performance characteristics,
	3 rd	2.7.Applications: Photovoltaic-battery charger, domestic lighting, street lighting.
	4 th	2.7.Applications: Photovoltaic-water pumping, solar cooker, Solar Pond.
	5 th	Tutorial
5 th	1 st	3.1.Introduction to Wind energy.
	2 nd	3.2.Wind energy conversion.
	3 rd	3.3.Types of wind turbines
	4 th	3.3.Types of wind turbines
	5 th	Tutorial
6 th	1 st	3.4.Aerodynamics of wind rotors.
	2 nd	3.5.Wind turbine control systems; conversion to electric

		cal power:
	3rd	3.6. Induction and synchronous generators.
	4th	3.7. Grid connected and self-excited induction generator operation.
	5th	Tutorial
7th	1st	3.8. Constant voltage and constant frequency generation with power electronic control.
	2nd	3.9. Single and double output systems.
	3rd	3.10. Characteristics of wind power plant.
	4th	4.1. Energy from Biomass.
	5th	Tutorial
8th	1st	4.2. Biomass as Renewable Energy Source
	2nd	4.3. Types of Biomass Fuels- Solid, Liquid and Gas.
	3rd	4.3. Types of Biomass Fuels- Solid, Liquid and Gas.
	4th	4.4. Combustion and fermentation.
	5th	Tutorial
9th	1st	4.5. Anaerobic digestion
	2nd	4.6. Types of biogas digester.
	3rd	4.6. Types of biogas digester.
	4th	4.6. Types of biogas digester.
	5th	Tutorial
10th	1st	4.7. Wood gasifier.
	2nd	4.8. Pyrolysis,.
	3rd	4.9. Applications: Biogas, Biodiesel
	4th	5.1. Tidal Energy: Energy from the tides, Barrage and Non Barrage Tidal power systems.
	5th	Tutorial
11th	1st	5.1. Tidal Energy: Energy from the tides, Barrage and Non Barrage Tidal power systems.
	2nd	5.1. Tidal Energy: Energy from the tides, Barrage and Non Barrage Tidal power systems.
	3rd	5.2. Ocean Thermal Energy Conversion (OTEC).
	4th	5.2. Ocean Thermal Energy Conversion (OTEC).
	5th	Tutorial
12th	1st	5.3. Geothermal Energy- Classification.
	2nd	5.3. Geothermal Energy- Classification.
	3rd	5.3. Geothermal Energy- Classification.
	4th	5.4. Hybrid Energy Systems.
	5th	Tutorial
	1st	5.3. Geothermal Energy- Classification.

13 th	2 nd	5.4.HybridEnergySystems.
	3 rd	5.6.Diesel-PV, Wind-PV, Microhydel-PV.
	4 th	5.6.Diesel-PV, Wind-PV, Microhydel-PV.
	5 th	Tutorial
14 th	1 st	5.6.Diesel-PV, Wind-PV, Microhydel-PV.
	2 nd	5.7.Electricandhybridelectricvehicles.
	3 rd	5.7.Electricandhybridelectricvehicles.
	4 th	5.7.Electricandhybridelectricvehicles.
	5 th	Tutorial
15 th	1 st	5.4.HybridEnergySystems.
	2 nd	5.5.Needfor HybridSystems.
	3 rd	Revision-BiomassPower
	4 th	Revision-BiomassPower
	5 th	CLASS TEST

Dhabani Shankar Behera
Signature of Teaching faculty