



Indra Ganesan

COLLEGE OF ENGINEERING

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai
Accredited by NAAC with 'B+' Grade, 2(f) & 12B Status Institution by UGC

IG Valley, Madurai Main Road, Manikandam, Tiruchirappalli - 620012

NAAC DOCUMENTS

QUALITY INDICATOR FRAME WORK

CRITERION – 2

TEACHING-LEARNING AND EVALUATION

SUBMITTED BY

IQAC

INTERNAL QUALITY ASSURANCE CELL

INDRA GANESAN COLLEGE OF ENGINEERING





Indra Ganesan
COLLEGE OF ENGINEERING
Madurai Main Road (NH-45B), Manikandam, Tiruchirappalli - 620 012
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Criteria 2	Teaching-Learning and Evaluation	350
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Key Indicator-2.6 Student Performances and Learning Outcome (90)

2.6.1 Programme Outcomes (POs) and Course Outcomes (COs) for all programmes offered by the institution are stated and displayed on website

**DEPARTMENT OF ELECTRICAL & ELECTRONICS
ENGINEERING R2013**

INDRA GANESAN COLLEGE OF ENGINEERING

IG Valley, Manikandam, Tiruchirappalli, Tamil Nadu – 620 012, India
(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai-25)

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

REGULATION -2013

COURSE OUTCOMES

SEM-II

E106- EE6201 Circuit Theory

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
E106.1	Ability to analyze electrical circuits	1,2,3,4,6,10,11,12	1,2
E106.2	Ability to apply circuit theorems	1,2,3,4,6,10,11,12	1,2
E106.3	Ability to analyze transients circuits	1,2,3,4,6,10,11,12	1,2
E106.4	Analyze Phasor diagrams and analysis of three phase circuits	1,2,3,4,6,10,11,12	1,2
E106.5	Acquire the knowledge Power measurement in three phase circuits.	1,2,3,4,6,10,11,12	1,2
E106.6	Analyze Quality factor and Bandwidth	1,2,3,4,6,10,11,12	1,2

Mapping of COs, C, PSOs with POs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
E106.1	3	3	2	2	-	2	-	-	-	2	1	1	2	2
E106.2	3	3	2	2	-	2	-	-	-	2	1	1	2	2
E106.3	3	3	2	2	-	2	-	-	-	2	1	1	2	2
E106.4	3	3	2	2	-	2	-	-	-	2	1	1	2	2
E106.5	3	3	2	2	-	2	-	-	-	2	1	1	2	2
E106.6	3	3	2	2	-	2	-	-	-	2	1	1	2	2
E106	3	3	2	2	-	2	-	-	-	2	1	1	2	2

E109- EE6211 Electric Circuits Laboratory

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
E109.1	Apply circuit theorems and concepts in engineering applications	1,2,3,4,6,10,11,12	1,2
E109.2	Simulate electric circuits	1,2,3,4,6,10,11,12	1,2
E109.3	Design and Simulation of series resonance circuit	1,2,3,4,6,10,11,12	1,2
E109.4	Design and Simulation of parallel resonant circuits	1,2,3,4,6,10,11,12	1,2
E109.5	Simulation and experimental verification of electrical circuit problems using Superposition theorem.	1,2,3,4,6,10,11,12	1,2
E109.6	Simulation and Experimental validation of R-C electric circuit transients	1,2,3,4,6,10,11,12	1,2

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Mapping of COs, C, PSOs with POs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
E109.1	3	3	2	2	-	2	-	-	-	2	1	1	2	2
E109.2	3	3	2	2	-	2	-	-	-	2	1	1	2	2
E109.3	3	3	2	2	-	2	-	-	-	2	1	1	2	2
E109.4	3	3	2	2	-	2	-	-	-	2	1	1	2	2
E109.5	3	3	2	2	-	2	-	-	-	2	1	1	2	2
E109.6	3	3	2	2	-	2	-	-	-	2	1	1	2	2
E109	3	3	2	2	-	2	-	-	-	2	1	1	2	2

SEM-III

E202- EE6301 DIGITAL LOGIC CIRCUITS

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
E202.1	Explain the concepts combinational and sequential Circuits	1,2,3,4,6,10,11,12	1,2
E202.2	Determine Shear force and bending moment in beams and understand concept of theory of simple bending.	1,2,3,4,6,10,11,12	1,2
E202.3	Calculate various number systems and simplify the logical expressions using Boolean functions	1,2,3,4,6,10,11,12	1,2
E202.4	Apply basic various synchronous and asynchronous circuits.	1,2,3,4,6,10,11,12	1,2
E202.5	Analyze sequential circuits and PLDs	1,2,3,4,6,10,11,12	1,2
E202.6	Digital simulation for development of application oriented logic circuits.	1,2,3,4,6,10,11,12	1,2

Mapping of COs, C, PSOs with POs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
E202.1	3	3	2	2	-	2	-	-	-	2	1	1	2	2
E202.2	3	3	2	2	-	2	-	-	-	2	1	1	2	2
E202.3	3	3	2	2	-	2	-	-	-	2	1	1	2	2
E202.4	3	3	2	2	-	2	-	-	-	2	1	1	2	2
E202.5	3	3	2	2	-	2	-	-	-	2	1	1	2	2
E202.6	3	3	2	2	-	2	-	-	-	2	1	1	2	2
E202	3	3	2	2	-	2	-	-	-	2	1	1	2	2



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E203- EE6302 ELECTROMAGNETIC THEORY

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
E203.1	Discuss a basic knowledge the basic mathematical concepts related to electromagnetic vectorfields.	1,2,3,4,9,10,11,12	1,2
E203.2	Explain the basic concepts about electrostatic fields, electrical potential, energy density and their applications	1,2,3,4,6,9,10,11,12	1,2
E203.3	acquire the knowledge in magneto static fields, magnetic flux density, vectorpotential and its applications	1,2,3,4,6,7,9,10,11,12	1,2
E203.4	Describe types the different methods of emf generation and Maxwell's equations.	1,2,3,4,6,10,11,12	1,2
E203.5	the basic concepts electromagnetic waves and characterizing parameters	1,2,3,4,10,11,12	1,2
E203.6	Summarize knowledge on properties and behavior of fluids.	1,2,3,4,10,11,12	1,2

Mapping of COs, C, PSOs with POs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
E203.1	3	3	2	2	-	-	-	-	1	2	1	1	2	2
E203.2	3	3	2	2	-	1	-	-	1	2	1	1	2	2
E203.3	3	3	2	2	-	1	1	-	1	2	1	1	2	2
E203.4	3	3	2	2	-	1	-	-	-	2	1	1	2	2
E203.5	3	3	2	2	-	-	-	-	-	2	1	1	2	2
E203.6	3	3	2	2	-	-	-	-	-	2	1	1	2	2
E203	3	3	2	2	-	1	1	-	1	2	1	1	2	2

SEM- IV

E210 - EE 6401 ELECTRICAL MACHINES – I

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
E210.1	to analyze the magnetic-circuits	1,2,3,4,5,10,11,12	1,2
E210.2	to acquire the knowledge in constructional details of transformers	1,2,3,4,5,10,11,12	1,2
E210.3	Identify the concepts of electromechanical energy conversion	1,2,3,4,5,10,11,12	1,2
E210.4	acquire the knowledge in working principles of DC Generator	1,2,3,4,5,10,11,12	1,2
E210.5	Acquire the knowledge in working principles of DC Motor	1,2,3,4,5,10,11,12	1,2
E210.6	to acquire the knowledge in various losses taking place in D.C. Machines	1,2,3,4,5,10,11,12	1,2

(Signature)
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Mapping of COs, C, PSOs with POs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
E210.1	3	3	2	2	2	-	-	-	-	2	1	1	2	2
E210.2	3	3	2	2	2	-	-	-	-	2	1	1	2	2
E210.3	3	3	2	2	2	-	-	-	-	2	1	1	2	2
E210.4	3	3	2	2	2	-	-	-	-	2	1	1	2	2
E210.5	3	3	2	2	2	-	-	-	-	2	1	1	2	2
E210.6	3	3	2	2	2	-	-	-	-	2	1	1	2	2
E210	3	3	2	2	2	-	-	-	-	2	1	1	2	2

E211 – EE6402 TRANSMISSION AND DISTRIBUTION

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
E211.1	Determine the importance and the functioning of transmission line parameters	1,2,3,4,6,10,11,12	1,2
E211.2	Analyze the concepts of Lines and Insulators.	1,2,3,4,6,10,11,12	1,2
E211.3	To acquire knowledge on the performance of Transmission lines	1,2,3,4,6,10,11,12	1,2
E211.4	To acquire the importance of distribution of the electric power in power system	1,2,3,4,6,10,11,12	1,2
E211.5	To Perceive knowledge on Underground Cabilities	1,2,3,4,6,10,11,12	1,2



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E211.6	To become familiar with the function of different components used in Transmission and Distribution levels of power system and modeling of these components.	1,2,3,4,6,10,11,12	1,2
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Mapping of COs, C, PSOs with POs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
E211.1	3	3	2	2	-	2	-	-	-	2	1	1	2	2
E211.2	3	3	2	2	-	2	-	-	-	2	1	1	2	2
E211.3	3	3	2	2	-	2	-	-	-	2	1	1	2	2
E211.4	3	3	2	2	-	2	-	-	-	2	1	1	2	2
E211.5	3	3	2	2	-	2	-	-	-	2	1	1	2	2
E211.6	3	3	2	2	-	2	-	-	-	2	1	1	2	2
E211	3	3	2	2	-	2	-	-	-	2	1	1	2	2

E212 - EE 6404 MEASUREMENTS AND INSTRUMENTATION

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
E212.1	To acquire knowledge on Basic functional elements of instrumentation	1,2,3,4,6,9,10,11,12	1,2
E212.2	Identify the concepts of Fundamentals of electrical and electronic instruments	1,2,3,4,6,10,11,12	1,2
E212.3	Ability to compare between various measurement techniques	1,2,3,4,10,11,12	1,2
E212.4	To acquire knowledge on Various storage and display devices	1,2,3,4,10,11,12	1,2
E212.5	Explain the understand the concepts Various transducers and the data acquisition systems	1,2,3,4,6,10,11,12	1,2
E212.6	Ability to model and analyze electrical and electronic Instruments and understand the operational features of display Devices and Data Acquisition System.	1,2,3,4,10,11,12	1,2

Mapping of COs, C, PSOs with POs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
E212.1	3	3	2	2	-	2	-	-	2	2	1	1	2	2
E212.2	3	3	2	2	-	2	-	-	-	2	1	1	2	2
E212.3	3	3	2	2	-	-	-	-	-	2	1	1	2	2
E212.4	3	3	2	2	-	-	-	-	-	2	1	1	2	2
E212.5	3	3	2	2	-	2	-	-	-	2	1	1	2	2
E212.6	3	3	2	2	-	-	-	-	-	2	1	1	2	2
E212	3	3	2	2	-	2	-	-	-	2	1	1	2	2



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E208- EE6411 ELECTRICAL MACHINES LABORATORY-I

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
E208.1	Experiment practical knowledge on DC Generator	1,2,3,4,8,9,11,12	1,2
E208.2	.Analyze types of DC Generator	1,2,3,4,8,9,11,12	1,2
E208.3	Demonstrate practical knowledge generators	1,2,3,4,8,9,11,12	1,2
E208.4	Experiment practical knowledge on DC Motors	1,2,3,4,8,9,11,12	1,2
E208.5	Experiment practical knowledge on DC Transformers	1,2,3,4,8,9,11,12	1,2
E208.6	Demonstrate practical knowledge generators & Transformers	1,2,3,4,8,9,11,12	1,2

Mapping of COs, C, PSOs with POs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
E208.1	3	3	2	2	-	-	-	3	3	-	1	1	2	2
E208.2	3	3	2	2	-	-	-	3	3	-	1	1	2	2
E208.3	3	3	2	2	-	-	-	3	3	-	1	1	2	2
E208.4	3	3	2	2	-	-	-	3	3	-	1	1	2	2
E208.5	3	3	2	2	-	-	-	3	3	-	1	1	2	2
E208.6	3	3	2	2	-	-	-	3	3	-	1	1	2	2
E208	3	3	2	2	-	-	-	3	3	-	1	1	2	2

SEM-V

E301- EE6501 POWER SYSTEM ANALYSIS

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
E301.1	Ability to model the power system under steady state operating condition	1,2,3,4,8,10,11,12	1,2
E301.2	Apply iterative techniques for power flow analysis	1,2,3,4,8,10,11,12	1,2
E301.3	Ability to model and carry out short circuit studies on power system	1,2,3,4,8,10,11,12	1,2
E301.4	Ability to model and analyze stability problems in power system	1,2,3,4,8,10,11,12	1,2
E301.5	Ability to acquire knowledge on Fault analysis	1,2,3,4,8,10,11,12	1,2
E301.6	Ability to model and understand various power system components and carry out power flow, short circuit and stability studies	1,2,3,4,8,10,11,12	1,2

Mapping of COs, C, PSOs with POs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
E301.1	3	3	2	2	-	-	-	2	-	2	1	1	2	2
E301.2	3	3	2	2	-	-	-	2	-	2	1	1	2	2
E301.3	3	3	2	2	-	-	-	2	-	2	1	1	2	2
E301.4	3	3	2	2	-	-	-	2	-	2	1	1	2	2

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E301.5	3	3	2	2	-	-	-	2	-	2	1	1	2	2
E301.6	3	3	2	2	-	-	-	2	-	2	1	1	2	2
E301	3	3	2	2	-	-	-	2	-	2	1	1	2	2

E302-EE6502 MICROPROCESSORS AND MICROCONTROLLERS

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
E302.1	Ability to acquire knowledge in Addressing modes & instruction set of 8085 & 8051.	1,2,3,4,10,11,12	1,2
E302.2	Ability to need & use of Interrupt structure 8085 & 8051	1,2,3,4,10,11,12	1,2
E302.3	Ability to understand the importance of Interfacing	1,2,3,4,10,11,12	1,2
E302.4	Ability to explain the architecture of Microprocessor and Microcontroller.	1,2,3,4,10,11,12	1,2
E302.5	Ability to write the assembly language programme	1,2,3,4,10,11,12	1,2
E302.6	Ability to develop the Microprocessor and Microcontroller based applications	1,2,3,4,10,11,12	1,2

Mapping of COs, C, PSOs with POs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
E302.1	3	3	2	2	-	-	-	-	-	2	1	2	2	2
E302.2	3	3	2	2	-	-	-	-	-	2	1	2	2	2
E302.3	3	3	2	2	-	-	-	-	-	2	1	2	2	2
E302.4	3	3	2	2	-	-	-	-	-	2	1	2	2	2
E302.5	3	3	2	2	-	-	-	-	-	2	1	2	2	2
E302.6	3	3	2	2	-	-	-	-	-	2	1	2	2	2
E302	3	3	2	2	-	-	-	-	-	2	1	2	2	2

E304 – EE6503 POWER ELECTRONICS

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
E304.1	Ability to analyse AC-AC AC converters	1,2,3,4,6,7,10,11,12	1,2
E304.2	Ability to analyse DC-DC converters	1,2,3,4,6,7,10,11,12	1,2
E304.3	Ability to analyse DC-AC converters	1,2,3,4,6,7,10,11,12	1,2
E304.4	Ability to choose the converters for real time applications	1,2,3,4,6,7,10,11,12	1,2
E304.5	Ability to analyse Chopper circuits	1,2,3,4,6,7,10,11,12	1,2
E304.6	Ability to analyse Inverters circuits	1,2,3,4,6,7,10,11,12	1,2

Mapping of COs, C, PSOs with POs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
E304.1	3	3	2	2	-	3	2	-	-	3	1	1	2	2
E304.2	3	3	2	2	-	3	2	-	-	3	1	1	2	2

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E304.3	3	3	2	2	-	3	2	-	-	3	1	1	2	2
E304.4	3	3	2	2	-	3	2	-	-	3	1	1	2	2
E304.5	3	3	2	2	-	3	2	-	-	3	1	1	2	2
E304.6	3	3	2	2	-	3	2	-	-	3	1	1	2	2
E304	3	3	2	2	-	3	2	-	-	3	1	1	2	2



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E305 – EE6504 ELECTRICAL MACHINES – II

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
E305.1	Explain the construction and working principle of synchronous Generator	1,2,3,4,6,10,11,12	1,2
E305.2	MMF curves and armature windings.	1,2,3,4,6,10,11,12	1,2
E305.3	Acquire knowledge on Synchronous motor.	1,2,3,4,6,10,11,12	1,2
E305.4	Explain the construction and working principle of Three phase Induction Motor	1,2,3,4,6,10,11,12	1,2
E305.5	Explain the construction and working principle of special machines	1,2,3,4,6,10,11,12	1,2
E305.6	Ability to predetermine the performance characteristics of Synchronous Machines	1,2,3,4,6,10,11,12	1,2

Mapping of COs, C, PSOs with POs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
E305.1	3	3	2	2	-	1	-	-	-	1	1	2	2	2
E305.2	3	3	2	2	-	1	-	-	-	1	1	2	2	2
E305.3	3	3	2	2	-	1	-	-	-	1	1	2	2	2
E305.4	3	3	2	2	-	1	-	-	-	1	1	2	2	2
E305.5	3	3	2	2	-	1	-	-	-	1	1	2	2	2
E305.6	3	3	2	2	-	1	-	-	-	1	1	2	2	2
E305	3	3	2	2	-	1	-	-	-	1	1	2	2	2

E306 – IC6501 CONTROL SYSTEMS

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
E306.1	Ability to develop various representations of system based on the knowledge of Mathematics, Science and Engineering fundamentals	1,2,3,4,10,11,12	1,2
E306.2	Ability to do time domain and frequency domain analysis of various models of linear system.	1,2,3,4,10,11,12	1,2
E306.3	Ability to interpret characteristics of the system to develop mathematical model.	1,2,3,4,10,11,12	1,2
E306.4	Ability to design appropriate compensator for the given specifications	1,2,3,4,6,10,11,12	1,2
E306.5	Ability to come out with solution for complex control problem	1,2,3,4,6,8,10,11,12	1,2
E306.6	Ability to understand use of PID controller in closed loop system.	1,2,3,4,6,8,10,11,12	1,2



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Mapping of COs, C, PSOs with POs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
E306.1	3	3	2	2	-	-	-	-	-	2	1	1	2	2
E306.2	3	3	2	2	-	-	-	-	-	2	1	1	2	2
E306.3	3	3	2	2	-	-	-	-	-	2	1	1	2	2
E306.4	3	3	2	2	-	2	-	-	-	2	1	1	2	2
E306.5	3	3	2	2	-	2	-	2	-	2	1	1	2	2
E306.6	3	3	2	2	-	2	-	2	-	2	1	1	2	2
E306	3	3	2	2	-	2	-	2	-	2	1	1	2	2

E307 – EE6511 CONTROL AND INSTRUMENTATION LABORATORY

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
E307.1	Ability to understand control theory and apply them to electrical engineering problems	1,2,3,4,5,6,8,9,10,11,12	1,2
E307.2	Ability to analyze the various types of converters	1,2,3,4,5,6,8,9,10,11,12	1,2
E307.3	Ability to design compensators	1,2,3,4,5,6,8,9,10,11,12	1,2
E307.4	Ability to understand the basic concepts of bridge networks	1,2,3,4,5,6,8,9,10,11,12	1,2
E307.5	Ability to the basics of signal conditioning circuits	1,2,3,4,5,6,8,9,10,11,12	1,2
E307.6	Ability to study the simulation packages	1,2,3,4,5,6,8,9,10,11,12	1,2

Mapping of COs, C, PSOs with POs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C307.1	3	3	2	2	3	3	-	2	3	2	1	2	2	2
C307.2	3	3	2	2	3	3	-	2	3	2	1	2	2	2
C307.3	3	3	2	2	3	3	-	2	3	2	1	2	2	2
C307.4	3	3	2	2	3	3	-	2	3	2	1	2	2	2
C307.5	3	3	2	2	3	3	-	2	3	2	1	2	2	2
C307.6	3	3	2	2	3	3	-	2	3	2	1	2	2	2
C307	3	3	2	2	3	3	-	2	3	2	1	2	2	2

E309 –EE6512 ELECTRICAL MACHINES LABORATORY - II

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
E309.1	Ability to understand and analyze EMF and MMF methods	1,2,3,4,6,8,9,10,12	1,2
E309.2	Ability to analyze the characteristics of V and Inverted V curves	1,2,3,4,6,8,9,10,12	1,2

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E309.3	Ability to understand the importance of Synchronous machines	1,2,3,4,6,8,9,10,12	1,2
E309.4	Ability to understand the importance of Induction Machine	1,2,3,4,6,8,9,10,12	1,2
E309.5	Ability to acquire knowledge on separation of losses	1,2,3,4,6,8,9,10,12	1,2

Mapping of COs, C, PSOs with POs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
E309.1	3	2	2	2	-	2	-	2	2	2		1	2	2
E309.2	3	2	2	2	-	2	-	2	2	2		1	2	2
E309.3	3	2	2	2	-	2	-	2	2	2		1	2	2
E309.4	3	2	2	2	-	2	-	2	2	2		1	2	2
E309.5	3	2	2	2	-	2	-	2	2	2		1	2	2
E309	3	2	2	2	-	2	-	2	2	2		1	2	2

SEM VI

E311 – EE6601 SOLID STATE DRIVES

After the course, the student should be able to:


CO	Course Outcomes	POs	PSOs
E311.1	Ability to suggest a converter for solid state drive	1,2,3,4,10,11,12	1,2
E311.2	Ability to select suitability drive for the given application	1,2,3,4,10,11,12	1,2
E.311.3	Ability to study about the steady state operation and transient dynamics of a motor loadsystem.	1,2,3,4,10,11,12	1,2
E311.4	Ability to analyze the operation of the converter/chopper fed dc drive	1,2,3,4,10,11,12	1,2
E311.5	Ability to analyze the operation and performance of AC motor drives	1,2,3,4,10,11,12	1,2
E311.6	Ability to analyze and design the current and speed controllers for a closed loop solid stateDC motor drive	1,2,3,4,10,11,12	1,2

Mapping of COs, C, PSOs with POs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
E311.1	3	3	2	2	-	-	-	-	-	2	1	2	2	2
E311.2	3	3	2	2	-	-	-	-	-	2	1	2	2	2
E.311.3	3	3	2	2	-	-	-	-	-	2	1	2	2	2
E311.4	3	3	2	2	-	-	-	-	-	2	1	2	2	2
E311.5	3	3	2	2	-	-	-	-	-	2	1	2	2	2
E311.6	3	3	2	2	-	-	-	-	-	2	1	2	2	2
E311	3	3	2	2	-	-	-	-	-	2	1	2	2	2

E312 – EE6602 EMBEDDED SYSTEMS

After the course, the student should be able to:


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CO	Course Outcomes	POs	
E312.1	Ability to analyze Embedded systems.	1,2,3,4,6,7,10,11,12	1,2
E312.2	Ability to suggest an embedded system for a given application	1,2,3,4,6,7,10,11,12	1,2
E312.3	Ability to operate various Embedded Development Strategies	1,2,3,4,6,7,10,11,12	1,2
E312.4	Ability to study about the bus Communication in processors	1,2,3,4,6,7,10,11,12	1,2
E312.5	Ability to acquire knowledge on various processor scheduling algorithms	1,2,3,4,6,7,10,11,12	1,2
E312.6	Ability to understand basics of Real time operating system.	1,2,3,4,6,7,10,11,12	1,2

Mapping of COs, C, PSOs with POs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
E312.1	3	3	2	2	-	2	2	-	-	2	1	2	2	2
E312.2	3	3	2	2	-	2	2	-	-	2	1	2	2	2
E312.3	3	3	2	2	-	2	2	-	-	2	1	2	2	2
E312.4	3	3	2	2	-	2	2	-	-	2	1	2	2	2
E312.5	3	3	2	2	-	2	2	-	-	2	1	2	2	2
E312.6	3	3	2	2	-	2	2	-	-	2	1	2	2	2
E312	3	3	2	2	-	2	2	-	-	2	1	2	2	2

E313 – EE6603 POWER SYSTEM OPERATION AND CONTROL

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
E313.1	Ability to Perceive the day-to-day operation of electric power system	1,2,3,4,10,11,12	1,2
E313.2	Ability to analyze the control actions to be implemented on the system to meet the minute-to-minute variation of system demand.	1,2,3,4,10,11,12	1,2
E313.3	Ability to Perceive the significance of power system operation and control	1,2,3,4,10,11,12	1,2
E313.4	Ability to acquire knowledge on real power-frequency interaction	1,2,3,4,10,11,12	1,2
E313.5	Ability to Perceive the reactive power-voltage interaction	1,2,3,4,10,11,12	1,2
E313.6	Ability to design SCADA and its application for real time operation	1,2,3,4,10,11,12	1,2

Mapping of COs, C, PSOs with POs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
E313.1	3	3	2	1	-	-	-	-	-	1	1	1	2	2
E313.2	3	3	2	1	-	-	-	-	-	1	1	1	2	2
E313.3	3	3	2	1	-	-	-	-	-	1	1	1	2	2
E313.4	3	3	2	1	-	-	-	-	-	1	1	1	2	2

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E313.5	3	3	2	1	-	-	-	-	-	1	1	1	2	2
E313.6	3	3	2	1	-	-	-	-	-	1	1	1	2	2
E 313	3	3	2	1	-	-	-	-	-	1	1	1	2	2

E314 –EE6604 Design of Electrical Apparatus

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
E314.1	Ability to design basics of design considerations for rotating and static electrical machines	1,2,3,4,6,7,10,11,12	1,2
E314.2	Ability to design of field system for its application	1,2,3,4,6,7,10,11,12	1,2
E314.3	Ability to design and three phase transformer	1,2,3,4,6,7,10,11,12	1,2
E314.4	Ability to design armature and field of DC machines	1,2,3,4,6,7,10,11,12	1,2
E314.5	Ability to design stator and rotor of induction motor	1,2,3,4,6,7,10,11,12	1,2
E314.6	Ability to design and analyze synchronous machines	1,2,3,4,6,7,10,11,12	1,2

Mapping of COs, C, PSOs with POs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
E314.1	3	3	2	2	-	2	2	-	-	2	1	2	2	2
E314.2	3	3	2	2	-	2	2	-	-	2	1	2	2	2
E314.3	3	3	2	2	-	2	2	-	-	2	1	2	2	2
E314.4	3	3	2	2	-	2	2	-	-	2	1	2	2	2
E314.5	3	3	2	2	-	2	2	-	-	2	1	2	2	2
E314.6	3	3	2	2	-	2	2	-	-	2	1	2	2	2
E314	3	3	2	2	-	2	2	-	-	2	1	2	2	2

E315 EE 6002 Power Systems Transients

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
C315.1	Ability to acquire and analyze switching and lightning transients	1,2,3,4,5,7,8,9,10,11,12	1,2
C315.2	Ability to acquire knowledge on generation of switching transients and their control	1,2,3,4,5,7,8,9,10,11,12	1,2
C315.3	Ability to analyze the mechanism of lighting strokes	1,2,3,4,5,7,8,9,10,11,12	1,2
C315.4	Ability to acquire the importance of propagation, reflection and refraction of travelling waves	1,2,3,4,5,7,8,9,10,11,12	1,2
C315.5	Ability to find the voltage transients caused by faults	1,2,3,4,5,7,8,9,10,11,12	1,2

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C315.6	Ability to acquire the concept of circuit breaker action, load rejection on integrated power system.	1,2,3,4,5,7,8,9,10,11,12	1,2
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Mapping of COs, C, PSOs with POs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C315.1	3	3	2	2	2	-	1	1	3	2	1	1	2	2
C315.2	3	3	2	2	2	-	1	1	3	2	1	1	2	2
C315.3	3	3	2	2	2	-	1	1	3	2	1	1	2	2
C315.4	3	3	2	2	2	-	1	1	3	2	1	1	2	2
C315.5	3	3	2	2	2	-	1	1	3	2	1	1	2	2
C315.6	3	3	2	2	2	-	1	1	3	2	1	1	2	2
C315	3	3	2	2	2	-	1	1	3	2	1	1	2	2

E316 – EE6611 POWER ELECTRONICS AND DRIVES LABORATORY

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
E316.1	Ability to practice converter and inverter circuits and apply software for engineering problems.	1,2,3,4,10,11,12	1,2
E316.2	Ability to experiment about switching characteristics various switches	1,2,3,4,10,11,12	1,2
E316.3	Ability to analyze about AC to DC converter circuits	1,2,3,4,10,11,12	1,2
E316.4	Ability to analyze about DC to AC circuits	1,2,3,4,10,11,12	1,2
E316.5	Ability to acquire knowledge on AC to AC converters	1,2,3,4,10,11,12	1,2
E316.6	Ability to acquire knowledge on simulation software.	1,2,3,4,10,11,12	1,2

Mapping of COs, C, PSOs with POs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
E316.1	3	3	2	2	-	-	-	-	-	2	1	1	2	2
E316.2	3	3	2	2	-	-	-	-	-	2	1	1	2	2
E316.3	3	3	2	2	-	-	-	-	-	2	1	1	2	2
E316.4	3	3	2	2	-	-	-	-	-	2	1	1	2	2
E316.5	3	3	2	2	-	-	-	-	-	2	1	1	2	2
E316.6	3	3	2	2	-	-	-	-	-	2	1	1	2	2
E316	3	3	2	2	-	-	-	-	-	2	1	1	2	2

E317 – EE6612 MICROPROCESSORS AND MICROCONTROLLERS LABORATORY

After the course, the student should be able to:

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CO	Course Outcomes	POs	PSOs
E317.1	Apply computing platform and software for engineering problems	1,2,3,4,8,9,10,11,12	1,2
E317.2	Ability to programming logics for code conversion	1,2,3,4,8,9,10,11,12	1,2
E317.3	Ability to acquire knowledge on A/D and D/A.	1,2,3,4,8,9,10,11,12	1,2
E317.4	Ability to understand basics of serial communication	1,2,3,4,8,9,10,11,12	1,2
E317.5	Ability to understand and impart knowledge in DC and AC motor interfacing	1,2,3,4,8,9,10,11,12	1,2
E317.6	Ability to understand basics of software simulators	1,2,3,4,8,9,10,11,12	1,2

Mapping of COs, C, PSOs with POs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
E317.1	3	3	2	2	-	-	-	3	3	2	1	1	2	2
E317.2	3	3	2	2	-	-	-	3	3	2	1	1	2	2
E317.3	3	3	2	2	-	-	-	3	3	2	1	1	2	2
E317.4	3	3	2	2	-	-	-	3	3	2	1	1	2	2
E317.5	3	3	2	2	-	-	-	3	3	2	1	1	2	2
E317.6	3	3	2	2	-	-	-	3	3	2	1	1	2	2
C317	3	3	2	2	-	-	-	3	3	2	1	1	2	2

SEM-VII

E401 – EE6701 HIGH VOLTAGE ENGINEERING

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
E401.1	Ability to perceive about Transients in power system	1,2,3,4,10,11,12	1,2
E401.2	Ability to perceive about Generation and measurement of high voltage	1,2,3,4,10,11,12	1,2
E401.3	Ability to perceive about High voltage testing	1,2,3,4,10,11,12	1,2
E401.4	Ability to perceive about various types of over voltages in power system	1,2,3,4,10,11,12	1,2
E401.5	Ability to measure over voltages	1,2,3,4,10,11,12	1,2
E401.6	Ability to test power apparatus and insulation coordination	1,2,3,4,10,11,12	1,2

Mapping of COs, C, PSOs with POs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
E401.1	3	3	2	2	-	-	-	-	-	2	1	1	2	2
E401.2	3	3	2	2	-	-	-	-	-	2	1	1	2	2
E401.3	3	3	2	2	-	-	-	-	-	2	1	1	2	2
E401.4	3	3	2	2	-	-	-	-	-	2	1	1	2	2
E401.5	3	3	2	2	-	-	-	-	-	2	1	1	2	2
E401.6	3	3	2	2	-	-	-	-	-	2	1	1	2	2
E401	3	3	2	2	-	-	-	-	-	2	1	1	2	2

E402 – EE6702 PROTECTION AND SWITCHGEAR

After the course, the student should be able to:

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CO	Course Outcomes	POs	PSOs
E402.1	Ability to analyze Electromagnetic and Static Relays	1,2,3,4,10,11,12	1,2
E402.2	Ability to suggest suitability circuit breaker	1,2,3,4,10,11,12	1,2
E402.3	Ability to find the causes of abnormal operating conditions of the apparatus and system	1,2,3,4,10,11,12	1,2
E402.4	Ability to analyze the characteristics and functions of relays and protection schemes	1,2,3,4,10,11,12	1,2
E402.5	Ability to study about the apparatus protection, static and numerical relays	1,2,3,4,10,11,12	1,2
E402.6	Ability to acquire knowledge on functioning of circuit breaker.	1,2,3,4,10,11,12	1,2

Mapping of COs, C, PSOs with POs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
E402.1	3	3	3	2	-	-	-	-	-	2	1	2	2	2
E402.2	3	3	3	2	-	-	-	-	-	2	1	2	2	2
E402.3	3	3	3	2	-	-	-	-	-	2	1	2	2	2
E402.4	3	3	3	2	-	-	-	-	-	2	1	2	2	2
E402.5	3	3	3	2	-	-	-	-	-	2	1	2	2	2
E402.6	3	3	3	2	-	-	-	-	-	2	1	2	2	2
E402	3	3	3	2	-	-	-	-	-	2	1	2	2	2


E403 – EE6703 Special Electrical Machines

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
E403.1	Ability to analyze and design controllers for special Electrical Machines	1,2,3,4,6,7,10,11,12	1,2
E403.2	Ability to acquire the knowledge on construction and operation of stepper motor	1,2,3,4,6,7,10,11,12	1,2
E403.3	Ability to acquire the knowledge on construction and operation of stepper switched reluctance motors.	1,2,3,4,6,7,10,11,12	1,2
E403.4	Ability to construction, principle of operation, switched reluctance motors	1,2,3,4,6,7,10,11,12	1,2
E403.5	Ability to acquire the knowledge on construction and operation of permanent magnet brushless D.C. motors	1,2,3,4,6,7,10,11,12	1,2
E403.6	Ability to select a special Machine for a particular application	1,2,3,4,6,7,10,11,12	1,2

Mapping of COs, C, PSOs with POs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
E403.1	3	3	2	2	-	2	2	-	-	2	1	2	2	2


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E403.2	3	3	2	2	-	2	2	-	-	2	1	2	2	2
E403.3	3	3	2	2	-	2	2	-	-	2	1	2	2	2
E403.4	3	3	2	2	-	2	2	-	-	2	1	2	2	2
E403.5	3	3	2	2	-	2	2	-	-	2	1	2	2	2
E403.6	3	3	2	2	-	2	2	-	-	2	1	2	2	2
E403	3	3	2	2	-	2	2	-	-	2	1	2	2	2

E405 EE6005 power Quality

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
E405.1	Ability to analyze power system operation	1,2,3,4,6,8,9,10,11,12	1,2
E405.2	Ability to analyze stability in power system operation	1,2,3,4,6,8,9,10,11,12	1,2
E405.3	Ability to analyze and control power system operation	1,2,3,4,6,8,9,10,11,12	1,2
E405.4	Ability to acquire the knowledge protection equipment	1,2,3,4,6,8,9,10,11,12	1,2
E405.5	Ability to acquire the knowledge in power quality monitoring	1,2,3,4,6,8,9,10,11,12	1,2
E405.6	Ability to acquire the knowledge in computer analysis tools for transients	1,2,3,4,6,8,9,10,11,12	1,2

Mapping of COs, C, PSOs with POs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
E405.1	3	3	2	2	-	1	-	2	2	2	1	1	2	2
E405.2	3	3	2	2	-	1	-	2	2	2	1	1	2	2
E405.3	3	3	2	2	-	1	-	2	2	2	1	1	2	2
E405.4	3	3	2	2	-	1	-	2	2	2	1	1	2	2
E405.5	3	3	2	2	-	1	-	2	2	2	1	1	2	2
E405.6	3	3	2	2	-	1	-	2	2	2	1	1	2	2
E405	3	3	2	2	-	1	-	2	2	2	1	1	2	2

E406 –EE 6008 Microcontroller Based System Design

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
C406.1	To apply computing platform for engineering problems.	1,2,3,4,10,11,12	1,2
C406.2	To apply ethical issues in system	1,2,3,4,10,11,12	1,2
C406.3	To apply software platform for engineering problems	1,2,3,4,10,11,12	1,2
C406.4	To analysis the environmental impact	1,2,3,4,10,11,12	1,2
C406.5	To acquire management skills	1,2,3,4,10,11,12	1,2

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C406.6	To analysis and Support Operating systems	1,2,3,4,10,11,12	1,2
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Mapping of COs, C, PSOs with POs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C406.1	3	3	2	2	-	-	-	-	-	2	1	1	2	2
C406.2	3	3	2	2	-	-	-	-	-	2	1	1	2	2
C406.3	3	3	2	2	-	-	-	-	-	2	1	1	2	2
C406.4	3	3	2	2	-	-	-	-	-	2	1	1	2	2
C406.5	3	3	2	2	-	-	-	-	-	2	1	1	2	2
C406.6	3	3	2	2	-	-	-	-	-	2	1	1	2	2
C406	3	3	2	2	-	-	-	-	-	2	1	1	2	2

E407 EE6711 Power System Simulation Laboratory

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
C407.1	Ability to analyze power system planning and operational studies	1,2,3,4	1,2
C407.2	Ability to acquire knowledge on Formation of Bus Admittance and Impedance Matrices and Solution of Networks	1,2,3,4	1,2
C407.3	Ability to analyze the power flow using GS and NR method	1,2,3,4	1,2
C407.4	Ability to find Symmetric and Unsymmetrical fault	1,2,3,4	1,2
C407.5	Ability to analyze the economic dispatch	1,2,3,4	1,2
C407.6	Ability to analyze the electromagnetic transients	1,2,3,4	1,2

Mapping of COs, C, PSOs with POs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C407.1	3	3	2	2	2	1	1	2	2	2	1	2	2	2
C407.2	3	3	2	2	2	1	1	2	2	2	1	2	2	2
C407.3	3	3	2	2	2	1	1	2	2	2	1	2	2	2
C407.4	3	3	2	2	2	1	1	2	2	2	1	2	2	2
C407.5	3	3	2	2	2	1	1	2	2	2	1	2	2	2
C407.6	3	3	2	2	2	1	1	2	2	2	1	2	2	2
C407	3	3	2	2	2	1	1	2	2	2	1	2	2	2

SEM -VIII

E409 – EE6801 Electric Energy Generation, Utilization and Conservation

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
E409.1	To realize the main aspects of generation, utilization and conservation	1,2,3,4,6,8,10,11,12	1,2
E409.2	To identify an appropriate method of heating for any particular industrial application	1,2,3,4,6,8,10,11,12	1,2
E409.3	To evaluate domestic wiring connection and debug any faults occurred	1,2,3,4,6,8,10,11,12	1,2

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E409.4	To construct an electric connection for any domestic appliance like refrigerator as well as to design a battery charging circuit for a specific household application	1,2,3,4,6,8,10,11,12	1,2
E409.5	To realize the appropriate type of electric supply system as well as to evaluate the	1,2,3,4,6,8,10,11,12	1,2
E409.6	To realize the main aspects of Traction	1,2,3,4,6,8,10,11,12	1,2

Mapping of COs, C, PSOs with POs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
E409.1	3	3	2	2	-	2	-	3	-	2	1	1	2	2
E409.2	3	3	2	2	-	2	-	3	-	2	1	1	2	2
E409.3	3	3	2	2	-	2	-	3	-	2	1	1	2	2
E409.4	3	3	2	2	-	2	-	3	-	2	1	1	2	2
E409.5	3	3	2	2	-	2	-	3	-	2	1	1	2	2
E409.6	3	3	2	2	-	2	-	3	-	2	1	1	2	2
E409	3	3	2	2	-	2	-	3	-	2	1	1	2	2

E410 – EE6009 Power Electronics for Renewable Energy Systems

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
E410.1	Ability to analyze power system operation	1,2,3,4,6,7,10,11,12	1,2
E410.2	Ability to handle the engineering aspects of electrical energy generation	1,2,3,4,6,7,10,11,12	1,2
E410.3	Ability to analyze stability in power system operation	1,2,3,4,6,7,10,11,12	1,2
E410.4	Ability to handle utilization in power system operation	1,2,3,4,6,7,10,11,12	1,2
E410.5	Ability to control power system operation	1,2,3,4,6,7,8,10,11,12	1,2
E410.6	Ability to analyze power system operation Protection.	1,2,3,4,6,7,8,10,11,12	1,2

Mapping of COs, C, PSOs with POs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
E410.1	3	3	2	2	-	1	2	-	-	2	1	1	2	2
E410.2	3	3	2	2	-	1	2	-	-	2	1	1	2	2
E410.3	3	3	2	2	-	1	2	-	-	2	1	1	2	2
E410.4	3	3	2	2	-	1	2	-	-	2	1	1	2	2
E410.5	3	3	2	2	-	1	2	1	-	2	1	1	2	2
E410.6	3	3	2	2	-	1	2	1	-	2	1	1	2	2
E410	3	3	2	2	-	1	2	1	-	2	1	1	2	2

E411 GE6075 Professional Ethics in Engineering

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After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
E411.1	The student should be able to apply ethics in society	1 - 12	1,2
E411.2	discuss theethical issues related to engineering	1 - 12	1,2
E411.3	Realize the responsibilities and rights in the society.	1 - 12	1,2
E411.4	Realize the responsibilities in Computer Ethics	1 - 12	1,2
E411.5	Realize the responsibilities in Corporate Social Responsibility.	1 - 12	1,2

Mapping of COs, C, PSOs with POs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
E411.1	3	3	3	2	3	2	2	2	3	2	1	1	2	2
E411.2	3	3	3	2	3	2	2	2	3	2	1	1	2	2
E411.3	3	3	3	2	3	2	2	2	3	2	1	1	2	2
E411.4	3	3	3	2	3	2	2	2	3	2	1	1	2	2
E411.5	3	3	3	2	3	2	2	2	3	2	1	1	2	2
E411	3	3	3	2	3	2	2	2	3	2	1	1	2	2

E412 EE6811 PROJECT WORK

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
E411.1	Acquire knowledge on current social problems and find solution by formulating proper	1 - 12	1,2
E411.2	Analyze and prepare literature review using research articles.	1 - 12	1,2
E411.3	Find a research gap in the field.	1 - 12	1,2
E411.4	Develop skills in preparing project reports and presentations.	1 - 12	1,2
E411.5	Identify and suggest future scope of work in the relevant field.	1 - 12	1,2

Mapping of COs, C, PSOs with POs

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
E411.1	3	3	3	2	3	2	2	2	3	2	1	1	2	2
E411.2	3	3	3	2	3	2	2	2	3	2	1	1	2	2
E411.3	3	3	3	2	3	2	2	2	3	2	1	1	2	2
E411.4	3	3	3	2	3	2	2	2	3	2	1	1	2	2
E411.5	3	3	3	2	3	2	2	2	3	2	1	1	2	2
E411	3	3	3	2	3	2	2	2	3	2	1	1	2	2

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