IPS Academy, Institute of Engineering & Science

(A UGC Autonomous Institute, Affiliated to RGPV, Bhopal)

Scheme Based on AICTE Flexible Curricula (B. Tech)

Electrical and Electronics Engineering Department

(For Batches admitted in 2022-23)

VI Semester

w.e.f. July 2023

S. No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours/ Week			Total Credits
				Theory			Practical						
				End Sem.	Mid Sem. Exam	Quiz/ Assignment	End Sem.	Lab Work & Sessional		L	T	P	
1	PCC-EE13	PCC	Power Electronics	60	25	15	-	-	100	2	1	-	3
2	PCC-EE14	PCC	Power System-II	60	25	15	-	-	100	2	1	-	3
3	PCC-EE15	PCC	Power system Protection	60	25	15	-	-	100	2	1	-	3
4	PCC-EE16	PCC	Computer Network	60	25	15	-	-	100	2	-	-	2
5	HSMC-HS06	HSMC	Humanities and Social Sciences Open Courses - II	60	25	15	-	-	100	2	-	-	2
6	IOC-CS-05	IOC	Interdisciplinary Open Course-I	60	25	15	-	-	100	3	-	-	3
7	LC-EE13(P)	LC	Power Electronics Lab	-	-	-	60	40	100	-	-	2	1
8	LC-EE14(P)	LC	Power System-II Lab	-	-	-	60	40	100	-	-	2	1
9	SBC-EE03(P)	SBC	Simulation Lab-II	-	-	-	60	40	100	-	-	2	1
10	PROJ-EE01	PROJ	Minor Project	-	-	-	60	40	100	-	-	4	2
11	LLC03	LLC	Liberal Learning Course -III	-		-	-	-	100	-	-	2	1
12	MLC04	MLC	Intellectual Property Rights				-	-	100	1	-	-	NC
13	Internship (To be completed anytime during Fifth/Sixth semester 90 hours.)												
Total				**360**	**150**	**90**	**240**	**160**	**1100**				**22**

Humanities and Social Sciences Open Courses – II, HSMC-HS06 (Any One Course)

a) Industrial Psychology
b) Engineering Psychology
c) Engineering Economics
d) Finance for Engineers
e) Stress Management

Interdisciplinary Open Course-I, IOC (Any One Course)

a) Basics of Python
b) JAVA
c) Data Science
d) Higher Mathematics (Operation Research)

Liberal learning Course-III, LLC-LLC03 (Any One Course)

a) Sociology
b) Interior Design
c) Graphic Design
d) Animation
e) Corporate Culture

Simulation Lab, SBC-EE03(P) (Any One Course)

a) MATLAB
b) Electrical CAD Lab
c) PSIM

1 Hr. Lecture	1 Hr. Tutorial	2 Hr. Practical
1 Credit	1 Credit	1 Credit

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Electrical and Electronics Engineering Department

Subject Code	Name of the Subject	L:T:P	Credits	Maximum Marks	
				Theory	
PCC-EE13	Power Electronics	2:1:0	3	CIE	ESE
				40	60

Course Objective

i. Acquire knowledge about fundamental concepts and switches used in power electronics
ii. Analyze various AC-DC converter (Rectifier) circuits and understand their applications
iii. Illustrate working principles of various DC-AC converter (Inverters) circuits
iv. Illustrate working principles of various DC-DC converter (Choppers) circuits
v. Illustrate working principles of various AC-AC converter (Cyclo-Converter) circuits

Pre Requisite

Knowledge of Basic Electrical Engineering, Circuit Analysis & Mathematics.

Module 1: **(10 Hrs)**

Power Semiconductor Devices - Advantages and application of power electronic devices, Study of switching devices, Power Diode, SCR, TRIAC, GTO, BJT, MOSFET, IGBT, Static characteristics: SCR, MOSFET and IGBT, Triggering and commutation circuit for SCR, SCR rating & protection of SCR, Design of snubber circuit, heating, cooling & mounting of SCR, series and parallel operation of SCR, String efficiency

Module 2: (10 Hrs)

AC-DC Converters - Operation and analysis of single phase (Half wave & Full Wave) and multiphase (Three Phase) uncontrolled and controlled rectifier circuit with resistive, resistive & inductive load(continuous & non continuous conduction, FW small & very large inductive loads) and RLE Loads, Effect of freewheeling diode and source inductance on performance rectifiercircuits,Comparisonofmid-point&Bridgerectifiercircuits,Harmonicanalysis.

Module 3: (7 Hrs)

DC-AC Converters - Introduction & Classification of inverter, Operating principle, Voltage source & current source inverter, Single phase and three phase bridge inverter, PWM techniques, Multiple PWM, Sinusoidal PWM, modified sinusoidal PWM, Mc- murray& MC murray bed ford inverters, Harmonics analysis and elimination techniques.

Module 4: (7 Hrs)

DC-DC Converters - Introduction of chopper, Basic chopper classification, Step-down and step-up chopper, Steady state analysis of chopper circuits, types of choppers-A, B, C, D and E, Switched mode regulators- Buck, Boost, Buck- Boost regulator, Resonant Converters, Applications-Battery operated vehicles.

Module 5: (6 Hrs)

AC-AC Converters - Single phase and Three phase AC voltage controllers, Control strategy, Power Factor Control, Multistage sequence control, Cyclo converter-Operation, control problems, various power circuits, single phase and three phase cyclo converters, Applications

List of Experiments

1. Plot the VI Characteristics of SCR (Silicon Control Rectifier)
2. Study of Different Commutation Techniques of SCR
3. Study of SCR Triggering circuits
4. Performance evaluation of single phase uncontrolled converter
5. Performance evaluation of single phase controlled converter
6. Toplotwaveformsforoutputvoltageandcurrentof3φSCRHalfControlledConverter
7. To plot waveforms for output voltage and current of 3φ SCR Full Controlled Converter
8. Performance evaluation of Step up Chopper
9. Performance evaluation Study of Series Inverter using SCR's
10. Phase control of TRIAC using DIAC and RC circuit in light dimming circuit.

Course Outcomes: After successful completion of course students will be able to

1. Evaluate the V-I characteristics, turn-on and turn-off methods for SCR.
2. Analyze about AC to DC converter circuits.
3. Analyze operation and control techniques of different power electronic converters.
4. Analyze waveforms exhibited at the input and output ports of the converters.
5. Measure the input and outputs of converters.

Text/ Reference Books:

1. Dr. P. S. Bimbhra, "Power Electronics", Khanna Publishers, 3rd Edition,2003.
2. M D. Singh, K B. Khanchandani, "Power Electronics", Tata McGraw Hill Publishing company limited, 2nd Edition,2006.
3. M H Rashid, "Handbook of Power Electronics", Pearson Education India,2008.
4. C. M. Pauddar, "Semiconductor Power Electronics (Devices and Circuits)", 1st Edition, Jain Brothers New Delhi,1999.
5. Joseph Vithayathil, "Power Electronics, Principles and Applications", McGraw Hill Series, 6th Reprint,2013.
6. L. Umanand, "Power Electronics Essentials and Applications", Wiley,2010.
7. Ned Mohan Tore. M. Undel and, William. P. Robbins, 'Power Electronics: Converters,ApplicationsandDesign',JohnWileyandsons,3rdedition,2003.
8. Sen, P.C., "Power Electronics", Tata McGraw Hill Publishing Company limited, 1ndEdition,2001.

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Subject Code	Name of the Subject	L:T:P	Credits	Maximum Marks	
				Theory	
PCC-EE14	Power System -II	2:1:0	3	CIE	ESE
				40	60

Course objective: To familiarize the students with the problems associated with modern interconnected power system, Load flow analysis and stability.

Prerequisite: Power System-I, electrical machines.

Module 1 (8 hrs.)

General - Problems associated with modern interconnected power Systems, deregulation, power systems restructuring, distributed generation, congestion, available transfer capability. Reactive power capability curve of alternator

Module2 (10 hrs.)

Power flow studies - Formulation of static power flow equations and solutions using Gauss Seidel, Newton Raphson, comparison of these methods, Economic operation of power system – Economic dispatch, line loss, ITL, economic dispatch uses Lagrangian multiplier method.

Module 3 (10 hrs.)

MW Frequency control- Fundamental of Speed Governing, Modeling of Speed Control Mechanism, Primary ALFC, Closing of ALFC, Static & Dynamic Response to Primary ALFC, Speed Control Characteristics ,Fundamental of AGC,AGC in Isolated & Interconnected Power Systems, Modeling of the Tie line, Static & Dynamic response of two area system, Economic dispatch Control.

Module 4 (8 hrs.)

Reactive Power & Voltage control –Protection & Absorption of Reactive Power Method of Voltage Control, Static VAR systems, Different types, Application, characteristics, characteristics of an excitation system, DC AC and static excitation system, General block diagram representation of voltage regulators

Module 5 (8 hrs.)

Power System Stability - Steady state, dynamic and transients stability, Swing equation, equal area criterion, solution of swing equation using step by step method, methods of improving transient stability.

Course Outcomes: After successful completion of course students will be able to

CO 1: Able to understand the Problems associated with modern interconnected power Systems.
CO 2: Evaluate the Power flow through different Power flow tech
CO 3: Explain MW Frequency control, methods for economic load dispatch and unit commitment
CO 4: Explain MVAR Voltage control Problem-.
CO 5: Analyze the performance of single and multi-machine systems under transient, steady state and dynamic conditions

List of Experiments (Expandable)

1. To develop a program in MATLAB for information of Y-bus matrix for N bus system.
2. Load flow solution for 3-bus system using Gauss- Seidel, Newton Raphson and FDLF methods up to 3 iteration.
3. Load flow solution for IEEE 6-bus and 30-bus system in MATLAB using Newton Raphson method.
4. Assessment of transient stability of a single machine system.
5. Effect of compensation on voltage profile of IEEE 6-bus system.
6. Study of software tool PSCAD.

Text/ Reference Books:

1. I.J. Nagrath& D.P. Kothari , Modern Power System Analysis, Tata Mc Graw – Hill Publication Company Ltd 2nd edition.
2. C.L.Wadhwa, Electrical Power Systems, New Age International (P) Limited Publishers, 2^{nd}edition 1998.
3. Elgerd O.I., "Electric Energy Systems Theory", TMH, New Delhi, Second Edition1983.
4. R Bergin Vijay Vittal ,Power system analysis, Prentice Hall
5. L L Lai ,Power system restructuring and deregulation, John Welly and sons

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Subject Code	Name of the Subject	L:T:P	Credits	Maximum Marks	
				Theory	
PCC-EE15	Power System Protection	2:1:0	3	CIE	ESE
				40	60

Course Objective: To understand the need of protection of electric equipment and their protection schemes.

Pre Requisite: - Power System-I, Power System-II

Module -1: (10 Hours)

Fault Analysis Faults in power systems, single line diagram, equivalent impedance diagram, per unit reactance. Analysis (using matrices) of power systems by symmetrical components under: (a) Three phase short circuit. (b) Line to line fault. (c) Line to ground fault. (d) Double line to ground fault. Sequence networks and their inter connections for different types of faults, effects of fault impedance. Current Limiting Reactors: Applications, types, construction and location of current limiting reactors, short circuit calculation using reactors.

Module -2: (10 Hours)

Relays:General considerations, sensing of faults, construction of electro-magnetic attraction and induction types relays, Buchholz and negative sequence relay, concept of reset, pick up, inverse time and definite time characteristics, over current , over voltage, directional, differential and distance relays on R-X diagram. Static Relays: Introduction, advantage and limitation of static relays, static over current, directional, distance and differential relays.

Module -3: (10 Hours)

Protection Types & detection of faults and their effects, alternator protection scheme (stator, rotor, reverse power protection etc.). Power transformer protection (external and internal faults protection), generator-transformer unit protection scheme, bus bar protection. Transmission line protection (current/time grading, distance), Pilot relaying schemes, power line carrier protection.

Module -4: (8 Hours)

Switchgear Theory of current interruption- energy balance and recovery rate theory, arc quenching, recovery and restriking voltages. Types of circuit breakers, bulk oil and minimum oil, air break and air blast, sulphurhexafluride (SF6) and vacuum circuit breakers. Rating selection and testing of circuit breakers/operating mechanisms. LT switchgear, HRC fuses, types construction and applications..

Module -5: (7 Hours)

Modern Trends In Protection Electronic relays, static relays functional circuits: comparators, level detectors, logic and training circuits, microprocessor and computer based protection schemes, software development for protection, security &reliability,High voltage testing: Testing of insulators

and bushings, testing of isolators and circuit breakers Testing of cables, testing of transformers - testing of surge diverters - radio interference measurements - design, planning and layout of high voltage laboratory.

List of Experiments(Expandable):

1. Determination of drop out factor of an instantaneous over current relay.
2. Determination of operating characteristic of IDMT relay.
3. Study of operating characteristic of differential relay.
4. Study of gas actuated protective relay (Buchholz Relay).
5. Study and operation of static over current relay.
6. Determination of transmission line parameters using MATLAB.
7. Analysis of power system faults (Symmetrical & Asymmetrical) using MATLAB.
8. Study of SF6 circuit breaker.
9. Protectional simulation study of Generator, Transformer protection.
10. Comparative study of different generation of relays

Course Outcomes: After successful completion of course students will be able to

CO1: Ability to find sequence network and their interconnection for different types of fault.
CO2: To find desirable qualities and requirement of protectiverelays.
CO3: Student will understand working and types of circuitbreaker.
CO4: Student will understand the system protection and protection oftransformer.
CO5: Student will understand the surge protection & insulationco-ordination.

Textbooks/References:

1. Van A. R & Warrington C., "ProtectiveRelays: Their Theory and Practice", Vol 1 &2, Chapman and Hall.
2. Badriram, B.H. Vishwakarma, "Power System Protection and Switchgear" New Age International Pvt. Ltd. Publishers, Second Edition 2011.
3. Masson R.J., Art & Science of Protective Relaying.
4. J & P Switchgear handbook RavindraNath B., and Chandar M., Power systems protection and switchgear
5. Rao Sunil S, Switchgear and protection.
6. C.L Wadhwa, "Electrical Power System",6th EditionNew Age International Pvt Ltd Publishers, Second Edition 2010.

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Subject Code	Name of the Subject	L:T:P	Credits	Maximum Marks	
				Theory	
PCC-EE16	Computer Network	2:0:0	2	CIE	ESE
				40	60

Course Objective:-

The course objectives include learning about computer network organization and implementation, obtaining a theoretical understanding of data communication and computer networks, and gaining practical experience in installation, monitoring, and troubleshooting of current LAN systems.

Pre Requisite:-Fundamental knowledge of data transmission.

Module 1(06hrs.)
Introduction to computer network, classification of networks (WAN, MAN, LAN), distributed systems, digital signals and data rates, bit stream, symbols and band rate, transmission media, modems, structure of computer network, circuit, packet, message switching topological design, back bone design OSI, reference model.

Module 2(08hrs.)
Physical and data link layer, bit communication between DTE and DCE, RS232C, novel modem Terminal handling, multiplexing and concentration data link layer service and design issues, errors detection and correction, retransmission strategies, sliding window protocols, satellite and packet radio networks, pure aloha protocols, slotted aloha protocol, satellite networks, reservation aloha protocol, DES, PCEM, packet radio networks.

Module 3(08hrs.)
Network layer, basic design issues, network layer services, connection oriented and connection less services, routing, static multipath, centralized isolated distributed hierarchical broadcast, flow based routing, congestion deadlocks radio concept of Ethernet LAN topology and architecture CSMA/CD protocol, token ring LAN token bus LAN, Fiber optic LAN principle of LAN bridges, transparent bridge source routing bridges, gateway, gateway design issues x25 internet working.

Module 4(08hrs.)
ISDN, B-ISDN and ATM, evolution of ISDN, goal of ISDN services, ISDN system architecture and network terminating devices ISDN interface ISDN signaling, broad band ISDN, A synchronomous transfer modem ATM adaptation layer, transport layer, OSI transport protocol, session layer designing issues, data exchange OSI session layer primitives, transport protocol TCP

Module 5 (08hrs.)

Presentation layer, abstract syntax notation data compressed on oxyptography, application layer OST service elements ACSE and CCR, electronic mail directory services distributed systems, formal protocol modules, network management, mobile networking. Networking Equipments and Monitoring Tools Routers, Modems, Switches, Gateways, online networking monitoring tools, Network security, Proxy Server design.

Course Outcomes:-After successful completion of course students will be able to:

CO1: Build an understanding of the fundamental concepts of computer networking.

CO2: Apply knowledge of different techniques of error detection and correction to detect and solve error bit during data transmission.

CO3: To determine proper usage of the IP address, subnet masks and default gateway in a routed network.

CO4: Students will understand the concepts of some Modern topics (like ISDN services & ATM)

CO5: Ability to discuss about network management, mobile networking, Networking Equipments and Monitoring Tools.

Text/ Reference books:

1. J.F. Kurose and K. W. Ross, "Computer Networking – A top down approach featuring the Internet", Pearson Education, 5th Edition
2. L. Peterson and B. Davie, "Computer Networks – A Systems Approach" Elsevier Morgan Kaufmann Publisher, 5 th Edition.
3. B. A. Forouzan, "Data Communications and Networking", Tata McGraw Hill, 4th Edition
4. Andrew Tanenbaum, "Computer networks", Prentice Hall

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Subject Code	Name of the Subject	L:T:P	Credits	Maximum Marks	
				Theory	
HSMC-HS06	Humanities and Social Science Open Course – II (a) Business Communication	2:0:0	2	CIE	ESE
				40	60

Course Objectives:

The course is designed to hone the communication skills of the students and enable them to be an integral part of the corporate world by providing an overview of prerequisites to business communication.

Course Contents:

Module-I

Communication: It's Interpretation

Basics of Communication: Process, Components and Factors of Communication. Types of Communication, Global Aspects, Ethical Aspects, Legal Aspects, Gender Communication, Communication in Organization, Communication during crisis

Module-II
Communication Core:

Communication Skills for Team and Leadership Effectiveness: Managerial Communication, Organizational Communication, Persuasive Communication, Negotiation Skills, Intercultural Communication Competence

Module- III

Communication and Digitalization:

Email, Phone calls, Video conferencing, Types of instant messaging: SMS, Business Blogs, Facebook, Instagram, Twitter, Linkedin, Snapchat, Telegram and Web chats

Module- IV

Business Correspondence:

Writing Skills in business and public administration in India: Effective writing, Job Application, Bio Data, Curriculum Vitae, Resume, Notice, Agenda & Minutes of meetings, Memorandum

Module–V

Presentation Skills:

Elements of Presentation, Tips for Effective Presentation, Practice and Perform **(**Presentation prepared by the students will be evaluated)

Course outcomes :

CO 1 : To develop knowledge, skills, and judgment around human communication that facilitates their ability to work collaboratively professionally.

CO 2 : To develop an ability to understand the different types of communication and demonstrate an ability to better understand and adapt to others and their behaviors

CO 3 : To apply changes to distinguish mass communication and media in the digital era.

CO 4 : To apply to draft effective business correspondence with brevity and clarity to maintain healthy business relationship

CO 5 : To learn to demonstrate students verbal and non-verbal communication ability through presentations.

Text Books:

1. Professional Communication by Aruna Koneru, Tata McGraw-Hill Publishing Company Limited, New Delhi,2005
2. Effective Technical Communication by M. Ashraf Rizvi, Tata McGraw-Hill Publishing Company Limited, New Delhi,2005
3. Communication Skill for Engineers and Scientist by Sangeeta Sharma and Vinod Mishra, PHI Learning, New Delhi, 2015
4. Business Communication by Dr. V.G. Sadh, Thakur Publications, Lucknow,2013
5. Business Correspondence and Report Writing by R.C. Sharma and Krishna Mohan, Tata McGraw-Hill Publishing Company Limited, New Delhi,2008

Reference Books:

1. Bonet, Diana. The Business of Listening: Third Edition. New Delhi: Viva Books, 2004.
2. Bovee, Courtland L, John V. Thill & Barbara E. Schatzman. Business Communication Today: Tenth Edition. New Jersey: Prentice Hall, 2010
3. Guffey, Mary Ellen. Essentials of Business Writing. Ohio: SouthWestern College Pubg., 2000.
4. Hughes, Shirley. Professional Presentations: A Practical Guide to the Preparation and Performance of Successful Business Presentations. Sydney: McGraw-Hill, 1990
5. Monippally, Matthukutty, M. Business Communication Strategies. New Delhi: Tata McGraw-Hill Publishing Company Ltd., 2001

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Subject Code	Name of the Subject	L:T:P	Credits	Maximum Marks	
				Theory	
IOC – CS 05	Interdisciplinary Open Course-I (a) Data Science	3:0:0	3	CIE	ESE
				40	60

Prerequisite: Basics of Statistics and Probability

Course Objective: The objective of this course is to familiarize students with the roles of a data scientist and enable them to analyze data to derive meaningful information from it.

Course Contents: (40 hrs.)

Module 1: **(06 hrs.)**

Data Science and Big Data Overview: Types of data, Sources of data, Data collection, Data storage and management, Big Data Overview, Characterization of Big data, Drivers of Big Data, Challenges, Big Data Use Cases, Defining Big Data Analytics and examples of its use cases, Data Analytics Lifecycle: Discovery, Data Preparation, Model Planning, Model Building, Communicate Results, Operationalize.

Module 2: **(12 hrs.)**

Advanced Analytical Theory and Methods: Clustering, K-means, Additional Clustering Algorithms, Association Rules, Apriori Algorithm, Applications of Association Rules, Regression, Linear Regression, Logistic Regression, Classification, Decision Trees, Naive Bayes, Additional Classification Methods, Text Analysis, Text Analysis Steps, Determining Sentiments.

Module 3: **(10 hrs.)**

Advanced Analytics-Technology and Tools: Analytics for Unstructured Data Use Cases, MapReduce, Apache Hadoop, Traditional database vs. Hadoop, Hadoop Core Components, HDFS, Design of HDFS, HDFS Components, HDFS Architecture, Hadoop 2.0 Architecture, Hadoop-2.0 Resource Management, YARN.

Module 4: **(08 hrs.)**

The Hadoop Ecosystem: Introduction to Hive, HBase, Hive Use Cases: Face book, Healthcare; Hive Architecture, Hive Components. Integrating Data Sources, Dealing with Real-Time Data Streams, Complex Event Processing, Overview of Pig, Difference between Hive and Pig, Use Cases of Pig, Pig program structure, Pig Components, Pig Execution, Pig data models, Overview of Mahout, Mahout working.

Module 5: **(04 hrs.)**

Introduction to R, Basic Data Analytics Methods Using R, Communicating and Operationalizing an Analytics Project, Creating the Final Deliverables, Data Visualization Basics.

Course Outcome:

1. Demonstrate proficiency with statistical analysis of data.
2. Build and assess data-based models.
3. Execute statistical analyses with professional statistical software.
4. Demonstrate skill in data management.
5. Apply data science concepts and methods to solve problems in real-world contexts and will communicate these solutions effectively

List of Text / Reference Books:

1. EMC Education Services, "Data Science and Big Data Analytics", Wiley, 2015.
2. Judith Hurwitz, Alan Nugent, Fern Halper, and Marcia Kaufman, "Big Data for Dummies", Wiley & Sons,2013.
3. Vignesh Prajapati, "Big Data Analytics with R and Hadoop", Packt Publishing, 2013.
4. David Dietrich, Barry Heller, and Beibei Yang "Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", John Wiley & Sons, Inc.

List of Experiments:

1. Introduction to R tool for data analytics science
2. Basic Statistics and Visualization in R
3. K-means Clustering
4. Association Rules
5. Linear Regression
6. Logistic Regression
7. Naive Bayesian Classifier
8. Decision Trees
9. Simulate Principal component analysis
10. Simulate Singular Value Decomposition

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Subject Code	Name of the Subject	L:T:P	Credits	Maximum Marks	
				Practical	
LC-EE13(P)	Power Electronics Lab	0:0:2	1	CIE	ESE
				40	60-

Course Objective

i. Acquire knowledge about fundamental concepts and switches used in power electronics
ii. Analyze various AC-DC converter (Rectifier) circuits and understand their applications
iii. Illustrate working principles of various DC-AC converter (Inverters) circuits
iv. Illustrate working principles of various DC-DC converter (Choppers) circuits
v. Illustrate working principles of various AC-AC converter (Cyclo-Converter) circuits

Course Outcomes: After successful completion of course students will be able to

1. Evaluate the V-I characteristics, turn-on and turn-off methods for SCR.
2. Analyze about AC to DC converter circuits.
3. Analyze operation and control techniques of different power electronic converters.
4. Analyze waveforms exhibited at the input and output ports of the converters.
5. Measure the input and outputs of converters.

List of Experiments

1. Plot the VI Characteristics of SCR (Silicon Control Rectifier)
2. Study of Different Commutation Techniques of SCR
3. Study of SCR Triggering circuits
4. Performance evaluation of single phase uncontrolled converter
5. Performance evaluation of single phase controlled converter
6. Toplotwaveformsforoutputvoltageandcurrentof3φSCRHalfControlledConverter
7. To plot waveforms for output voltage and current of 3φ SCR Full Controlled Converter
8. Performance evaluation of Step up Chopper
9. Performance evaluation Study of Series Inverter using SCR's
10. Phase control of TRIAC using DIAC and RC circuit in light dimming circuit.

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Subject Code	Name of the Subject	L:T:P	Credits	Maximum Marks	
				Practical	
LC-EE14(P)	Power System-II Lab	0:0:2	1	CIE	ESE
				40	60-

Course objective: To familiarize the students with the problems associated with modern interconnected power system, Load flow analysis and stability.

Course Outcomes: After successful completion of course students will be able to

CO 1: Able to understand the Problems associated with modern interconnected power Systems.
CO 2: Evaluate the Power flow through different Power flow tech
CO 3: Explain MW Frequency control, methods for economic load dispatch and unit commitment
CO 4: Explain MVAR Voltage control Problem-.
CO 5: Analyze the performance of single and multi-machine systems under transient, steady state and dynamic conditions

List of Experiments (Expandable)

1. To develop a program in MATLAB for information of Y-bus matrix for N bus system.
2. Load flow solution for 3-bus system using Gauss- Seidel, Newton Raphson and FDLF methods up to 3 iteration.
3. Load flow solution for IEEE 6-bus and 30-bus system in MATLAB using Newton Raphson method.
4. Assessment of transient stability of a single machine system.
5. Effect of compensation on voltage profile of IEEE 6-bus system.
6. Study of software tool PSCAD.

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Subject Code	Name of the Subject	L:T:P	Credits	Maximum Marks	
				Practical	
SBC-EE03(P)	Simulation Lab-II (a) MATLAB	0:0:2	1	CIE	ESE
				40	60-

Course Objective: To teach students simulation process of different power electronics converter.

Pre Requisite: Power Electronics, Basic MATLAB, PSIM.

List of Experiments

Experiments can cover any of the above topics, following is a suggestive list:

1. Introduction to Basic SIMULINK Modeling & Analysis
2. Introduction of PSIM (Power Simulation Software) for power Electronics
3. Simulation and of Uncontrolled Rectifier Circuits
4. Simulation and of Controlled Rectifier Circuits
5. Simulation of One Quadrant Chopper Circuit
6. Simulation of Fourth Quadrant Chopper Circuit
7. Simulation of Single Phase Half Wave Inverter
8. Simulation of Single Phase Full Wave Inverter
9. Simulation of AC Voltage Controller Circuit using MATLAB & PSIM
10. Simulation and Analysis of Three Phase 120 Degree Inverter Circuit

Course Outcomes:-After successful completion of course students will be able to:
CO1: Analyzing operation of different power electronic converters.
CO2: Analyzing waveforms exhibited at the input and output ports of the converters.
CO3: Measurement of input and outputs of converters

Text/ Reference books:

1 Dr. Shailendra Jain, "Modeling and Simulation using MATLAB - Simulink", 2nd Edition, John wiley& sons.
2 MATLAB and its Applications in Engineering, Raj kumar Bansal, Pearson Publishers, ISBN-10: 8131716813, 2009.
3 MATLAB: An Introduction with Applications, by Amos Gilat, 2nd edition, Wiley,ISBN-13 978-0471694205, 2004.
4 MATLAB: A Practical Introduction to Programming and Problem Solving. Attaway, Stormy, 2012.

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Subject Code	Name of the Subject	L:T:P	Credits	Maximum Marks	
				Practical	
PROJ-EE01	Minor Project	0:0:4	2	CIE	ESE
				40	60-

Course Objectives: The core objective of Minor Project is to establish a solid and well documented foundation for the subsequent phases by completing all necessary research, planning, and design tasks. This includes defining the scope, identifying critical resources and constraints, and finalizing the detailed project plan (including timelines and milestones) to ensure the technical feasibility and strategic alignment of the overall project goals.

Course Outcomes:

1. To understand the mathematical and physical foundations of electronics engineering and how these are used in electronic devices and systems.
2. To critically evaluate alternate assumptions, approaches, procedures, tradeoffs, and results related to engineering problems.
3. To design a variety of electronic and computer-based components and systems for applications including signal processing, communications, computer networks, and control systems.
4. To lead a small team of student engineers performing a laboratory exercise or design project; to participate in various roles in a team and understand how they contribute to accomplishing the task at hand. 5. To use written and oral communications to document work and present project results.

IPS Academy

INSTITUTE OF ENGINEERING & SCIENCE

(A UGC Autonomous Institute affiliated to RGPV)

Electrical and Electronics Engineering Department

Subject Code	Name of the Subject	L:T:P	Credits	Maximum Marks	
				Practical	
LLC03	Liberal Learning Courses-III	0:0:2	1	CIE	ESE
				40	60-

Course Objective: The objective is to develop critically-thinking, interdisciplinary scholars who possess broad domain expertise, utilize evidence-based reasoning to solve complex problems, appreciate and connect diverse cultural and social experiences (including sports) to individual life, and are equipped for global citizenship through effective communication, self-awareness, and a commitment to lifelong learning**.**

Liberal Learning Course (LLC) -III, LLC03 (Any One Course from NCC/NSO/NCA**)**

A. NCC
B. NSO ➢ Any one Sports at State Level
C. NCA
(a) Music
(b) Dance
(c) Photography
(d) Cinematography
(e) Podcasting
(f) Theatre
(g) Painting

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Subject Code	Name of the Subject	L:T:P	Credits	Maximum Marks	
				Practical	
MLC04	Intellectual Property Rights	1:0:0	NC	CIE	ESE
					100

Course Objective:

1. To be familiar with the concept of intellectual property.
2. To be familiar with Purpose and function of trademarks
3. To be familiar with Fundamental of copy right law
4. To clear idea of the trade Secrete.
5. To be familiar with latest development in the field of intellectual property.

Course Content:

Module 1 **(06 Hrs)**

INTRODUCTION TO INTELLECTUAL PROPERTY: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

Module 2 **(06 Hrs)**

TRADE MARKS: Purpose and function of trademarks, acquisition of trade mark rights, protectablematter, selecting, and evaluating trade mark, trade mark registration processes.

Module 3 **(06 Hrs)**

LAW OF COPYRIGHTS: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law. Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer.

Module 4 **(06 Hrs)**

TRADE-SECRETS: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation. Unfair competition: Misappropriation right of publicity, false advertising.

Module 5 **(06 Hrs)**

NEW DEVELOPMENT IN INTELLECTUAL PROPERTY: new developments in trade mark law; copy right law, patent law, intellectual property audits. International overview on intellectual property, international – trade mark law, copy right law, international patent law, and international development in trade secrets law.

Course Outcomes:

At the end of this course student will be able to:

1. Understand the concept of intellectual property.
2. Understand what is trademark and its importance.
3. Understand the law of copyright.
4. Understand how trade secrete help in competitive market
5. Understand the latest trends in intellectual property.

List of Text/Reference Books:

1. Intellectual property right, Deborah. E. Bouchoux, Cengage learning.
2. Intellectual property right – Unleashing the knowledge economy, prabuddha ganguli,Tata McGraw Hill Publishing company ltd.,