SCHEME OF COURSE WORK

Course Details:

Course Title	**:Design and Simulation and Power Electronics Circuits (Elective –II)**		
Course Code	**: 13EE2217**	**L T P C**	**:4 - 0 3**
Program:	**: M. Tech.**		
Specialization:	**: Power Electronics And Drives**		
Semester	**: II**		
Prerequisites	**:** Basic s of Power Electronics		
Courses to which it is a prerequisite	**: --**		

Course Outcomes (COs): At the end of the course**,** the student will be able to have knowledge in:

1	Basics of simulation, Analysis of power electronic systems.
2	Different algorithms for analysis, Future trends in simulation.
3	Fourier analysis of harmonics, modeling of power electronic devices.
4	Time domain analysis, Fourier analysis of power electronic devices, Simulation of power electronic circuits for different types of loads.

Program Outcomes (POs):

The programme outcomes are achieved through the following means:

1	Be a part of competent workforce in the area of Static Power Electronics Converters and power electronic converter fed electrical drives and power quality issues .
2	Apply soft computing techniques for Power Electronic Systems and Electric Drives.
3	Understand large scale Power Electronic Converter Systems, Electric Drives and issues involved through modeling, analysis and simulation.
4	Apply present day techniques and tools to solve Power electronic and electric drives problems relevant to india and other countries
5	To gain necessary skills in using state-of-the-art simulation tools such as PLEXIM, SABER, OPAL-RT Lab, dSPACE, MULTISIM , LABVIEW and other Tools for analysis , design and trouble shooting of power electronics converters and various Electric drives .
6	Collaborate with industries on problems of relevance to them while planning/organizing graduate dissertations towards expanding sphere of interaction.
7	Improve soft skills of students through seminars and organization of technology workshops, writing research/project reports as a part of graduate education.
8	Encourage life-long learning through professional bodies (such as IEEE. Institute of Engineers (India),etc).
9	Imbibe social responsibilities and ethical practices towards creating a work force for national growth.

Course Outcome versus **Program Outcomes:**

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO-1	S	S	S	S	M				
CO-2	S	S	S	S	S	S	M	M	M
CO-3	S	S	S	S	S	M			
CO-4	S	S	S	S	S	S	M	M	

S - Strongly correlated, *M - Moderately* correlated, *Blank - No correlation*

Assessment Methods:	Assignment / Quiz / Seminar / Case Study / Mid-Test / End Exam

Teaching-Learning and Evaluation

Week	TOPIC / CONTENTS	Course Outcomes	Sample questions	TEACHING-LEARNG STRATEY	Assessment Method & Schedule
1	UNIT-1 Simulation Techniques-1 Importance of simulation Methods of simulation of power electronic systems	CO-1	Briefly explain 1. Basics of simulation 2. Methods of simulation of power electronic systems	Lecture Discussion	Mid-Test 1 (Week 9) Seminar (Week 1)
2	Analysis of power electronic converters in a sequential manner, coupled and decoupled systems	CO-1 & CO-2	Briefly explain coupled and decoupled analysis of power electronic converter	Lecture Discussion	Mid-Test 1 (Week 9) Seminar (Week 2)
3	UNIT-II Simulation Techniques-1 Various algorithms for steady state solution in power electronic systems	CO-1 & CO-2	Explain different types of algorithms for steady state solution in power electronics	Lecture Problem solving	Mid-Test 1 (Week 9) Seminar (Week 3)
4	Future trends in computer simulation	CO-1 & CO-2	What are the Future trends in computer simulation	Lecture	Mid-Test 1 (Week 9) Seminar (Week 4) Assignment (Week 4)
5	UNIT-III Modeling of power Electronic Devices AC sweep and DC sweep Analysis	CO-3 & CO-4	Explain AC and DC sweep analysis?	Lecture Problem solving	Mid-Test 1 (Week 9) Seminar (Week 5)
6	Transients and time domain analysis of power Electronic Devices	CO-3 & CO-4	Explain the importance of Transients and time domain analysis in designing power electronic	Lecture	Mid-Test 1 (Week 9) Seminar (Week 6)
7	Fourier series and harmonic components of power Electronic Devices	CO-3 & CO-4	Explain the fourier series analysis of harmonic components in power electronic converters	Lecture Problem solving	Mid-Test 1 (Week 9) Seminar (Week 7)
8	BJT, FET ,MOSFET and its model of power Electronic Devices	CO-3 & CO-4	Explain different modeling of switches used as a power electronic device	Lecture	Mid-Test 1 (Week 9) Seminar (Week 8) Assignment (Week 8)
9	Mid-Test 1				
10	Amplifiers and oscillator and non linear Device	CO-3 & CO-4	Explain the modeling of amplifiers and oscillators	Lecture Discussion	Mid-Test 2 (Week 18) Seminar (Week 9)
11	UNIT-IV Simulation of power electronic circuits Introduction, Simulation and capture, Time domain analysis	CO-1 ,CO-3	Explain time domain analysis of power electronic circuits	Lecture	Mid-Test 2 (Week 18) Seminar (Week 10)
12	System level integration and analysis	CO-3 & CO-4	Explain System level integration and analysis	Lecture	Mid-Test 2 (Week 18) Seminar (Week 11)
13	Monte Carlo analysis Sensitivity/ stress analysis, Fourier analysis.	CO-3 & CO-4	Explain Monte Carloanalysis Sensitivity/ stress analysis	Lecture Problem solving	Mid-Test 2 (Week 18) Seminar (Week 12)

14	UNIT-V CASE STUDY :Simulation of Converters, Choppers, Inverters feeding R, R-L, and R-L-E loads	CO-3 & CO-4	Explain Simulation of Converters, Choppers, Inverters feeding R, R-L, and R-L-E loads	□ Lecture	Mid-Test 2 (Week 18)
15	AC voltage controllers, feeding R, R-L, and R-L-E loads	CO-3 & CO-4	Explain AC voltage controllers, feeding R, R-L, and R-L-E loads	□ Lecture □ Discussion	Mid-Test 2 (Week 18) Seminar (Week 14)
16	Cyclo-converters feeding R, R-L, and R-L-E loads	CO-3 & CO-4	Explain Cyclo-converters feeding R, R-L, and R-L-E loads	□ Lecture □ Discussion	Mid-Test 2 (Week 18) Seminar
17	Practice of all converter practically in simulation lab	CO-3 & CO-4	Simulate power electronic converters	□ Lecture	Mid-Test 2 (Week 18) Seminar (Week 16)
18	Mid-Test 2				
19/20	END EXAM				