GOVT. POLYTECHNIC KALAHANDI

LESSON PLAN:CONTROL SYSTEM ENGINEERING SUMMER 2025

Discipline: ELECTRICAL	Semester:SUMMER 2026	Name of the teaching faculty: **LIPSA PANIGRAHI**
Subject: **Control System Engineering**	No of days/per week class-5/week	Semester From Date: 04/02/2025 To Date: 18/01/2026 6th

Toal Class allotted:75		No of weeks: 15 weeks
Week	period	Topic
1st	1st	1.FUNDAMENTALS OF CONTROL SYSTEM 1.1 Classification of Control system 1.2 Open loop system & Closed loop system and its comparison
	2nd	1.3 Effects of Feed back
	3rd	1.4 Standard test Signals(Step, Ramp, Parabolic, Impulse Functions)
	4th	1.5 Servomechanism
	5th	1.5 Servomechanism
2nd	1st	TUTORIAL Chapter 1
	2nd	2.MATHEMATICAL MODEL OF A SYSTEM 2.1 Transfer Function & Impulse response
	3rd	2.2 Properties, Advantages & Disadvantages of Transfer Function
	4th	2.3 Poles & Zeroes of transfer Function
	5th	2.4 Simple problems of transfer function of network
3rd	1st	2.5 Mathematical modeling of Electrical Systems(R, L, C, Analogous
	2nd	TUTORIAL Chapter 2
	3rd	3.CONTROL SYSTEM COMPONENTS 3.1 Components of Control System
	4th	3.2 Gyroscope, Synchros
	5th	3.2 Tachometer
4th	1st	3.2 DC servomotors, Ac Servomotors.
	2nd	TUTORIAL Chapter 3
	3rd	4.BLOCK DIAGRAM ALGEBRA & SIGNAL FLOW GRAPHS 4.1 Definition: Basic Elements of Block Diagram
	4th	4.2 Canonical Form of Closed loop Systems
	5th	4.3 Rules for Block diagram reduction
5th	1st	4.4 Procedure for of Reduction of Block Diagram
	2nd	4.5Simple Problem for equivalent transfer function
	3rd	4.6 Basic Definition in Signal Flow Graph & properties
	4th	4.7Construction of Signal Flow graph from Block diagram
	5th	4.8 Mason's Gain formula
6th	1st	4.9 Simple problems in Signal flow graph for network
	2nd	TUTORIAL Chapter 4
	3rd	5.TIME RESPONSE ANALYSIS 5.1 Time response of control system. 5.2 Standard Test signal.
	4th	5.2 Step signal, Ramp Signal
	5th	5.2 Parabolic Signal, Impulse Signal
7th	1st	5.3 Time Response of first order system with Unit step response
	2nd	5.3 Time Response of first order system Unit impulse response.
	3rd	5.4 Time response of second order system to the unit step input.
	4th	5.4 Time response specification.
	5th	5.4 Derivation of expression for rise time, peak time, peak overshoot,

8th	1st	Numerical problems of time response analysis.
	2nd	5.4 Steady state error and error constants
	3rd	5.5 Types of control system.[Steady state errors in Type-0, Type-1,
	4th	5.6 Effect of adding poles and zero to transfer function.
	5th	5.7 Response with P, PI controller.
9th	1st	5.7 Response with PD and PID controller.
	2nd	TUTORIAL Chapter 5
	3rd	6.ANALYSIS OF STABILITY BY ROOT LOCUS TECHNIQUE 6.1 Root locus concept.
	4th	6.3 Basic Rules for construction of root locus
	5th	-do-
10th	1st	6.2 Construction of root loci
	2nd	-do-
	3rd	6.4 Effect of adding poles and zeros to G(s) and H(s).
	4th	TUTORIAL Chapter 6
	5th	7.FREQUENCY RESPONSE ANALYSIS 7.1 Correlation between time response and frequency response.
11th	1st	-do-
	2nd	7.2 Polar plots.
	3rd	7.3 Basic rules of construction of Bode plots.
	4th	-do-
	5th	7.3 Bode plots
12th	1st	-do-
	2nd	7.4 All pass and minimum phase system
	3rd	-do-
	4th	7.5 Computation of Gain margin and phase margin.
	5th	. -do-
13th	1st	7.6 Log magnitude versus phase plot.
	2nd	-do-
	3rd	7.7 Closed loop frequency response.
	4th	-do-
	5th	TUTORIAL Chapter 7
14th	1st	8.NYQUIST PLOT 8.1 Principle of argument
	2nd	8.2 Nyquist stability criterion.
	3rd	-do-
	4th	8.3 Nyquist stability criterion applied to inverse polar plot
	5th	8.4 Effect of addition of poles and zeros to G(S) H(S) on the shape of
15th	1st	-do-
	2nd	8.5 Assessment of relative stability.
	3rd	8.6 Constant M circle and N circle
	4th	8.7 Nicholas chart
	5th	Class Test

Lipsa Panigrahi
22/12/2025
Signature Of Faculty

22/12/2025
P/c H.O.D(Electrical Engg.)

LESSON PLAN
GOVT POLYTECHNIC KALAHANDI, BHAWANIPATNA

Faculty Name: KAMBHUDEEP BAG   *BRANCH*: ELECTRICAL   *SEM*: 6TH   *SESSION*:2025-26(S)

SUBJECT: ELECTRICAL INSTALLATION AND ESTIMATING	No. of days/ week Class allotted: 5 Total Periods: 75	w.e.f. 22-12-2025 to 18-04-2026

Week	Class Day	Theory
1st	1st	**1. INDIAN ELECTRICITY RULES** 1.1 Definitions, Ampere, Apparatus, Accessible, Bare, cable, circuit, circuit breaker, conductor voltage (low, medium, high, EH), live, dead, cut-out, conduit, system, danger, Installation, earthing system, span, volt, switch gear, etc.
	2nd	1.2 General safety precautions, rule 29, 30, 31, 32, 33, 34, 35, 36, 40, 41, 43, 44, 45, 46.
	3rd	1.3 General conditions relating to supply and use of energy : rule 47, 48, 49, 50, 51, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 70.
	4th	1.4 OH lines : Rule 74, 75, 76, 77, 78, 79, 80, 86, 87, 88, 89, 90, 91
	5th	**Tutorial**
2nd	1st	**2. ELECTRICAL INSTALLATIONS** 2. 1 Electrical installations, domestics, industrial, Wiring System, Internal distribution of Electrical Energy. Methods of wiring, systems of wiring, wire and cable, conductor materials used in cables, insulating materials mechanical protection. Types of cables used in internal wiring, multi-stranded cables, voltage grinding of cables, general specifications of cables.
	2nd	-DO-
	3rd	-DO-
	4th	-DO-
	5th	**Tutorial**
3rd	1st	2. 2 ACCESSORIES: Main switch and distribution boards, conduits, conduit accessories and fittings, lighting accessories and fittings, fuses, important definitions, determination of size of fuse – wire, fuse units. Earthing conductor, earthing, 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.
	2nd	-DO-
	3rd	-DO-
	4th	2. 3 LIGHTING SCHEME: Aspects of good lighting services. Types of lighting schemes, design of lighting schemes, factory lighting, public lighting installations, street lighting,
	5th	**Tutorial**
4th	1st	general rules for wiring, determination of number of points (light, fan, socket, outlets), determination of total load, determination of Number of sub-circuits.
	2nd	-DO-
	3rd	-DO-
	4th	-DO-
	5th	**Tutorial**
5th	1st	**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.

	2nd	-DO-
	3rd	-DO-
	4th	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.
	5th	**Tutorial**
6th	1st	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.
	2nd	-DO-
	3rd	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.
	4th	-DO-
	5th	**Tutorial**
7th	1st	3.4 Prepare one estimate of materials required for concealed wiring for domestic installation of two rooms and one latrine, bath, kitchen & verandah within 80m2 with given light, fan & plug points.
	2nd	-DO-
	3rd	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.
	4th	-DO-
	5th	**Tutorial**
8th	1st	**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.
	2nd	-DO-
	3rd	-DO-
	4th	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.
	5th	**Tutorial**
9th	1st	4.2. Prepare an estimate of materials required for LT distribution line within load of 100 KW maximum and standard spans involving calculation of the size of conductor (from conductor chart), current carrying capacity and voltage regulation consideration using ACSR.
	2nd	-DO-
	3rd	4.3. Prepare an estimate of materials required for LT distribution line within load of 100 KW maximum and standard spans involving calculation of the size of conductor (from conductor chart), current carrying capacity and voltage regulation consideration using ACSR.
	4th	-DO-
	5th	**Tutorial**
10th	1st	4.4. Prepare an estimate of materials required for HT distribution line (11 KV) within 2 km and load of 2000 KVA maximum and standard spans involving calculation of the size of conductor (from conductor chart), current carrying capacity and voltage regulation of the size of conductor (from conductor chart), current carrying capacity and voltage regulation consider action using ACSR.

	2nd	-DO-
	3rd	-DO-
	4th	-DO-
	5th	Tutorial
11th	1st	**5. OVER HEAD SERVICE LINES** 5. 1 Components of service lines, service line (cables and conductors), bearer wire, lacing rod. Ariel fuse, service support, energy box and meters etc.
	2nd	-DO-
	3rd	5. 2 Prepare and estimate for providing single phase supply of load of 5 KW (light, fan, socket) to a single stored residential building.
	4th	-DO-
	5th	Tutorial
12th	1st	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.
	2nd	-DO-
	3rd	5. 4 Prepare one estimate of materials required for service connection to a factory building with load within 15 KW using insulated wire.
	4th	-DO-
	5th	Tutorial
13th	1st	5. 5 Prepare one estimate of materials required for service connection to a factory building with load within 15 KW using bare conductor and insulated wire combined.
	2nd	-DO-
	3rd	-DO-
	4th	**6. ESTIMATING FOR DISTRIBUTION SUBSTATIONS** 6. 1 Prepare one materials estimate for following types of transformer substations.
	5th	Tutorial
14th	1st	6. 1 Prepare one materials estimate for following types of transformer substations.
	2nd	6.1.1 Pole mounted substation.
	3rd	-DO-
	4th	6.1.2 Plinth Mounted substation.
	5th	Tutorial
15th	1st	6.1.2 Plinth Mounted substation.
	2nd	-DO-
	3rd	-DO-
	4th	-DO-
	5th	Tutorial

22/12/2025
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22/12/2025
ℙℂ HOD(Electrical)

LESSON PLAN
GOVT POLYTECHNIC, KALAHANDI, BHAWANIPATNA

FACULTY NAME: BHUBANTA KAND   **BRANCH: ELECTRICAL**   **SEM: 6ᵗʰ**   **SESSION:2025-26(S)**

| SUBJECT: Electrical Work Shop	No. of days/ week Class allotted: 6 Total Periods: 90	w.e.f. 22.12.2025 to 18.04.2026
Week	**Class Period**	**Theory**
1st	1st	1. Identification of single core (SC), twin core (TC), three cores (3c), four cores (4c); copper and aluminum PVC, VIR & Weather proof (WP) wire and prepare Britannia T- joint and Married joint.
	2nd	
	3rd	
	4th	-do-
	5th	
	6th	
2nd	1st	-do-
	2nd	
	3rd	
	4th	2. Cutting copper and aluminum cable and crimping lug to them from 2.5mm$_2$ to 6 mm$_2$ cross section.
	5th	
	6th	
3rd	1st	-do-
	2nd	
	3rd	
	4th	3. Connection and testing of fluorescent tube light, high pressure M.V. lamp, sodium vapor lamp, M.H lamp, CFL and latest model lamps – measure inductance, Lux/ lumens (intensity of illumination) in each case-prepare lux table .
	5th	
	6th	
4th	1st	-do-
	2nd	
	3rd	
	4th	-do-
	5th	
	6th	
5th	1st	4. Study battery charger and make charging of lead acid battery (record charging voltage, current and specific gravity).
	2nd	
	3rd	
	4th	-do-
	5th	
	6th	
6th	1st	-do-
	2nd	
	3rd	
	4th	5. Erection of residential building wiring by CTS and conduit wiring system using main two points and test installation by test lamp method and a meggar.
	5th	
	6th	
7th	1st	-do-
	2nd	
	3rd	
	4th	-do-
	5th	
	6th	

LESSON PLAN
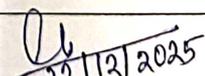## GOVT POLYTECHNIC, KALAHANDI, BHAWANIPATNA

Faculty Name: SATYAPRAKASH OJHA   **BRANCH:** ELECTRICAL   **SEM:** 6TH   **SESSION:** 2025-26(S)

SUBJECT: Electrical Work Shop	No. of days/ week Class allotted: 6 Total Periods: 90	w.e.f. 22.12.2025 to 18.04.2026
Week	**Class Period**	**Theory**
1st	1st 2nd 3rd	1. Identification of single core (SC), twin core (TC), three cores (3c), four cores (4c); copper and aluminum PVC, VIR & Weather proof (WP) wire and prepare Britannia T- joint and Married joint.
	4th 5th 6th	-do-
2nd	1st 2nd 3rd	-do-
	4th 5th 6th	2. Cutting copper and aluminum cable and crimping lug to them from 2.5mm2 to 6 mm2 cross section.
3rd	1st 2nd 3rd	-do-
	4th 5th 6th	3. Connection and testing of fluorescent tube light, high pressure M.V. lamp, sodium vapor lamp, M.H lamp, CFL and latest model lamps – measure inductance, Lux/ lumens (intensity of illumination) in each case-prepare lux table .
4th	1st 2nd 3rd	-do-
	4th 5th 6th	-do-
5th	1st 2nd 3rd	4. Study battery charger and make charging of lead acid battery (record charging voltage, current and specific gravity).
	4th 5th 6th	-do-
6th	1st 2nd 3rd	-do-
	4th 5th 6th	5. Erection of residential building wiring by CTS and conduit wiring system using main two points and test installation by test lamp method and a meggar.
7th	1st 2nd 3rd	-do-
	4th 5th 6th	-do-

8th	1st 2nd 3rd	6. Fault finding & repairing of Ceiling Fan – prepare an inventory list of parts.
	4th 5th 6th	-do-
9th	1st 2nd 3rd	-do-
	4th 5th 6th	7. Find out fault of D.C. generator, repair and test it to run.
10th	1st 2nd 3rd	-do-
	4th 5th 6th	8. Find out fault of D.C. motor starters and A.C motor starter – prepare an inventory list of parts used in different starters.
11th	1st 2nd 3rd	-do-
	4th 5th 6th	9. Dismantle, over haul and assemble a single phase induction motor. Test and run it. – prepare an inventory list.
12th	1st 2nd 3rd	-do-
	4th 5th 6th	-do-
13th	1st 2nd 3rd	10. Dismantle over haul and assemble a three phase squirrel cage and phase wound motor. Test and run them.
	4th 5th 6th	-do-
14th	1st 2nd 3rd	-do-
	4th 5th 6th	11. Overhaul a single phase and 3-phase variac.
15th	1st 2nd 3rd	-do-
	4th 5th 6th	-do-

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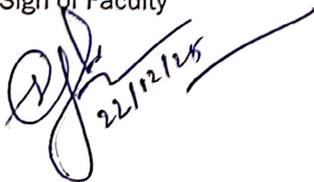
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I/c HOD (Electrical Dept)

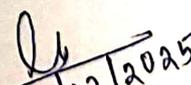22/12/2025

LESSON PLAN
GOVT POLYTECHNIC KALAHANDI, BHAWANIPATNA

Faculty Name: Kambhudeep Bag   **BRANCH:** ELECTRICAL   **SEM:** 4TH   **SESSION:**2025-26(W)

SUBJECT: LINEAR CONTROL SYSTEMS LAB	No. of days/ week Class allotted: 4 Total Periods: 60	w.e.f.22-12-2025to18-04-2026
Week	**Class Period**	**Theory**
1st	1st 2nd	To study speed Torque characteristics of • AC servo motor • DC servomotor.
	3rd 4th	To study speed Torque characteristics of • AC servo motor • DC servomotor.
2nd	1st 2nd	To study and demonstrate • Simplemotor driven closed loop DC position control system. • Simple closed loop speed control system.
	3rd 4th	To study and demonstrate • Simplemotor driven closed loop DC position control system. • Simple closed loop speed control system.
3rd	1st 2nd	To study the lead, lag, lead-lag compensators and to draw their magnitude and phase plots.
	3rd 4th	To study the lead, lag, lead-lag compensators and to draw their magnitude and phase plots.
4th	1st 2nd	To study behavior of 1st order, 2nd order type 0, type 1 system. • Step, ramp and Impulse response of first order systems. • Step, ramp and Impulse response of second order
	3rd 4th	To study behavior of 1st order, 2nd order type 0, type 1 system. • Step, ramp and Impulse response of first order systems. • Step, ramp and Impulse response of second order
5th	1st 2nd	To study • DC potentiometer as error detector. • Synchro transmitter/receiver
	3rd 4th	To study • DC potentiometer as error detector. • Synchro transmitter/receiver
6th	1st 2nd	To study temperature control system
	3rd 4th	To study temperature control system
7th	1st 2nd	Different Toolboxes in software,

	3rd 4th	Different Toolboxes in software,
8th	1st 2nd	Introduction to Control Systems Toolbox
	3rd 4th	Introduction to Control Systems Toolbox
9th	1st 2nd	Determine transpose, inverse values of given matrix
	3rd 4th	Determine transpose, inverse values of given matrix
10th	1st 2nd	Plot the pole-zero configuration in s-plane for the given transfer function.
	3rd 4th	Plot the pole-zero configuration in s-plane for the given transfer function.
11th	1st 2nd	Plot unit step response of given transfer function and find peak overshoot, peak time.
	3rd 4th	Plot unit step response of given transfer function and find peak overshoot, peak time.
12th	1st 2nd	Plot unit step response and to find rise time and delay time.
	3rd 4th	Plot unit step response and to find rise time and delay time.
13th	1st 2nd	Plot locus of given transfer function, locate closed loop poles for different values of k.
	3rd 4th	Plot locus of given transfer function, locate closed loop poles for different values of k.
14th	1st 2nd	Plot root locus of given transfer function and to find out S, Wd, Wn at given root & to discuss stability
	3rd 4th	Plot root locus of given transfer function and to find out S, Wd, Wn at given root & to discuss stability
15th	1st 2nd	Plot Nyquist plot and identify stability of a system.
	3rd 4th	Plot Bode plot and identify stability of a system

22/12/2025

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22/12/2025

HOD(Electrical)

LESSON PLAN
GOVT POLYTECHNIC, KALAHANDI, BHAWANIPATNA

FACULTY NAME: BHUBANTA KAND   **BRANCH:ELECTRICAL**   **SEM: 6th**   **SESSION:2025-26(S)**

SUBJECT: Project phase ii	No. of days/ week Class allotted: 8 Total Periods: 120	w.e.f. 22.12.2025 to 18.04.2026

Week	Class Day(no. of periods)	Theory
1st	1st (3P)	1. Selection of project assignment & project work
	2nd (2P)	-do-
	3rd (3P)	-do-
2nd	1st (3P)	-do-
	2nd (2P)	-do-
	3rd (3P)	2. Planning and execution of considerations & project work
3rd	1st (3P)	-do-
	2nd (2P)	-do-
	3rd (3P)	-do-
4th	1st (3P)	-do-
	2nd (2P)	3. Quality of performance & project work
	3rd (3P)	-do-
5th	1st (3P)	-do-
	2nd (2P)	-do-
	3rd (3P)	-do-
6th	1st (3P)	4. Providing solution of the problems or production of final product & project work
	2nd (2P)	-do-
	3rd (3P)	-do-
7th	1st (3P)	-do-
	2nd (2P)	-do-
	3rd (3P)	5. Sense of responsibility & project work
8th	1st (3P)	-do-
	2nd (2P)	-do-
	3rd (3P)	-do-
9th	1st (3P)	-do-
	2nd (2P)	6. Self-expression/ communication/ Presentation skills & project work
	3rd (3P)	-do-
10th	1st (3P)	-do-
	2nd (2P)	-do-
	3rd (3P)	-do-
11th	1st (3P)	7. Interpersonal skills/human relations & project work
	2nd (2P)	-do-
	3rd (3P)	-do-
12th	1st (3P)	-do-
	2nd (2P)	-do-
	3rd (3P)	8. Report writing skills & project work
13th	1st (3P)	-do-

LESSON PLAN
GOVT POLYTECHNIC, KALAHANDI, BHAWANIPATNA

Faculty Name: SATYPRAKASH OJHA	BRANCH: ELECTRICAL SEM: 6TH SESSION:2025-26(S)	
SUBJECT: Project phase ii	**No. of days/ week** Class allotted: 8 Total Periods: 120	**w.e.f.** 22.12.2025 to 18.04.2026

Week	Class Day(no of periods)	Theory
1st	1st (3P)	1. Selection of project assignment & project work
	2nd(2P)	-do-
	3rd (3P)	-do-
2nd	1st (3P)	-do-
	2nd(2P)	-do-
	3rd (3P)	2. Planning and execution of considerations & project work
3rd	1st (3P)	-do-
	2nd(2P)	-do-
	3rd (3P)	-do-
4th	1st (3P)	-do-
	2nd(2P)	3. Quality of performance & project work
	3rd (3P)	-do-
5th	1st (3P)	-do-
	2nd(2P)	-do-
	3rd (3P)	-do-
6th	1st (3P)	4. Providing solution of the problems or production of final product & project work
	2nd(2P)	-do-
	3rd (3P)	-do-
7th	1st (3P)	-do-
	2nd(2P)	-do-
	3rd (3P)	5. Sense of responsibility & project work
8th	1st (3P)	-do-
	2nd(2P)	-do-
	3rd (3P)	-do-
9th	1st (3P)	-do-
	2nd(2P)	6. Self-expression/ communication/ Presentation skills & project work
	3rd (3P)	-do-
10th	1st (3P)	-do-
	2nd(2P)	-do-
	3rd (3P)	-do-
11th	1st (3P)	7. Interpersonal skills/human relations & project work
	2nd(2P)	-do-
	3rd (3P)	-do-
12th	1st (3P)	-do-
	2nd(2P)	-do-
	3rd (3P)	8. Report writing skills & project work
13th	1st (3P)	-do-

	2nd(2P)	-do-
	3rd (3P)	-do-
14th	1st (3P)	-do-
	2nd(2P)	9. Viva voce
	3rd (3P)	-do-
15th	1st (3P)	-do-
	2nd(2P)	-do-
	3rd (3P)	-do-

22/12/25

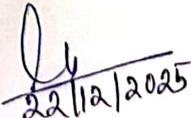Sign of Faculty

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LESSON PLAN
GOVT POLYTECHNIC KALAHANDI, BHAWANIPATNA

Faculty Name: SATYAPRAKASH OJHA **BRANCH: ELECTRICAL** **SEM: 6TH** **SESSION:2025-26(S)**

SUBJECT: RES	No. of days/ week Class allotted: 5 Total Periods: 75	**w.e.f.** 22.12.2025 **to** 18.04.2026

Week	Class Day	Theory
1st	1st	**1.Introduction to Renewable energy:** 1.1. Environmental consequences of fossil fuel use.
	2nd	1.2. Importance of renewable sources of energy.
	3rd	1.3. Sustainable Design and development.
	4th	1.4 Types of RE sources. 1.5. Limitations of RE sources.
	5th	1.6. Present Indian and international energy scenario of conventional and RE sources
2nd	1st	TUTORIAL Chapter 1
	2nd	-do-
	3rd	-do-
	4th	**2.Solar Energy:** 2.1. Solar photovoltaic system-Operating principle.
	5th	2.2. Photovoltaic cell concepts
3rd	1st	2.2.1. Cell, module, array, Series and parallel connections. Maximum power point tracking (MPPT).
	2nd	-DO-
	3rd	-DO-
	4th	-DO-
	5th	2.3. Classification of energy Sources.
4th	1st	2.4. Extra-terrestrial and terrestrial Radiation.
	2nd	-DO-
	3rd	2.5. Azimuth angle, Zenith angle, Hour angle, Irradiance, Solar constant.
	4th	-DO-
	5th	2.6. Solar collectors, Types and performance characteristics,
5th	1st	2.7. Applications: Photovoltaic - battery charger
	2nd	domestic lighting
	3rd	street lighting
	4th	water pumping
	5th	solar cooker, Solar Pond
6th	1st	TUTORIAL Chapter 2
	2nd	-do-
	3rd	**3.Wind Energy:** 3.1. Introduction to Wind energy.
	4th	3.2. Wind energy conversion.
	5th	3.3. Types of wind turbines
7th	1st	3.4. Aerodynamics of wind rotors.
	2nd	3.5. Wind turbine control systems; conversion to electrical power:
	3rd	3.6. Induction and synchronous generators.
	4th	3.7. Grid connected and self excited induction generator operation.
	5th	-DO-
8th	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	TUTORIAL Chapter 3
	5th	-do-
9th	1st	-do-
	2nd	CLASS TEST
	3rd	**4. Biomass Power:** 4.1. Energy from Biomass 4.2. Biomass as Renewable Energy Source
	4th	4.3. Types of Biomass Fuels - Solid, Liquid and Gas.
	5th	-DO-
10th	1st	4.4. Combustion and fermentation.
	2nd	-DO-
	3rd	4.5. Anaerobic digestion.
	4th	4.6. Types of biogas digester
	5th	4.7. Wood gassifier.
11th	1st	4.8. Pyrolysis,.
	2nd	4.9. Applications: Bio gas, Bio diesel
	3rd	-DO-
	4th	TUTORIAL Chapter 4
	5th	-do-
12th	1st	-do-
	2nd	**5.Other Energy Sources** 5.1. Tidal Energy: Energy from the tides, Barrage and Non Barrage Tidal power systems
	3rd	-DO-
	4th	5.2. Ocean Thermal Energy Conversion (OTEC).
	5th	-DO-
13th	1st	5.3. Geothermal Energy – Classification.
	2nd	-DO-
	3rd	5.4. Hybrid Energy Systems.
	4th	-DO-
	5th	-DO-
14th	1st	5.5. Need for Hybrid Systems
	2nd	-DO-
	3rd	5.6. Diesel-PV, Wind-PV, Microhydel-PV.
	4th	-DO-
	5th	-DO-
15th	1st	-DO-
	2nd	TUTORIAL Chapter 5
	3rd	-do-
	4th	-do-
	5th	Doubt clearing Session

Sign of Faculty 22/12/25

P/c HOD (Electrical Dept) 22/12/2025

LESSON PLAN
GOVT POLYTECHNIC KALAHANDI, BHAWANIPATNA

FACULTY NAME: BHUBANTA KAND   **BRANCH: ELECTRICAL**   **SEM: 6th**   **SESSION: 2025-26(S)**

SUBJECT: SGPD	No. of days/ week Class allotted: 5 Total Periods: 75	w.e.f. 22.12.25 to 18.04.26
Week	**Class Day**	**Theory**
1st	1st	**1.INTRODUCTION TO SWITCHGEAR** 1.1 Essential Features of switchgear. 1.2 Switchgear Equipment.
	2nd	1.3 Bus-Bar Arrangement.
	3rd	-do-
	4th	1.4 Switchgear Accommodation. 1.5 Short Circuit.
	5th	1.6 Short Circuit Current
2nd	1st	1.7 Faults in a power system.
	2nd	TUTORIAL CHAPTER 1
	3rd	**2. FAULT CALCULATION** 2.1 Symmetrical faults on 3-phase system.
	4th	2.2 Limitation of fault current. 2.3 Percentage Reactance.
	5th	2.4 Percentage Reactance and Base KVA. 2.5 Short – circuit KVA.
3rd	1st	2.6 Reactor control of short circuit currents. 2.7 Location of reactors.
	2nd	-do-
	3rd	2.8 Steps for symmetrical Fault calculations.
	4th	2.9 Solve numerical problems on symmetrical fault.
	5th	-do-
4th	1st	-do-
	2nd	-do-
	3rd	TUTORIAL CHAPTER 2
	4th	**3. FUSES** 3.1 Desirable characteristics of fuse element.
	5th	3.2 Fuse Element materials.
5th	1st	3.3 Types of Fuses and important terms used for fuses.
	2nd	-do-
	3rd	3.4 Low and High voltage fuses.
	4th	3.5 Current carrying capacity of fuse element. 3.6 Difference Between a Fuse and Circuit Breaker.
	5th	TUTORIAL CHAPTER 3
6th	1st	CLASS TEST I
	2nd	**4.CIRCUIT BREAKERS** 4.1 Definition and principle of Circuit Breaker.
	3rd	4.2 Arc phenomenon and principle of Arc Extinction. 4.3 Methods of Arc Extinction.
	4th	4.4 Definitions of Arc voltage, Re-striking voltage and Recovery voltage.
	5th	4.5 Classification of circuit Breakers. 4.6 Oil circuit Breaker and its classification.
7th	1st	4.7 Plain brake oil circuit breaker. 4.8 Arc control oil circuit breaker.
	2nd	4.11 Air-Blast circuit breaker and its classification.

Week	Period	Content
		4.12 Sulphur Hexa-fluoride (SF6) circuit breaker.
	3rd	4.13 Vacuum circuit breakers.
	4th	4.14 Switchgear component.
	5th	4.15 Problems of circuit interruption
8th	1st	4.16 Resistance switching. 4.17 Circuit Breaker Rating.
	2nd	TUTORIAL CHAPTER 4
	3rd	**5. PROTECTIVE RELAYS** 5.1 Definition of Protective Relay. 5.2 Fundamental requirement of protective relay.
	4th	5.3 Basic Relay operation 5.3.1. Electromagnetic Attraction type 5.3.2. Induction type
	5th	5.4 Definition of following important terms 5.5 Definition of following important terms. 5.5.1. Pick-up current. 5.5.2. Current setting. 5.5.3. Plug setting Multiplier. 5.5.4. Time setting Multiplier.
9th	1st	5.6 Classification of functional relays 5.7 Induction type over current relay (Non-directional)
	2nd	5.8 Induction type directional power relay.
	3rd	5.9 Induction type directional over current relay.
	4th	5.10 Differential relay 5.10.1. Current differential relay
	5th	5.10.2. Voltage balance differential relay. 5.11 Types of protection
10th	1st	TUTORIAL CHAPTER 5
	2nd	**6. PROTECTION OF ELECTRICAL POWER EQUIPMENT AND LINES** 6.1 Protection of alternator. 6.2 Differential protection of alternators.
	3rd	6.3 Balanced earth fault protection.
	4th	6.4 Protection systems for transformer. 6.5 Buchholz relay.
	5th	6.6 Protection of Bus bar.
11th	1st	6.7 Protection of Transmission line. 6.8 Different pilot wire protection (Merz-price voltage Balance system)
	2nd	6.9 Explain protection of feeder by over current and earth fault relay.
	3rd	TUTORIAL CHAPTER 6
	4th	**7. PROTECTION AGAINST OVER VOLTAGE AND LIGHTING** 7.1. Voltage surge and causes of over voltage.
	5th	7.2. Internal cause of over voltage. 7.3. External cause of over voltage (lighting)
12th	1st	7.4. Mechanism of lightning discharge.
	2nd	7.5. Types of lightning strokes.
	3rd	7.6. Harmful effect of lightning.
	4th	7.7. Lightning arresters and Type of lightning Arresters. 7.7.1. Rod-gap lightning arrester. 7.7.2. Horn-gap arrester. 7.7.3. Valve type arrester.
	5th	-do-

		1st	7.8. Surge Absorber
		2nd	TUTORIAL CHAPTER 7
		3rd	**8. STATIC RELAY:**
F			8. 1 Advantage of static relay.
		4th	8. 2 Instantaneous over current relay.
		5th	-do-
14th		1st	8. 3 Principle of IDMT relay.
		2nd	-do-
		3rd	-do-
		4th	TUTORIAL CHAPTER 8
		5th	DOUBT CLEARING CLASS
15th		1st	-do-
		2nd	-do-
		3rd	-do-
		4th	-do-
		5th	CLASS TEST II

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22/12/2025
HOD(Electrical)