EE401U – ELECTRIC DRIVES

Teaching Scheme: 03L, Total: 03 **Credits:** 03
Evaluation Scheme: 30 MSE + 10 ISA + 60 ESE **Total marks:** 100
Duration of ESE: 03 Hrs

COURSE DESCRIPTION:

This course contains different industrial drives, load characteristics, factors for selection of drives depending upon their electrical and mechanical characteristics. The subject also provides the knowledge of solid state microprocessor based electric drives. The course consists of general factors of electrical drives, material classification, temperature rise and rating of machines.

DESIRABLE AWARENESS/SKILLS:

Knowledge of DC Machines, Transformer, AC Machines and Power Electronics.

COURSE OBJECTIVES:

The objectives of the course are to:

1. provide basic knowledge of topology, hardware configuration, control techniques of DC and AC variable speed drives.
2. impart skills to select suitable drive for particular application.
3. develops ability to repair and maintain the drive panels.
4. gives exposure to advanced Electrical Drives.

COURSE OUTCOMES:

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

1. understanding the various concepts used in AC and DC drives.
2. apply the control techniques for AC and DC drives for speed control.
3. analyze the problems of AC and DC drives based on topology.
4. evaluate the control techniques for AC and DC drives.

Course Outcomes (COs) and Program Outcomes (POs) mapping with strength of correlation:

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	1								1				1	2	
2		1		1				1			2		2	1	1
3					2				2			1	2	1	
4			3							1				2	1

1-Weakly correlated **2 - Moderately correlated** **3 - Strongly correlated**

Course Content

Basics of Drives: Types & parts of the Electrical drives, Selection criteria of drives, motor rating, selection based on duty cycle, selection of converter rating, fundamental torque equation, speed torques characteristics DC motor & Induction motor, multi quadrant operation of the drive, classification of mechanical load torques, steady state stability of the drive, constant torque and constant HP operation of the drive, closed loop speed control.

DC Motor Drives: Methods of speed control, starting and breaking operation, single phase and three phase full controlled and half controlled converter fed DC drives, Multi quadrant operation of separately excited DC shunt motor, dual converter fed DC drives, circulating and non – circulating mode of operation, converter fed DC series motor drive, chopper control of DC shunt and series motor drives, four quadrant operation of chopper fed DC shunt motor drive.

Induction Motor Drives: Closed loop speed control of induction motor by stator voltage control, multi quadrant operation of drive with AC voltage controller, phase angle and integral cycle control of stator voltage controlled induction motor drive VSI fed induction motor drive, constant torque (constant E/F and constant V/F), constant HP operation, closed loop speed control block diagram., CSI fed induction motor drive, speed torque characteristics of CSI fed drive, closed loop speed control block diagram, comparison of CSI fed and VSI fed induction motor drive. Analysis of inverter fed induction motor drive using harmonic equivalent circuit, harmonic slip, harmonic torques and losses with inverter fed induction motor. Introduction to field oriented control and direct torque control.

Slip Ring Induction Motor Drives: Chopper controlled resistance in rotor circuit, slip power recovery using converter cascade in rotor circuit, sub synchronous and super synchronous speed control, Kramer speed control, cyclo - converter in rotor circuit.

Synchronous Motor Drives and Brushless DC Drives: VSI fed synchronous motor drives, true synchronous and self-control mode, open loop and closed loop speed control of Permanent Magnet Synchronous Machine, Brushless DC Motor Drives: working principal operation performance advantages and disadvantages.

Text Books:

1. Fundamentals of Electrical Drive, G. K. Dubey, Narosa publication, 2nd edition,2002
2. Electric Drives, N. K. De, P. K. Sen, Prentice Hall of India Eastern Economy Edition
3. Analysis of Thyristor Power Conditioned Motors, S. K. Pillai, University Press,1996
4. Electric Motor Drives – Modeling Analysis and Control, R. Krishnan, Pearson,1st edition,2001

Reference Books:

1. Modern Power Electronics and AC drives, B. K. Bose, Prentice Hall of India, 2001
2. Power Electronics - Converter application, N. Mohan T.M. undeland and W. P. Robbins, John Wiley and sons, 3rs edition, 2002
3. Electrical Drives - Concept and application, Vedam Subramanyam,TMH, 1st edition, 1996

EE402U – POWER SYSTEM OPERATION AND CONTROL

Teaching Scheme: 03L, Total: 03 **Credits:** 03
Evaluation Scheme: 30 MSE + 10 ISA + 60 ESE **Total marks:** 100
Duration of ESE: 03 Hrs

COURSE DESCRIPTION:

This course contains economic load scheduling and dispatch. It also discusses power system operation, voltage and frequency control. It explores the basic concept of voltage stability, voltage collapse.

DESIRABLE AWARENESS/SKILLS:

Knowledge of Electrical Machines and Power System.

COURSE OBJECTIVES:

The objectives of the course are to:

1. study power system operation and control.
2. analyze the stability problem for complex and large capacity units.
3. understand voltage and frequency control,
4. know enhancement of power handling capacity by use of FACTs
5. understand need of reactive power compensation

COURSE OUTCOMES:

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

1. understand the operational constraints (equipment and stability), control objectives and their implementation, under normal and abnormal states of a power system.
2. enable the students to analyze economic dispatch of thermal units and methods of solution, Unit commitment- Solution methods
3. impart the knowledge of automatic generation control and automatic voltage regulation
4. understanding of interchange of power and energy- Economy interchange between interconnected utilities
5. create awareness of power system security -factors affecting power system security - contingency analysis

Course Outcomes (COs) and Program Outcomes (POs) mapping with strength of correlation:

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	1			1						1			1		2
2		2					1				2		3	2	
3		1			1				1				1		2
4			2							2		2	2	2	
5	2			2							1			1	

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

Course Content

Generator Voltage control: Automatic voltage control, generator controllers, Cross coupling between P-F and Q-V control channel, automatic voltage regulator, types of exciters and excitation system, exciter modeling, transfer function modeling for control static performance and dynamic response of AVR loops.

Load Frequency Control: Automatic load frequency control, speed governing system and hydraulic valve actuator for individual generator, turbine modeling, generator and load modeling, transfer function representation of power control mechanism of generator.

Electric Power Control: Concept of control area, division of power system into control areas, load frequency of single area, two area and multi area power system without integral control Advantage of pool operation , tie line bias control area exchange.

Voltage Stability and Compensation: Power system security, Operating stage (state transition diagram), voltage stability, Comparison of angle and voltage stability, reactive power flow and voltage collapse, voltage stability analysis and prevention of voltage collapse. Compensation in power system: load compensation, load ability of compensated and uncompensated over head transmission line, shunt & series compensation of transmission line.

Economic Load Dispatch and Optimal Operation of Power System: Input output characteristics, heat-rate characteristics, Incremental fuel rate and cost, Incremental Production cost, optimum scheduling of generation between different units. (Neglecting transmission losses), Transmission loss as a function of plant generation and incremental transmission loss for optimum economy, calculation of loss coefficients (two plant system), Optimum scheduling of generation between different plant considering transmission loss concept and significance of penalty factor, Automatic load dispatch, function and applications.

Text Books:

1. Modern Power System Analysis,I. J. Nagrath, D. P. Kothari, TMH New Delhi, 2nd edition, 2000
2. Economic Operation of Power System, L. K. Kirchamayor, Wiley Eastern Pvt. Ltd., New Delhi 2009

References:

1. Electric Energy Systems Theory: An Introduction, O. L. Elgerd, McGraw-Hill Book Comp. N.Y.,2nd edition, 2nd edition, 2017.
2. Power System Analysis, Hadi Saadat, WCB/McGraw-Hill International Edition, 1998
3. http://www.nptel.iitm.ac.in/

EE403U A – POWER SYSTEM DESIGN

Teaching Scheme: 03L, Total: 03 **Credits:** 03
Evaluation Scheme: 30 MSE + 10 ISA + 60 ESE **Total marks:** 100
Duration of ESE: 03 Hrs

COURSE DESCRIPTION:

This course contains design aspects of the transmission and Distribution sector. Electric power systems including power flow analysis. The course has abundant information about tender filling requirements of various equipment along with their testing. The course sets high standards in the corporate sector as it deals with on field concepts of power systems.

DESIRABLE AWARENESS/SKILLS:

Knowledge of Power system and switchgear protection

COURSE OBJECTIVES:

The objectives of the course are to:

1. educate students about the process of restructuring of power system
2. familiarize students about the operation of power system
3. teach students about designing concepts
4. gain knowledge of the fundamental concept of protection devices.
5. analyze the terms required for tender filing.

COURSE OUTCOMES:

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

1. analyze the aspects of designing various electrical systems
2. model the distribution systems with complex technical constraints.
3. identify different abnormal conditions and design protection systems.
4. file the tenders for several power system sectors.
5. classify different Earthing systems and design it.

Course Outcomes (COs) and Program Outcomes (POs) mapping with strength of correlation:

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1				1			1						1		2
2	1					3		2			3			1	
3		1			1					1			2		
4			2				1					2			1
5									1					2	

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

Course Content

Design of Transmission System: Selection of insulation parameters, selection of voltage level, choice of type of conductor, Design aspects of Transmission systems. Types of insulators. Distribution of potential over a string of suspension insulators, methods to improve string efficiency.

Design of DC Distribution System: Types of distribution system arrangements, Primary and secondary distribution design, calculation of distribution sizes: voltage drops, efficiency, voltage regulation, types of cables used, design of rural and industrial distribution systems.

Design of Protection Systems: Operating mechanism, ratings and specifications, types of circuit breakers. Operating mechanism, ratings and specifications, types of Lightning Arrestors

Tenders Filing in Power System: Special characteristics to be defined in tender filing of Circuit Breakers, Lightning Arrestors, Transformers, Cables, Shunt Capacitors. Testing of Circuit Breakers, Lightning Arrestors, Shunt Capacitors.

Earthing Systems: Need of Earthing, various ways of Earthing according to voltage levels. Different Earthing done for transmission and distribution lines. Earthing Systems- step potential, touch potential, transfer potential.

Text Books:

1. Restructured Electrical Power System Design, M. V. Deshpande, Tata McGraw Hill, 2014.
2. Power System Analysis and Design, B. R. Gupta, S. Chand & Company, 2005.

Reference Books:

1. Substation Design Equipment, Pratap Singh Satnam, P. V. Gupta,Dhanpat Rai and Sons, 1994
2. Electrical Design-Estimation and Costing, K. B Raina and S. K. Bhattacharya, New age international publishers, 2nd edition, 2007.

EE404U C INDUSTRIAL ELECTRICAL SYSTEMS

Teaching Scheme: 03L, Total: 03 **Credits:** 03
Evaluation Scheme: 30 MSE + 10 ISA + 60 ESE **Total marks:** 100
Duration of ESE: 03 Hrs

COURSE DESCRIPTION:

This course contains Electrical System Components, Residential and Commercial Electrical Systems, Industrial Electrical Systems: HT connection, Industrial Electrical System Automation. Recognize the need for technical change & ability to learn in the broadest knowledge of Technical Advancement in Electrical System.

DESIRABLE AWARENESS/SKILLS:

Knowledge of Electrical Machines and Power Electronics

COURSE OBJECTIVES:

The objectives of the course are to:

1. provide in-depth understanding of Electrical System Components, Residential and Commercial Electrical Systems
2. industrial Electrical Systems: HT connection, industrial substation, transformer selection,
3. role of Engineer in automation
4. advantages of process automation

COURSE OUTCOMES:

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

1. understand the electrical wiring systems for residential, commercial and industrial consumers, representing the systems with standard symbols and drawings, SLD.
2. understand various terms regarding light, lumen, intensity, candle power, lamp efficiency, and specific consumption.
3. understand various components of industrial electrical systems, Industrial loads, Switchgear selection
4. analyze and select the proper size of the transformer.
5. understand Role of in automation, PLC based control system design, Panel Metering

Course Outcomes (COs) and Program Outcomes (POs) mapping with strength of correlation:

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1				2									3		
2					3									2	
3					2									2	
4						2								2	
5						2								1	

1-Weakly correlated **2 – Moderately correlated** **3 – Strongly correlated**

Course Content

Electrical System Components: LT system wiring components, selection of cables, wires, switches, distribution box, metering system, Tariff structure, protection components- Fuse, MCB, MCCB, ELCB, inverse current characteristics, symbols, single line diagram (SLD) of a wiring system, Contactor, Isolator, Relays, MPCB, Electric shock and Electrical safety practices.

Residential and Commercial Electrical Systems: Types of residential and commercial wiring systems, general rules and guidelines for installation, load calculation and sizing of wire, rating of main switch, distribution board and protection devices, earthing system calculations, requirements of commercial installation, deciding lighting scheme and number of lamps, earthing of commercial installation, selection and sizing of components.

Illumination Systems: Understanding various terms regarding light, lumen, intensity, candle power, lamp efficiency, specific consumption, glare, space to height ratio, waste light factor, depreciation factor, various illumination schemes, Incandescent lamps and modern luminaries like CFL, LED and their operation, energy saving in illumination systems, design of a lighting scheme for a residential and commercial premises, flood lighting

Industrial Electrical Systems: HT connection, industrial substation, Transformer selection, Industrial loads, motors, starting of motors, SLD, Cable and Switchgear selection, Lightning Protection, Earthing design, Power factor correction – kVAR calculations, type of compensation, Introduction to PCC, MCC panels. Specifications of LT Breakers, MCB and other LT panel components.

Industrial Electrical System Automation: Study of basic PLC, Role of in automation, advantages of process automation, PLC based control system design, Panel Metering and Introduction to SCADA system for distribution automation

Text Books:

1. S. L. Uppal, G. C. Garg, "Electrical Wiring, Estimating & costing", Khanna publishers, 6th edition, 2008.

Reference Books:

1. K. B. Raina, "Electrical Design, Estimating & Costing", New age International, 1st edition, 2007.
2. S. Singh, R. D. Singh, "Electrical estimating and costing", Dhanpat Rai & Co., 2nd edition, 2010.
3. J. B. Gupta, "Utilization of Electric Power & Electric Traction", S.K. Kataria & Sons, 2nd edition, 2014.
4. H. Joshi, "Residential Commercial and Industrial Systems", Volume I, McGraw Hill Education, 2008.

ET404UY WIRELESS COMMUNICATION TECHNOLOGIES

Teaching Scheme	: 03L+00T; Total: 03	**Credits**	: 03
Evaluation Scheme	: 10 ISA + 30MSE + 60 ESE	**Total Marks**	: 100
ESE Duration	: 03 Hrs		

COURSE DESCRIPTION

This course will explore the basic concepts of wireless communication. It will impart the basic concepts of digital communication. In the course, various concepts of communication systems and information theory are explained. In this course, more emphasis is given on analysis of performance of wireless communication systems. This course is designed to lay the foundation for further studies in areas such as advanced communication systems.

DESIRABLE AWARENESS/SKILLS

Knowledge of analog and digital communication systems and mobile communication

COURSE OBJECTIVES

The objectives of offering this course are to

1. design various wireless networks and perform mini project in recent technologies.
2. gain basic concepts of cellular system, wireless propagation and the techniques used to maximize the capacity of cellular network.
3. understand architecture of Global Systems for Mobile (GSM) and Code Division Multiple Access (CDMA) system.

COURSE OUTCOMES

On the successful completion of this course; student shall be able to

1. analyze radio channel and cellular capacity.
2. gain knowledge of concepts of GSM and CDMA system.
3. evaluate performance of a mobile communication system.
4. demonstrate the understanding of propagation characteristics of wireless channels, attenuation.

COURSE OUTCOMES (COS) AND PROGRAM OUTCOMES (POS) MAPPING WITH STRENGTH OF CO-RELATION

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1						3	2					2	3		1
2		3	2		3					1	1		1	2	3
3							2	3				3	1		2
4	1							3	3	3	3		3	1	2

1-Weakly correlated 2 - Moderately correlated 3 - Strongly correlated

COURSE CONTENT

Overview of Wireless Systems

Introduction, first (1G) and second(2G) generation cellular systems, cellular communication from 1G to 3G,wireless 4G systems, future wireless network, Wireless Local Loop (WLL)

Radio Propagation Characteristics

Models for path loss, shadowing and multipath fading (delay spread, coherence band width, coherence time, Doppler spread), jakes channel model, digital modulation for mobile radio, analysis under fading channels, radio wave propagation

Propagation Characteristics of Mobile Channel

Free-space attenuation, attenuation over reflecting surface, effect of earth's curvature, radio wave propagation, characteristics of wireless channel, multipath delay spread, coherence bandwidth, and coherence time, signal fading statistics, level crossing rate and average fade duration, propagation path-loss models, indoor loss models, fade margin, link margin

Wireless Networks

Wireless Local Area Networks (WLAN), bluetooth, Orthogonal Frequency Division Multiplexing (OFDM), cellular concept: frequency reuse, the basic theory of hexagonal cell layout, spectrum efficiency, Frequency Division Multiplexing (FDM) / Time Division Multiplexing (TDM) cellular systems: channel allocation schemes, handover analysis, Erlang capacity comparison of FDM / TDM systems and cellular Code Division Multiple Access (CDMA)

Universal Mobile Telecommunications System (UMTS)

System features, wireless core network architecture, reference architecture, channel structure, spreading and scrambling, bearer service, quality of service, beyond 3G

Text Books

1. Wireless Communications Principles and Practice, T. Rappaport, 2nd Edition, Pearson Education, 2010
2. Wireless Communications and Networking, V. Garg, 1st Edition, Morgan Kaufmann Publishers, 2007

Reference Books

1. Mobile Cellular Telecommunication Systems, William C.Y. Lee, 2nd Edition, McGraw-Hill, 1995
2. Wireless Communications and Networking, W. Stallings, 2nd Edition, Prentice Hall of India, 2006
3. Wireless Communication Technology, R. Blake and L. Chartrand, 1st edition, McGraw-Hill, 2000

EE406U – ELECTRIC DRIVES LAB

Teaching Scheme: 02P, Total: 02 **Credits:** 01
Evaluation Scheme: 25 ICA + 25 ESE **Total marks:** 50
Duration of ESE: 02 Hrs

COURSE DESCRIPTION:

This course contains different industrial drives, load characteristics, factors for selection of drives depending upon their electrical and mechanical characteristics. The subject also provides the knowledge of solid state microprocessor based electric drives. The course consists of general factors of electrical drives, material classification, temperature rise and rating of machines.

DESIRABLE AWARENESS/SKILLS:

Knowledge of DC Machines and Transformer, AC Machines and Power Electronics

COURSE OBJECTIVES:

The objectives of the course are to:

1. provide basic knowledge of topology, hardware configuration, working principles and control techniques of DC and AC variable speed drives.
2. impart skills to select suitable drives for particular applications.
3. develops the ability to repair and maintain the drive panels.
4. gives exposure to research avenues in the field of Electrical Drives.

COURSE OUTCOMES:

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

1. explain the various concepts used in AC and DC drives.
2. apply the control techniques for AC and DC drives for speed control.
3. solve the problems of AC and DC drives based on topology.
4. evaluate the control techniques for AC and DC drives.

Course Outcomes (COs) and Program Outcomes (POs) mapping with strength of correlation:

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1				2			2			1			3		
2					3									2	
3					2				2		2			2	
4						2		1				3		2	
5						2				2				1	

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

EE406U – ELECTRIC DRIVES LAB

Teaching Scheme: 02P, Total: 02 **Credits:** 01
Evaluation Scheme: 25 ICA + 25 ESE **Total marks:** 50
Duration of ESE: 02 Hrs

The laboratory work should consist of experiments based on theory syllabus of EE401U. Experiments should involve simulation performance/design of practical, result and conclusion based on it. The sample list given below is just a guideline.

1. Speed – torque characteristics of chopper fed D. C. series motor.
2. Closed – loop speed control of chopper fed D. C. drive (simulation).
3. Open loop speed control of single phase full wave, half controlled converter fed D. C. shunt motor.
4. Open loop speed control of single phase full wave, full controlled converter fed D. C. shunt motor.
5. Closed loop speed control of converter fed D. C. drive.
6. Two quadrant single phase converter fed 5 HP DC drive (simulation).
7. Four quadrant single phase converter fed 5 HP DC drive (simulation).
8. Four quadrant chopper fed DC drive (simulation).
9. Speed control of slip-ring induction motor by rotor resistance control.
10. To study VSI fed induction motor drive.
11. Simulation of brushless DC motor drive.
12. Speed control of induction motor drive.
13. Closed loop Speed control of induction motor drive (simulation).

Note:

Guidelines for ICA: Internal Continuous Assessment shall support for regular performance of minimum 10 practical's and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by the student (journal) based on practical performance by the student. The performance shall be assessed experiment wise using internal continuous assessment format (S10).

Guidelines for ESE: The end semester examination(ESE) for the laboratory course of three hrs duration, shall be based on performance in one of the experiments performed by student in the semester followed by sample questions to judge the depth of understanding/knowledge or skill acquired by the student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

EE407U A – POWER SYSTEM DESIGN LAB

Teaching Scheme: 02P, Total: 02 **Credits:** 01
Evaluation Scheme: 25 ICA + 25 ESE **Total marks:** 50
Duration of ESE: 02 Hrs

COURSE DESCRIPTION:

This course contains different industrial drives, load characteristics, factors for selection of drives depending upon their electrical and mechanical characteristics. The subject also provides the knowledge of solid state microprocessor based electric drives. The course consists of general factors of electrical drives, material classification, temperature rise and rating of machines.

DESIRABLE AWARENESS/SKILLS:

Knowledge of DC Machines and Transformer, AC Machines and Power Electronics

COURSE OBJECTIVES:

The objectives of the course are to:

1. provide basic knowledge of topology, hardware configuration, working principles and control techniques of DC and AC variable speed drives.
2. impart skills to select suitable drives for particular applications.
3. develops the ability to repair and maintain the drive panels.
4. gives exposure to research avenues in the field of Electrical Drives.

COURSE OUTCOMES:

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

1. analyze the aspects of designing various electrical systems
2. model the distribution systems with complex technical constraints.
3. identify different abnormal conditions and design protection systems.
4. file the tenders for several power system sectors.
5. classify different Earthing systems and design it.

Course Outcomes (COs) and Program Outcomes (POs) mapping with strength of correlation:

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1				2			2			2			3		
2					3			3				1		2	
3											1			2	
4						2			1					2	
5						2						2		1	

1-Weakly correlated 2 – Moderately correlated 3 – Strongly correlated

EE407U A – POWER SYSTEM DESIGN LAB

Teaching Scheme: 02P, Total: 02 **Credits:** 01
Evaluation Scheme: 25 ICA + 25 ESE **Total marks:** 50
Duration of ESE: 02 Hrs

The laboratory work should consist of experiments based on theory syllabus of EE403U. Experiments should involve simulation performance/design of practical, result and conclusion based on it. The sample list given below is just a guideline.

1. Study on (i) on load Time Delay Relay (ii) off load Time Delay Relay
2. Polarity, Ratio and Magnetization Characteristics Test of CT & PT
3. Testing on (i) Under Voltage Relay and (ii) Earth Fault Relay
4. Study on D C Load Flow
5. Study of A C Load Flow Using Gauss – Seidel Method
6. Study of A C Load Flow Using Newton Raphson Method
7. Study on Economic Load Dispatch
8. Study of Transformer Protection by Simulation
9. Study of Generator Protection by Simulation
10. Study of Motor Protection by Micon Relay
11. Study of Different Characteristics of Over Current Relay

Note:

Guidelines for ICA: Internal Continuous Assessment shall support for regular performance of minimum 10 practical's and its regular assessment. In addition; it shall be based on knowledge/skill acquired and record submitted by the student (journal) based on practical performance by the student. The performance shall be assessed experiment wise using internal continuous assessment format (S10).

Guidelines for ESE: The end semester examination(ESE) for the laboratory course of three hrs duration, shall be based on performance in one of the experiments performed by student in the semester followed by sample questions to judge the depth of understanding/knowledge or skill acquired by the student. It shall be evaluated by two examiners out of which one examiner shall be out of institute.

EE408U – SEMINAR

Teaching Scheme: 02P, Total: 02 **Credits:** 02
Evaluation Scheme: 50 ICA **Total marks:** 50
Duration of ESE: 02 Hrs

The guidelines for seminar are as below:

1. Each Student shall select a topic for seminar which is not covered in the curriculum. Seminar topics should not be repeated and registration of the same shall be done on a first come first serve basis.
2. Topic of Seminar shall be registered within three weeks from commencement of VII Semester and shall be approved by the committee.
3. The three-member committee appointed by Head of the department shall be constituted for finalizing the topics of Seminar-II. Seminar shall be related to the state of the art topic of his/her choice approved by the committee.
4. Each student should deliver a seminar in scheduled period (Specified in time table or time framed by department) and submit the seminar report (paper bound copy/Thermal bound) in following format:

a. Title
b. Abstract
c. Introduction
d. Literature survey
e. Concept
f. Functional and Technical Details
g. Applications
h. Comparison with similar topics / methods
i. Future scope
j. References

ASSESSMENT OF SEMINAR

Guidelines for ICA: ICA shall be based on topic selection, presentation and Seminar report submitted by the student in the form of thermal bound. Assessment of the Seminar for award of ICA marks shall be done jointly by the guide and a departmental committee, as per the guidelines given in Table- B.

Name of Guide: _____

Table-B

Sr No	Name of Studets	Seminar topic	Topic selection	Literature Survey	Report Writing	Depeth of understanding	presentation	Total
			5	5	5	5	5	25

EE409U PROJECT-I

Teaching Scheme: 02P, Total: 02 **Credits:** 02
Evaluation Scheme: 25 ICA + 25 ESE **Total marks:** 50
Duration of ESE: 02 Hrs

The guidelines for Project-I are as below:
1. It is expected that the broad area of Project-I shall be finalized by the student in the beginning of the VII semester / extension of the Minor project undertaken may be Project-I.

2. A group of Minimum 3 and Maximum 5 students shall be allotted for Project-I and same project group for Project-II.

3. Fabrication, design or analysis

4. Approximately more than 50% work should be completed by the end of VII semester.

5. Each student group is required to maintain log book for documenting various activities of Project-I and submit group project report in the form of thermal bound at the end of semester – VII. Submit the progress report in following format:
a. Title
b. Abstract
c. Introduction
d. Problem identification and project objectives
e. Literature survey
f. Case study/Analysis/Design Methodology
g. Work to be completed (Progress status)
h. Expected result and conclusion
i. References.

6. Evaluation Committee comprising of the Guide, Project Coordinator and Expert appointed by the Head of the department will award the marks based on the work completed by the end of semester and the presentation based on the project work.

Guidelines for ICA: The Internal Continuous Assessment shall be based on the active participation of the students in the Project work and knowledge / skill acquired. Assessment of the project-I for award of ICA marks shall be done jointly by the guide and departmental committee as per the guidelines given in Table-A.

Guidelines for ESE: The End Semester Examination for Project shall consist of demonstration if any, presentation and oral examinations based on the project report.

Assessment of Project-I

Name of the Project: _____

Name of the Guide: _____

Table-A

Sr. No.	Name Of Student	Problem identification and project objective	Literature survey	Project methodology/ design / pcb/ hardware/simulation programming	Progress status	Presentation	Total
		5	5	5	5	5	25

EE410U Industrial Lecture

Teaching Scheme: 01L, Total: 01 **Credits:** 01
Evaluation Scheme: 50 ICA **Total marks:** 50
Duration of ESE: 03 Hrs

The guidelines for Industrial lectures are as below:
Industrial lectures are to be arranged to share experiences of eminent industrial Managers/ Engineers/ Entrepreneurs/Scientists/Professors. At least 4 lectures could be arranged for EE459 during the semester and tests may be conducted based on lectures.

1. There is a need to create avenues for close academia and industry interaction through all the phases of technology development, starting from conceptualization down to commercialization.

2. List of renowned persons from industry shall be prepared by the committee appointed by the Head of the department. After approval from the Principal, minimum five Industrial lectures in alternate week shall be arranged. This shall be delivered by the experts/Officials from Industries/Govt. organizations/ Private Sectors/Public Sectors / R&D Labs covering the various aspects.

3. Topics of Industrial Lectures shall be Technical in nature and should not be the specific contents from the curriculum.

4. Minimum five Lectures to be delivered by experts from the industry in alternate weeks.

5. Students shall submit the report based on minimum five lectures giving summary of the lecture delivered.

6. The summary should contain a brief resume of the expert, brief information of his organization and brief summary of the lecture in bullet point form.

Guidelines for ICA : Assessment of the Industrial Lecture for award of ICA marks shall be done jointly by departmental committee as per attendance in industrial lecture, report submitted by student and overall performance in the semester as per the guidelines given in Table- D.

Table-D

SN	Name of Student	Attendance (05 Marks per Lecture)	Dept of understanding (03 Marks per Lecture)	Report	Total
		25	15	10	50