Department of Electrical Engineering
Subject Code: EE22841 Subject Name: ELECTRICAL WORKSHOP & DESIGN-II Session: 2022
Faculty:
Lesson Plan

S. No.	Topic	No. of lab required	COs	POs	PSOs
1	INTRODUCTION OF TOOLS, ELECTRICAL MATERIALS, SYMBOLS AND ABBREVIATIONS.	1	CO1	1,2	1
2	TO MAKE T JOINT AND STRAIGHT JOINT.	1	CO1	1	1
3	TO STUDY STAIRCASE WIRING.	1	CO1	2	1
4	TO STUDY HOUSE WIRING.	2	CO1	2	1
5	TO STUDY FLUORESCENT TUBE LIGHT.	2	CO2	3,4	1
6	TO STUDY HIGH PRESSURE MERCURY VAPOUR LAMP (H.P.M.V.).	2	CO3	4	1
7	TO STUDY SODIUM VAPOUR LAMP.	2	CO3	4	1
8	TO STUDY REPAIRING OF COSTING AND ESTIMATION OF THE SYSTEM.	2	CO3	3	2
9	TO STUDY REPAIRING OF FAN MOTOR.	3	CO3	3,4	2
10	TO STUDY THE EARTHING OF THE HOUSES.	1	CO1	3	2

PO Mapping

PO Mapped	COs	no of LAB	% of LAB	Mapping strength
PO1	CO1,CO3, CO4	8	20	1
PO2	CO1,CO2, CO5	9	23	1
PO3	CO2, CO3, CO4, CO5	15	38	2
PO4	CO2, CO3, CO5	13	33	2
PSO1	CO1, CO2, CO3, CO4, CO5	26	65	3
PSO2	CO3, CO4, CO5	11	28	2
PSO3	CO5	3	8	1

Mapping strength Criteria	Level
>=40%	Level-3
25 to 40%	Level-2
5 to 25%	Level-1
<5%	Level-0

Department of Electrical Engineering
EE32008 Electrical Machies-II
Faculty: Mr. Abhishek Dubey
Lesson Plan

S.no	Unit	Topic	No. of lectures	CO	PO	PSO
1	1	Comparative analysis of cylindrical rotor machine and salient pole	1	CO1	PO1	1
2	1	Salient pole machine- Two reaction theory, analysis of phasor diagram,	1	CO1	PO1,PO2	1
3	1	Power angle characteristics of salient pole synchronous machine	1	CO1	PO2	1,3
4	1	Parallel operation of alternators	1	CO1	PO3,PO6, PO7	1,3
5	1	Synchronization of alternators-dark lamp method	1	CO1	PO4	1
6	1	Synchronization of alternators-synchronoscope	1	CO1	PO4	1
7	1	Effect of changing mechanical torque and excitation.	1	CO1	PO4	1,2
8	1	Load sharing between two alternators, Capability curve	1	CO1	PO3,PO7	1,3
9	1	Numerical problems associated with parallel operation of alternators	1	CO1	PO1,PO2	1
10	2	Hunting, damper windings in sychronous machines	1	CO2	PO1,PO2	1
11	2	Various sequence reactance of a synchronous machine-Introduction	1	CO2	PO2	1
12	2	Various sequence reactance of a synchronous machine-Analysis	1	CO2	PO2,PO4	1,2
13	2	Direct and quadrature axis transient and sub transient reactance	1	CO2	PO2,PO4	2
14	2	Negative sequence reactance and zero sequence reactance and their utility,	1	CO2	PO2,PO4	2
15	2	Slip test -determination of xd and xq	1	CO2	PO3	2
16	2	Numerical problems associated with various reactances of synchronous machines	1	CO2	PO2,PO3	1
17	3	Operation of induction motor on unbalanced supplies and Non- Sinusoidal supplies- Introduction	1	CO3	PO2	1
18	3	Operation of induction motor on unbalanced supplies and Non- Sinusoidal supplies- Analysis	1	CO3	PO2,PO4	1,2
19	3	Production of time and space harmonics and their effect -Introduction	1	CO3	PO3	1
20	3	Production of time and space harmonics and their effect -Analysis	1	CO3	PO3	1,3

21	3	Harmonic torques, motor de-rating,	1	CO3	PO4	1,3
22	3	Slip-power recovery schemes for three phase induction motor	1	CO3	PO2,PO4	1
23	3	Numerical problems based on analysis of three phase induction motor	1	CO3	PO2	1
24	4	Introduction to special motors and fractional HP motors and their applications	1	CO4	PO1,PO2	1,2
25	4	Single phase induction motor operation- double revovling theory	1	CO4	PO2	1,2
26	4	Single phase motors- methods of starting	1	CO4	PO2,PO3	1
27	4	Equivalent circuit and its analysis with example	1	CO4	PO2,PO4	1,2
28	4	Principle and working of stepper motors,	1	CO4	PO1,PO2	1
29	4	Various construction techniques, control of stepper motors,	1	CO4	PO3, PO4	1
30	4	Static and dynamic characteristics	1	CO4	PO2, PO3	1
31	4	Constructional features, analysis and operation of AC series motor,	1	CO4	PO1,PO2	1
32	4	Application of AC series motor, Universal Motor	1	CO4	PO2	1,2
33	4	Numerical problems based on analysis of speacial motors	1	CO4	PO2, PO6	1
34	5	Induction machine as a generator- Introduction	1	CO5	PO2	1
35	5	Induction machine as a generator- Constructional features, operating principle	1	CO5	PO2, PO7	2,3
36	5	Characteristics and applications of: Induction generator,	1	CO5	PO4,PO6, PO7	2,3
37	5	Doubly fed Induction Generator, Self-excited induction generator	1	CO5	PO3, PO6	2,3
38	5	Induction machine as an induction regulator	1	CO5	PO3	1
39	5	Numerical problems based on analysis of induction generator	1	CO5	PO2	1
40	5	Numerical problems based on analysis of induction regulator	1	CO5	PO2	1

<div align="center">Total Lectures   40</div>

ELECTRICAL ENGINEERING DEPARTMENT
B.Tech. THIRD YEAR SEM A (4 YDC)
EE 32009: CONTROL SYSTEM

Course Outcomes

EE32009(T).1: Develop mathematics models (TF and state space) of various physical systems.
EE32009(T).2: Define time domain and frequency domain specifications of a control system.
EE32009(T).3: Determine stability of a control system using time domain techniques and design appropriate controller for a given problem.
EE32009(T).4: Propose alternate solution via compensator design to get desired frequency domain specifications.
EE32009(T).5: Explain concepts of controllability and observability as well design of state feedback controller.

Unit No.	Topics	Number of lectures	CO Mapping	PO	PSO
1	Introduction	1	CO1	1	1
	Modelling of Dynamic Systems and Simulation	1	CO1	2,3	1
	concept of transfer function, Block diagram reduction method	1	CO1	2	1
	Signal flow graph method	1	CO1	3,5	1
	Analogue simulation, linearity, impulse response	1	CO1	2	1
	Mason's gain formula	1	CO1	2	1
	a-c and d-c Servomotors, servo-amplifiers (a-c & d-c) using	1	CO1	1,4	1
	Gyro, Resolver component study	1	CO1	4	1

	Topic		CO		
	Concept and mathematical theory of feedback, return ratio, return	1	CO1	3	1
	understanding the necessity of feedback as real control action supplemented by a small example	1	CO1	3	1
2	Time-Domain Analysis of Feedback Control Systems with Typical reference test signals	1	CO2	2	1
	transient behaviour Proportional plus derivative	1	CO2	2	1
	rate feedback control actions for improving the transient response	1	CO2	2,3	1
	Steady state behaviour	1	CO2	2,4	1
	Types of open loop transfer functions, Steady state errors	1	CO2	2	1
	improvement of steady state errors	1	CO2	2,3	1
3	Frequency-Domain Analysis of Feedback Control system	1	CO2	4	1,2
	Concept of frequency-domain analysis, Bode plots	1	CO2,3	3,4	1,2
	Numerical Exmple	1	CO3,4	3,4	1
	Polar plots	1	CO3	4,5	1,2
	Bode of closed loop transfer function Mp	1	CO3,4	3,4	1
	Systems Bode plots of error transfer functions, Principle of	1	CO3,CO4	4	1

	Nyquist criteria	1	CO3	4,5	1
	Conditionally stable closed loop systems	1	CO3	3	1
	Transportation lag, Constant M and constant N loci	1	CO3	5	1
	Root locus and example	1	CO3	3,4	1
4	Compensation Techniques, need, Different types of compensation	1	CO4	4	2
	Phase-lead and Phase-lag compensation	1	CO4	4,5	2
	Design of compensating networks for the desired frequency-domain	1	CO4	3,4	2
	Examples	1	CO4	3,4	2
5	Fundamentals of state space: concept of state and state variable.	1	CO5	1,2	1
	Representation of linear system through state dynamics	1	CO5	1,2	1
	Calculation of Eigen-values and Eigen-vectors	1	CO5	1,2	1
	Modal matrix, Modal transformation	1	CO5	1,2	1
	Elementary understanding controllability and observability,	1	CO5	5	1
	BIBO stability, asymptotic stability	1	CO5	2	1
	Routh-Hurwitz stability analysis	1	CO2,3	2	1

Nyquist stability analysis and relative stability	1	CO2,3	2	1,2	
state feedback control. - concept of stability, gain margin and phase	1	CO3	2,3		1
Total	40				

Department of Electrical Engineering
Subject Code: EE42704 Subject Name: OPTIMIZATION TECHNIQUES APPLIED TO POWER SYSTEM
Session:2021-2022 Faculty: Mr Vineet Mishra
Lesson Plan

S. No.	Topic	No. of lecture required	COs	POs	PSOs
1	Introduction,history & classification of operation research and Optimization techniques	1	CO1	1	1
2	Optimization techniques, Fundamentals of optimization techniques, Definition-Classification of optimization problems	1	CO1	1	1
3	Unconstrained & Constrained Optimization approach with example	2	CO1	1,2	1
4	Formulate various objective function, Definition of optimality, optimality Conditions	2	CO1	1,2	1
5	Classical & Modern optimization techniques	2	CO1	1	1
6	Linear programming: Introduction & definition, Examples of linear programming	2	CO2	1,2	1
7	Simplex Method I, Fundamental of simplex method & theorem of linear programming	2	CO2	1	1
8	Standard & Canonical form of Simplex Method,Weak and strong duality theorems	2	CO2	1	1
9	Analytical & Graphical method of LPP, develop a LP model from problem description.	3	CO2	1,4	2
10	Integer Linear programming problem & Network flow	1	CO2	1,2	2
11	Non-linear Programming: Introduction Comparison of linear & Non-linear programming problem	2	CO3	1	1
12	Unconstrained & Constrained problems of Maxima and Minima, Equality and inequality constraints	2	CO3	1,2	1
13	Lagrangian Method with example	2	CO3	1,2	2

14	Kuhn Tucker conditions with example	2	CO3	1,2	2
15	Genetic Algorithm: Introduction to genetic Algorithm,Working principle of Genetic Algorithm	1	CO4	1	1
16	Evolutionary Strategy and Evolutionary Programming, Genetic Algorithm & Flow chart	2	CO4	1,2,4,12	3
17	Genetic Operators-Selection, Crossover and Mutation fitness function.	2	CO4	1	2
18	Similarities and differences between GA and traditional methods, Unconstrained and constrained optimization using Genetic Algorithm.	2	CO4	1	2
19	Introduction & History of Particle Swarm Optimization, Fundamental Principle- Position & Velocity Updating-Advanced Operators-Parameter selection	2	CO5	1,2	1
21	Particle Swarm Optimization algorithm & Flow chart, Particle Swarm Optimization algorithm including IWA and CFA	2	CO5	1,2,4,12	2
22	Hybrid approaches of Genetic Algorithm & Particle Swarm Optimization, Hybrid of Evolutionary Programming and Particle Swarm Optimization, Binary, discrete and combinatorial.	3	CO5	1,12	3
	Total	**40**			

	B.Tech Third Year (4YDC) Electrical Engineering
	Lesson Plan
	Subject : EE32510 Hybrid Energy System
	Class : B.Tech III Year Electrical

Lect No	Topic	CO
1	Introduction and Fossil fuel based systems	
2	Impact of fossil fuel based systems and environmental effects	
3	Greenhouse gas emission, Non-conventional energy – seasonal variations and availability	CO1
4	Renewable energy – sources and features	
5	Hybrid energy systems,	
6	Distributed energy systems and dispersed generation (DG)	
7	Distributed energy systems and dispersed generation (DG)	
8	Solar radiation spectrum	
9	Technologies and Applications such as heating, cooling, drying, power generation	
10	Solar Photovoltaic systems : Operating principle	
11	Photovoltaic cell concepts	
12	Cell, module, array, Series and parallel connection	CO2
13	Electrical models	
14	Efficiency limits	
15	Maximum power point tracking	
16	Impact of temperature and applications	
17	Grid tied and stand-alone systems	
18	Wind patterns and wind data and Site selection	
19	Types of wind mills	
20	Power in the wind and Betz limit	
21	Wind turbine electrical systems	CO3

		CO3
22	Constant and variable speed models	
23	Characteristics of wind generators	
24	Maximum power point tracking	
25	Interfacing to the grid, grid tied and stand-alone systems.	
26	Energy storage systems.	CO4
27	Operating principle and Components of a microhydel power plant	
28	Types and characteristics of turbines and Selection and modification	
29	Load balancing. Operating principle of biomass,	
30	Combustion and fermentation, anaerobic digester, Wood gassifier, Pyrolysis, application in combustion engine,	
31	stand-alone plants.	
32	Hybrid Energy Systems, block diagram,	CO5
33	Need for Hybrid Energy Systems, Range and type of Hybrid Energy systems	
34	Wind-solar Hybrid stand-alone Energy Systems	
35	Wind-solar Hybrid stand-alone Energy Systems	
36	Wind-Hydro Hybrid stand-alone Energy Systems.	
37	Wind-Hydro Hybrid stand-alone Energy Systems.	
38	Examples	

	B.Tech Third Year (4YDC) Electrical Engineering
	Lesson Plan
	Subject : EE32284 Reliability Engineering
	Class : B.Tech III Year Electrical

Lect No.	Topic	CO
1	Introduction to reliability and indices.	CO1
2	Introduction to reliability and indices.	
3	Review of probability theory.	
4	Review of probability theory.	
5	Density and distribution function of continuous random variable.	
6	Density and distribution function of continuous and discrete random variable.	
7	Density and distribution function of discrete random variable.	
8	Component reliability	CO2
9	Hazard function, failure laws	
10	Exponential failure law	
11	Wear in period and its importance.	
12	Safety and reliability	
13	Replacement	
14	Methods of reliability improvement	
15	Reliability evaluation of series network	CO3
16	Reliability evaluation of parallel network	
17	Reliability evaluation of series–parallel network	
18	Complex network reliability evaluation using event space method	
19	Complex network reliability evaluation using decomposition and tie-set,	
20	Complex network reliability evaluation using cut-set.	
21	Monte carlo simulation technique and convergence in Monte carlo simulation.	
22	Stand by system and load sharing system,	
23	Multi state models.	
24	Markov process, State diagram,	CO4
25	Availability and unavailability function.	
26	Evaluation of time dependent and limiting state probabilities.	
27	MTTF calculation.	
28	Concept of frequency and durations.	
29	State enumeration method for evaluating failure frequency	
30	MUT, MDT,	

31	frequency balance approach.	
32	Practice examples	
33	Practice examples	
34	Reliability testing	CO5
35	estimation of reliability function	
36	failure function and MTTF from grouped data	
37	failure function and MTTF from ungrouped data	
38	censoring and accelerations, parametric methods	
39	Practice examples	
40	Practice examples	

S. No.	Topic	No. of lecture	COs	POs
1	Introduction to Smart Grid	1	CO1	1
2	Definition of smart grid, need for smart grid	1	CO1	1
3	Smart grid domain, enablers of smart grid.	1	CO1	1
4	Smart grid priority areas	1	CO1	1
5	Regulatory challenges	1	CO1	1,2
6	Smart-grid activities in India	1	CO1	1,2,3
7	Smart Grid Architechture	1	CO2	1,3
8	The fundamental components of Smart Grid designs in Transmission Automation	2	CO2	2,3
9	Smart Grid designs in Distribution Automation	2	CO2	2,3
10	General View of the Smart Grid Market Drivers, Stakeholder Roles and Function	2	CO2	2,6
11	Working Definition of the Smart Grid Based on Performance Measures,	2	CO2	2,3,4
12	Representative Architecture, Functions of Smart Grid Components	2	CO2	4,5
13	Computational Techniques – Static Optimization Techniques for power applications such as Economic load dispatch	2	CO3	4,5
14	Dynamic Optimization Techniques for power applications such as Economic load dispatch	2	CO3	4,5
15	Computational Intelligence Techniques – Evolutionary Algorithms in power system	2	CO3	4,5
16	Artificial Intelligence techniques and applications in power system.	2	CO3	4,5
17	Introduction to Communication Technology, Two Way Digital Communications Paradigm,	2	C04	6,7
18	Synchro Phasor Measurement Units (PMUs)	2	CO4	3,4
19	Wide Area Measurement Systems (WAMS)	2	CO4	3,4
20	Introduction to Internet of things (IoT)- Applications of IoT in Smart Grid	1	CO4	4,5,6
21	Active distribution networks	2	CO5	3,4
22	Microgrids, distribution system automation	2	CO5	5,6,7
23	Reliability and resiliency studies	2	CO6	3,4

24	Smart city pilot projects, essential elements of smart cities.	2	CO6	11,12
	Total	**40**		

PO Mapping

PO Mapped	COs	no of Lec	% of lec	Mapping strength
PO1	CO1,CO2	7	18	1
PO2	CO1,CO2	10	25	1
PO3	CO1,CO2,CO4,CO5,CO6	16	40	2
PO4	CO2,CO3,CO4,CO5,CO6	21	53	3
PO5	CO2,CO3,CO4,CO5	13	33	2
PO6	CO2,CO4,CO5	7	18	1
PO7	CO4,CO5	4	10	1
PO11	CO6	2	5	1
PO12	CO6	2	5	1
PSO1	CO1,CO2,CO4,CO5,CO6	19	48	3
PSO2	CO1,CO2,CO3	15	38	2
PSO3	CO1,CO4,CO6	6	15	1

Mapping strength Criteria	Level
>=40%	Level-3
25 to 40%	Level-2
5 to 25%	Level-1
<5%	Level-0

Lesson Plan
Subject Name: Power System Planning
Elective-II EE 32603
B.E. III year

Course Outcomes

EE32603(T).1: Use tools to analyze power system planning and load forecasting.
EE32603(T).2: Evaluate the significance of generation planning for power system reliability.
EE32603(T).3: Develop plan for design and calculation of distributed power system.
EE32603(T).4: Evaluate the requirement for interconnected system and expansion of power system under cost consideration and expansion obligations.
EE32603(T).5: Determine load model for reactive power planning of distributed generation system.

Unit	Lecture No.	Topics	Number of lectures	CO Mapping
1	1	Introduction	1	3
	2	National and regional planning,	1	2
	3	structure of power system,	1	2
	4	planning tools, Stages in planning and design,	1	2
	5	power system planning issues,	1	1,2
	6	Load forecasting, forecasting techniques,	1	1
	7	Electricity consumption pattern,	1	1
	8	Peak demand energy forecasting by trend and economic projection methods.	1	1
2	9	Integrated power generation	1	2
	10	co-generation / captive power,	1	2
	11	power pooling and power trading,	1	2
	12	Probabilistic models of generating units,	1	3
	13	Growth rate, Rate of generation capacity,	1	3
	14	Outage performance of system	1	2

		15	System evaluation of loss of load and loss of energy indices,	1	2
		16	Power supply availability assessment.	1	2
3		17	Development of a distribution plan,	1	1,2,3
		18	types of distribution systems arrangements,	1	3
		19	primary distribution design,	1	3
		20	secondary distribution design,	1	3
		21	calculation of distributor sizes,	1	3
		22	Optimal conductor selection,	1	3
		23	Capacitor placement,	1	3
		24	Reconfiguration,	1	3
		25	Substation planning.	1	2
4		26	Multi area reliability analysis,	1	4
		27	Power pool operation and power exchange energy contracts,	1	2,4
		28	Quantification of economic and reliability benefits of pool operation.	1	5
		29	Power System expansion planning methods	1	4
		30	optimal Power system expansion planning	1	4
		31	generation expansion	1	4
		32	transmission and distribution expansion	1	4
		33	cost consideration and expansion obligations	1	5
		34	Regulatory Incentives	1	5
5		35	Static and dynamic resource allocation and sizing	1	5
		36	modeling and economic issues pertaining to reactive power planning,	1	5
		37	planning from the distributed power system performance	1	4
		38	distributed generation,	1	3
		39	effect of load model in distributed generation planning	1	2
		40	research trends in power system planning	1	2

	Shri G.S. Institute of Technology and Science, Indore (MP)
	Department of Electrical Engineering
	EE32005: Microprocessor and Operating System

Lecture Plan

Lect#	Unit#	learning contents	CO
1	1	Register transfer, Bus and Memory Transfer,	CO1
2		Arithmetic micro-operations, Four-bit arithmetic circuit,	
3		logic micro-operations, Shift micro-operation.	
4		Single stage of ALU. Evolution and development of microprocessor,	
5		internal organization of 8-bit microprocessor 8085,	
6		System clock, bus cycle, timing diagram	
7	2	Types of main memory,	CO2
8		RAM/ROM interface and addressing decoding technique.	
9		Memory Mapped I/O and Peripherals I/O	
10		Serial I/O	
11		Serial I/O	
12	3	Software model, addressing modes,	CO3
13		instruction set, assembly and machine language programming,	
14		instruction set, assembly and machine language programming,	
15		Counters, Time delays.	
16		Counters, Time delays.	
17		Stack	
18		Subroutines	
19		Interrupts	
20		Interrupts	
21	4	Programmable Peripheral Interface(8255),	CO4
22		Programmable Peripheral Interface(8255),	
23		Programmer timer(8254)	
24		Keyboard and Display controller(8279)	
25		ADC/DAC	
26		DMA controller(8237),	
27	5	Types of operating system, services,	CO5
28		utilities, system calls	
29		Disk allocation methods,	
30		disk schedulers	
31		Case study of UNIX and DOS.	
32		Process Concept, Scheduling concept	
33		Types of Schedulers, Process State Diagram, Scheduling Algorithms	
34		Paging Segmentation, Paged Segmentation	
35		Demand Paging	