SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
(Engineering College), VIDISHA M.P.
(An Autonomous Institute Affiliated to RGPV Bhopal)
Department of Electrical Engineering

Semester/Year		IV /II	Program		B.Tech
Subject Category	DC	Subject Code:	EE-402	Subject Name:	Electro Mechanical Energy Conversion. – II

Maximum Marks Allotted							Contact Hours			Total Credits
Theory			Practical			Total Marks				
ES	MS	Quiz	ES	LW	Quiz		L	T	P	
60	20	20	30	20		150	3	-	2	4

Prerequisites:

Knowledge of AC & DC Machines and fundamentals of AC & DC Circuits**.**

Course Objective:

1. To explain basic principle and operation of a synchronous motor.
2. Analysis of electrical machines using generalized theory.
3. Constructional features, operating principle, characteristics and applications of special induction machine

Course Outcomes:

At the end of this course, students will demonstrate the ability to:

CO1. Analyze the constructional features of polyphase synchronous machines and explain their operating principles, excitation systems. Derive the EMF equation, equivalent circuit model, and phasor diagram for cylindrical rotor and salient pole of synchronous machines and apply the two-reaction theory of salient pole synchronous machines.

CO2. Understand the voltage regulation and V-curves and inverted V-curves, analyze synchronizing methods for synchronous alternator, starting methods synchronous motors.

CO3. Understand the parameters of synchronous machines, analyze 3-phase short circuit oscillograms and perform slip tests and measure positive, negative, and zero sequence reactances.

CO4. Understand the basics and principles for the development of a generalized approach, apply the concepts of speed, transformer voltage, electrical torque, Kron's Primitive machine model, Park's and inverse Park's transformations for analyzing electrical machines.

CO5. Analyze the constructional features and operating principles of induction generators, synchronous induction motors, LIM, and eddy current slip coupling.

Units	Descriptions	Hrs.	CO's
I	Polyphase Synchronous Machines**:** Constructional features. Excitation systems, emf equation, equivalent circuit model and phasor diagram for cylindrical rotor machine, Salient pole machines: Two reaction theory, Power angle equations and characteristics.	8	CO1
II	Methods of voltage regulation, Synchronizing methods, Starting methods of synchronous motor, V-curves, inverted v-curve, synchronous condenser, damper winding and hunting effects.	8	CO2
III	Parameters of synchronous machines, Analysis of 3-ϕ, short circuit oscillogram, slip test, measuring method of positive, negative and zero sequence reactances.	8	CO3

IV	Generalized theory of Electrical Machines: Basics for development of generalized approach for analysis of electrical machines, Kron's Primitive machine, Concept of speed and transformer voltage, development of electrical torque, Park's and Inverse Parks transformation.	8	CO4
V	Constructional features, operating principle, characteristics and applications of special induction machine: Induction generator, Synchronous induction motor, Linear induction motors, Eddy current slip coupling.	8	CO5
Expert Lecture			
Total Hours		40	

Suggestive list of experiments:

1) To determine the voltage regulation of alternator by synchronous impedance method. (CO2)
2) To plot the V-curves of a synchronous motor at no load. (CO2).
3) To perform the parallel operation of alternator with the existing bus-bar. (CO2)
4) To determine direct axis reactance (X_d) and quadrature axis reactance (X_q) of salient pole synchronous machine by slip test. (CO3)
5) Analysis of 3 phase short circuit fault of an alternator and determination of different reactance and time constants from oscillogram. (CO3).
6) Demonstration of eddy current clutch/ slip coupling (CO5).
7) Measurement of negative sequence reactance of synchronous machine. (CO3).
8) Measurement of zero sequence reactance of synchronous machine. (CO3).
9) Study of synchronous induction motor (CO5).
10) Study of linear induction motor (CO5).

Text Book-

1. Dr. P.S. Bimbhra, "Generalized Theory of Electrical Machines" Khanna Publishers,fifth Edition, 1995.
2. Dr. P.S. Bimbhra, "Electrical Machinery" Khanna Publishers, seventh Edition ,2007.

Reference Books-

1. Fitzgerald, C.Kingslay, S.D. Umans, "Electric machinery" (5th Ed.), McGraw Hills, 1992
2. GMC pherson and R.D.Laramorl, "An Introduction to Electric Machine & Transformer" (2nd Ed.) John Wiley & Sons, 1990.
3. J.B.Gupta, "Electrical Machines" S.K. Kothari & Sons.
4. Gopal K.Dubey "Fundamentals of Electrical Drives ", Narosa Publishers.
5. Electrical Machines Nagrath & Kothari
6. R K Rajput "Electrical Machine " - Laxmi Publication.

Modes of Evaluation and Rubric

Theory 60	Attendance (10)	Midsem (10 + 10)	Performance (10)	Total (100)
Practical (30)	Attendance (10)	Viva/lab performance (10)		Total (50)

List/Links of e-learning resource

1. NPTEL/ MOOCs
2. https://onlinecourses.nptel.ac.in/noc22_ee06/preview

Recommendation by Board of studies on	7th June 2023
Approval by Academic council on	
Compiled and designed by	Prof. C S Sharma/ Dr. Jitendra K. Tandekar
Subject handled by department	Department of Electrical Engg.

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
(Engineering College), VIDISHA M.P.
(An Autonomous Institute Affiliated to RGPV Bhopal)
Department of Electrical Engineering

Semester/Year		IV/II	Program		B.Tech.
Subject Category	DC	Subject Code:	EE-403	Subject Name:	Digital Electronics

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
ES	MS	Assig	Quiz	ES	LW	Quiz		L	T	P	
60	20	10	10	30	10	10	150	3	0	2	4

Prerequisites:

Mathematics, Basic Physics, Basic Electronics and Logic and Boolean Algebra

Course Objective:

1. The objective of this course is to provide the fundamental concepts associated with the digital logic and circuit design.
2. To familiarize students with the different number systems, logic gates, minimization of logic circuits and combinational and sequential circuits utilized in the different digital circuits and systems.
3. The course will help student to design and analyze the digital circuits and systems.

Course Outcomes:

Upon completion of this course, the student will be able to:

CO1. Understand the different number systems and codes; perform different mathematical operations on them.
CO2. Simplify and analyze the digital logic circuits using Boolean algebra and other mapping techniques.
CO3. Analyze and design different combinational logic circuits using K- Map techniques.
CO4. Analyze and design sequential circuits and their application is registers and Flip-flop.
CO5. Analyse and design different type of asynchronous and synchronous counter.

UNITs	Descriptions	Hrs.	CO's
I	**Introduction to Digital Electronics**: Review of number system and conversions; Binary Arithmetic, Signed and Unsigned representation, Binary codes, Gray Code, Code Conversions, Error detection and correction codes - parity check codes and Hamming code.	8	CO1
II	**Boolean Algebra and Switching Functions -** Study of basic logic gates, Basic postulates and fundamental theorems of Boolean algebra; Standard representation of logic functions - SOP and POS forms; Simplification of switching functions - K-map and Quine-McCluskey tabular methods.	8	CO2
III	**Combinational Logic Modules and their applications**: Adders, Subtractors, Code Converters, parity generators and comparators, Encoders & Decoders, BCD to seven-segment decoder, Multiplexers & Demultiplexers and their applications.	9	CO3
IV	**Sequential Circuits and Systems:** Set-Reset latches and flip flops, D-flip flop, R-S flip-flop, J-K Flip-flop, Master slave Flip flop, edge triggered flip-flop, T flip-flops, Shift registers, classification of shift registers.	7	CO4

V	**Counters classification**: asynchronous counters, synchronous counters, counters design, BCD counter, MOD counters, ripple counter, Introduction to finite state machines.	8	CO4
Expert Lecture		--	
Total Hours		40	

List of Experiments:

1. Implementation of Logic gate on bread board. (CO2)
2. Implementation of Logic function using Gates on bread board. (CO2)
3. Implementation of reduction of Boolean expression using universal gates.(CO2)
4. Implementation of half adder on bread board. (CO3)
5. Implementation of full adder on bread board. (CO3)
6. Converting half adder to half substractor. (CO3)
7. Converting full adder to full substractor on bread board. (CO3)
8. Implementation of 4×1 Multiplexer on bread board. (CO3)
9. Implementation of 3-bit Binary to gray code converter circuit on bead board. (CO3)
10. Analysis of flip-flop using kit. (CO4)
11. Implementation of 7-segment display using up counter. (CO4)
12. Analysis of up and down synchronous/ asynchronous counter using kit. (CO5)

Text Books-

1. "Digital Logic and Computer Design", M. Morris Mano, Pearson Education (PHI).
2. “Fundamentals of Digital Circuits”, A. Anand Kumar, PHI.

Reference Books:

1. “Digital Fundamentals”, T. L. Floyd, Pearson Education.
2. “Digital Electronics, principle and integrated circuits”, Anil K Maini, Wiley Publication.
3. “Digital Electronics”, G.H.Kharate, Oxford, higher Education.

Modes of Evaluation and Rubric

Theory 60	Attendance (10)	Mid Sem (10 + 10)	Performance (10)	Total (100)
Practical (30)	Attendance (10)	Viva/lab performance (10)		Total (50)

List/Links of e-learning resource

https://de-iitr.vlabs.ac.in/
MOOC, NPTL, Coursera

Recommendation by Board of studies on	7th June 2023
Approval by Academic council on	
Compiled and designed by	Dr. Monika Jain
Subject handled by department	Electrical Engg.

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
(Engineering College), VIDISHA M.P.
(An Autonomous Institute Affiliated to RGPV Bhopal)
Department of Electrical Engineering

Semester/Year		IV/II	Program		B.Tech
Subject Category	DE	Subject Code:	EE-404	Subject Name:	Power system -I

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				**Practical**			Total Marks				
ES	MS	Quiz	Assig	ES	LW	Quiz		L	T	P	
60	20	10	10	30	10	10	150	3	0	2	4

Prerequisites:

Fundamental knowledge of Basic Electrical Engineering

Course Objective:

- To understand the structure of Electric power system, generation scenario and different generating plants.
- To inculcate the economic aspects of generating plants.
- To impart knowledge of distribution electric power system and underground cables..

Course Outcomes:

CO1. Awareness of general structure of the power network and the generation sources.
CO2. Illustrate the economic aspects of Generation and economic scheduling.
CO3. Elucidate the knowledge of distribution system.
CO4. Articulate the types of insulators and their application.
CO5. Impart the knowledge of Underground Cables.

UNITs	Descriptions	Hrs.	CO's
I	**Introduction:** Typical Layout of an Electrical Power System, Overview of Generation, Transmission & Distribution, Generation Scenario in India. Generation of Electric Power from Conventional Sources and non Conventional Sources (Hydro, thermal, nuclear, solar, wind etc.)	8	CO1
II	**Economic aspects of Generation and Economic Scheduling**: Introduction, connected load, maximum demand, demand factor, load factor, diversity factor, Load duration curve, Base load and peak load plants. Cost of electrical energy-fixed cost, running cost, Electric Tariff, comparison of cost in various types of power plants, Economic scheduling of power plants.	8	CO2

III	**Distribution system**: Classification of Distribution system, Requirement and design features of distribution systems, Voltage drop calculations in DC distributor fed at one end and both end with equal/unequal voltages, Voltage drop calculations in AC distributors with point and uniform loading.	8	CO3
IV	**Overhead Line Insulators**: Introduction, Types of insulators, Potential distribution over a string of suspension insulators. String efficiency, Methods of equalizing the potential. Testing of insulators.	8	C04
V	**Underground cable**s: Classification of cables, Cable conductor. Insulation resistance of cables, capacitance of single and three core cables, losses and current carrying capacity, Grading of cables.	8	CO5
Expert Lecture			
Total Hours		40	

Suggestive list of Experiments.

1. Study of different types of distribution systems by physical inspection of these systems.(CO3)
2. Study of different types of insulators with ratings. Enumerate the different applications of the different types of insulators, with their properties.(CO4)
3. Study of Underground Cables (CO5)
4. Estimation and Costing of service mains for single face, three face domestic/industrial consumers.(CO3)
5. Study of grading of cables (CO5)
6. Study of generation scenario in India (CO1)
7. Study of comparison of different generating sources specifying efficiency of each.(CO1)
8. Matlab simulation of Economic load dispatch problem with transmission losses (CO2)
9. Matlab simulation of Economic load dispatch Problem without transmission losses(CO2)
10. Study of different types of tariff (CO2)

Text Book-

1. C.L. Wadhwa – Generation, Distribution and Utilization of Electrical Energy, New Age International, Second Edition, 2009.
2. I.J.Nagrath and D.P. Kothari, “Modern Power System Analysis”, Tata McGraw Hill, fourth edition, 2011.

Reference Books-

1. D. Das “Electrical Power Systems”, New Age International Publishers, 2006.
2. Hadi Saadat, “Power System Analysis”, Tata McGraw Hill Edition, 2009.
3. J.J. Grainger and W.D Stevenson, “Power System Analysis”, McGraw Hill, 1994.
4.NPTEL Lecture Series on “Power System Engineering”, S.N. Singh, “Electrical Power Generation, Transmission & Distribution”, PHI Pvt. Ltd.

Modes of Evaluation and Rubric

Theory (60)	Attendance (10)	Mid Sem (10 + 10)	Performance (10)	Total (100)
Practical (30)	Attendance (10)	Viva/lab performance (10)		Total (50)

List/Links of e-learning resource	
NPTEL/Moocs	
Recommendation by Board of studies on	7th June 2023
Approval by Academic council on	
Compiled and designed by	Dr. Shilpi Tomar
Subject handled by department	Electrical Engineering

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
(Engineering College), VIDISHA M.P.
(An Autonomous Institute Affiliated to RGPV Bhopal)
Department of Electrical Engineering

Semester/Year		IV /II		Program		B.Tech					
Subject Category	DL	Subject Code:		EE-406	Subject Name:	MATLAB Programming					
Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
ES	MS	Quiz	Asst.	ES	LW	Quiz		L	T	P	
-	-	-	-	60	20	20	100	-	-	4	2

Prerequisites:

Basic Mathematics, Computer Literacy, Basic Programming Concepts, Basic electrical and Electronics

Course Objective:

1. To get familiar with MATLAB Software, modelling as well as simulation.
2. To introduce the basic tootboxes required in Electrical Engineering.
3. To get familiar with MATLAB Software so that new circuits can be tested before its implementation

Course Outcomes:

On the successful completion of this course student should be able to:

CO1. Students will be able to describe the components of the MATLAB desktop and the types of files used in MATLAB.

CO2. Students will be able to explain the search path in MATLAB and its significance and students will understand the purpose and usage of input-output commands in MATLAB.

CO3. Students will apply their knowledge of MATLAB to perform basic arithmetic operations and generate random numbers

CO4. Students will utilize MATLAB's plotting capabilities to create 2D and 3D plots, and students will analyze and interpret different types of plots in MATLAB, understanding their characteristics and applications.

CO5. Students will assess and critique the tools used in Simulink for power system and electrical drives simulation.

UNITs	Descriptions	Hrs.	CO's
I	Introduction to MATLAB: MATLAB desktop, components of MATLAB desktop, Help Browser, types of files, important commands.	6	CO1
II	MATLAB Basics: MATLAB search path, basic arithmetic operations, display format, generation of random number	6	CO2
III	Operators: Logic operator, Airthematic operator, array, loop, input-output command	6	CO3
IV	Introduction to Plotting: The plot command, 2 dimension plot, 3 dimension plot, Different types of plots	6	CO4
V	Simulink: Introduction of Simulink, various tools used in power system and electrical drives.	6	CO5
Expert Lecture			
Total Hours		30	

Suggestive list of experiments:

1. Introduction of MATLAB and various types of window. (CO1)
2. Plotting of sine and cosine wave. (CO2)
3. Performance of matrix operation using MATLAB. (CO2)
4. Performance of Array, long array, string, array function, array addressing using MATLAB. (CO3)
5. Plotting of sine wave using for loop. (CO3)
6. Designing of RLC circuit using simulink block. (CO5)
7. Program to find the sum of even number using while loop. (CO3)
8. Creation of 2 D and 3 D plots, inserting title, label, grid in the plot. (CO4)
9. Programming to draw the pie chart using MATLAB. (CO4)
10. Program to find current and power in parallel resistive circuit. (CO5)

Text Books-

1. Modelling and Simulation using MATLAB Simulink by Dr. Shailendra Jain, Wiley
2. "MATLAB for Engineers and Scientists" by R.K. Jain, S.R.K. Iyengar, and R. K. Jain., McGraw-Hill.

Reference Books-

1. “Getting Started with MATLAB” by Rudra Pratap,, Oxford University press,1999
2. "MATLAB: A Practical Introduction to Programming and Problem Solving" by Stormy Attaway:
3. "MATLAB for Engineers" by Holly Moore, Salt Lake Community College.
4. "Introduction to Simulink with Engineering Applications" by Steven T. Karris, Orchard Pubns

Modes of Evaluation and Rubric

Practical (30)	Attendance (10)	Viva/lab performance (10)	Total (50)

List/Links of e-learning resource

MOOC, NPTL

Recommendation by Board of studies on	7th June 2023
Approval by Academic council on	
Compiled and designed by	Dr. Monika Jain
Subject handled by department	Electrical Engg.

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
(Engineering College), VIDISHA M.P.
(An Autonomous Institute Affiliated to RGPV Bhopal)
Department of Electrical Engineering

Semester/Year		IV/II	Program		B.Tech
Subject Category	VAO	Subject Code:	EEVA256	Subject Name:	Artificial Intelligence (AI)

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			Total Marks				
ES	MS	Quiz	Assig	ES	LW	Quiz		L	T	P	
-	-	-	-	-	-	-	-	-	-	-	Grade

Prerequisites:

Basic Mathematics, Programming Skills, Probability and Statistics, Linear Algebra, Basic Electrical Engineering, Logic and Reasoning

Course Objective:

1. To provide insight into fundamentals of Artificial Intelligence Techniques to the students.
2. To convey application of Artificial Intelligence techniques in power system.

Course Outcomes:
CO1: Understanding AI Fundamentals, principles, and techniques of AI.
CO2: Knowledge of AI Algorithms and Learning Techniques.
CO3: Students will develop fuzzy logic concepts
CO4: Students will analyze the Genetic Algorithms working and concepts.
CO5: Students will create AI applications in the power system.

UNITs	Descriptions	Hrs.	CO's
I	Artificial Intelligence: History of AI and its Applications , Importance, Definitions, Progress of Artificial Intelligence, Growth of AI, AI and Industry, AI and the world, Current Trends in Applied AI.	6	CO1
II	Artificial Neural Network: Difference between human machine and intelligence, biological neural network, artificial neuron model, Concept of Perceptron, Feedback in Neural Network, Neural Network Architectures: Neural Learning techniques.	6	CO2

III	Fuzzy Logic: Introduction, Foundation of Fuzzy Systems, Representing Fuzzy Elements, Basic Terms and Operations, Properties of Fuzzy Sets, Fuzzification, Arithmetic Operations of Fuzzy Numbers, Defuzzification Methods.	6	CO3
IV	Genetic Algorithms: Introduction, Genetic Algorithms, Procedure of Genetic Algorithms, Genetic Representations, Initialization and Selection, Genetic Operators, Mutation, The Working of Genetic Algorithms.	6	C04
V	Application of AI in Power Systems: Short term and long term load forecasting, Fault location and fault diagnosis, Stability evaluation, Economic load dispatch, Voltage estimation.	6	C05
Expert Lecture			
Total Hours		30	

Text Books-

1. S. Rajashekran, and G.A. Vijaylaksmi Pai., Neural Networks, Fuzzy Logic and Genetic Algorithm Synthesis and Applications, McGraw Hall of India Private Limited, 2007.
2. Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach",Pearson, 4th Edition, 2020.

Reference Books-

1. Amit Konar,"Artificial Intelligence and Machine Learning: Fundamentals, Algorithms, and Applications", CRC Press, 2nd Edition, 2019.
2. Sanjeevikumar Padmanaban, Sivaraman Palanisamy, Sharmeela Chenniappan, Jens Bo Holm-Nielsen,Artificial Intelligence-based Smart Power Systems, Wiley,February 2023.
3. Almoataz Y. Abdelaziz, Anamika Yadav, Shady Hossam Eldeen Abdel Aleem,Artificial Intelligence Applications in Electrical Transmission and Distribution Systems Protection,CRC Press, 2021.

Modes of Evaluation and Rubric

Grade Course

List/Links of e-learning resource

Coursera - Artificial Intelligence by Andrew Ng: https://www.coursera.org/learn/ai-for-everyone

Recommendation by Board of studies on	7th June 2023
Approval by Academic council on	
Compiled and designed by	Dr. Shilpi Tomar
Subject handled by department	Electrical Engg. Department

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
(Engineering College), VIDISHA M.P.
(An Autonomous Institute Affiliated to RGPV Bhopal)
Department of Electrical Engineering

Semester/Year	IV/II	Program	B.Tech

Subject Category	HEC	Subject Code:	EEHE-257	Subject Name:	Emotional Intelligence

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				**Practical**			Total Marks				
End Sem	Mid-Sem	Quiz	Assig	End Sem	LW	Quiz		L	T	P	
-	-	-	-	-	-	-	-	-	-	-	Grade

Prerequisites:

The main Pre-requisites are physics, calculus and fundamental of electrical Engg.

Course Objective:

The Learning Objectives of the course are:

- Introduce the concept of emotional intelligence, its models and components.
- Understand the significance of emotional intelligence in self-growth and building effective relationships.
- Identify the measures of emotional intelligence.

Course Outcomes:

At the end of this course, students will demonstrate the ability to:

CO1. Identify and explain the building blocks of emotional intelligence, including self-awareness, self-management, social awareness, and relationship management.
CO2. Acquire strategies and techniques for effective self-management, including managing emotions, anxiety, fear, and anger.
CO3. Develop skills in relationship management, including effective communication, collaboration, teamwork, and conflict management.
CO4. Apply strategies and techniques to develop and enhance emotional intelligence in personal and professional contexts.
CO5. Practice various techniques of relationship management, including displaying empathy, utilizing effective communication, fostering teamwork, resolving conflicts, and employing other relevant strategies.

UNITs	**Descriptions**	**Hrs.**	**CO's**

I	**Fundamentals of Emotional Intelligence** Nature and Significance Models of emotional intelligence: Ability, Trait and Mixed Building blocks of emotional intelligence: self-awareness, self-management, social awareness, and relationship management	6	CO1
II	**Personal Competence:** Self Awareness: Observing and recognizing one's own feelings, Knowing one's strengths and areas of development. Self Management: Managing emotions, anxiety, fear, and anger.	6	CO2
III	**Social Competence** Social Awareness: Others' Perspectives, Empathy and Compassion Relationship Management: Effective communication, Collaboration, Teamwork,and Conflict management	6	CO3
IV	**Emotional Intelligence: Measurement and Development** Measures of emotional intelligence Strategies to develop and enhance emotional intelligence	6	CO4
V	Students will practice self-management techniques to regulate emotions such as (Mindfulness, Conditioned relaxation response, Boundary setting, Any other) Students will practice various techniques of relationship management such as engaging with: (Display of empathy, Effective communication, Teamwork, Conflict resolution and Any other	6	CO5
Expert Lecture			
Total Hours		30	

TEXT BOOKS:

1. Bar-On, R., & Parker, J.D.A.(Eds.) (2000). The handbook of emotional intelligence. San Francisco, California: Jossey Bros.
2. Goleman, D. (2005). Emotional Intelligence. New York: Bantam Book.

REFERENCE BOOKS: BOOKS:

1. Singh, D. (2003). Emotional intelligence at work (2 nd ed.) New Delhi
2. HBR's 10 Must Reads on Emotional Intelligence (2015)
3. HBR's 10 Must Reads on Managing Yourself (2011)
4. Self Discipline: Life Management, Kindle Edition, Daniel Johnson.
5. Sternberg, R. J. (Ed.). (2000). Handbook of intelligence. Cambridge University Press.

Modes of Evaluation and Rubric

Grade course

List/Links of e-learning resource	
https://archive.nptel.ac.in/courses/108/105/108105159/	
Recommendation by Board of studies on	7th June 2023
Approval by Academic council on	
Compiled and designed by	Dr. Jeetendra Prasad
Subject handled by department	Electrical Engg. Deptt.