SCHEME OF COURSE WORK

COURSE DETAILS:

Course Title	**Power Electronic Converter Fed Drives**
Course Code	13EE1117 L T P C 4 1 0 3
Program	B.Tech, EEE
Branch	Electrical & Electronics Engineering
Semester	VI
Prerequisites	Power Electronics, Electrical Machines – I and II

COURSE OUTCOMES:

At the end of the Course, the Student will be able to:

CO-1	Analyze DC motor drive fed from phase controlled converters
CO-2	Understand DC motor drive fed from Chopper
CO-3	Learn Induction motor fed from AC voltage Controllers
CO-4	Analyze Induction motor fed from VSI and CSI.
CO-5	Analyze Synchronous motor drive fed from VSI, CSI & Cycloconverter

Program Outcomes (POs):

The student of Electrical and Electronics Engineering at the end of the program will be able to:

PO-1	Apply the knowledge of basic sciences and electrical and electronics engineering fundamentals to solve the problems of power systems and drives.
PO-2	Analyze power systems that efficiently generate, transmit and distribute electrical power in the context of present Information and Communications Technology.
PO-3	Design and develop electrical machines and associated controls with due considerations to societal and environmental issues.
PO-4	Design and conduct experiments, analyze and interpret experimental data for performance analysis.
PO-5	Apply appropriate simulation tools for modeling and evaluation of electrical systems.
PO-6	Apply the electrical engineering knowledge to assess the health and safety issues and their consequences.
PO-7	Demonstrate electrical engineering principles for creating solutions for sustainable development.
PO-8	Develop a techno ethical personality that help to serve the people in general and Electrical and Electronics Engineering in particular.
PO-9	Develop leadership skills and work effectively in a team to achieve project objectives.
PO-10	Communicate effectively in both verbal and written form.
PO-11	Understand the principles of management and finance to manage project in multi disciplinary environments.
PO-12	Pursue life-long learning as a means of enhancing the knowledge and skills.

COURSE OUTCOME/PROGRAM OUTCOMES:

CO/PO	1	2	3	4	5	6	7	8	9	10	11	12
CO-1	S		M	M	M		M					M
CO-2	S		M	M	M		M					M
CO-3	S		M	M	M		M					M
CO-4	S		M	M	M		M					M
CO-5	S		M	M	M		M					M

Assessment Methods	Assignments/Quiz/Mid Exam/End Exam

TEACHING LEARNING AND EVALUATION

Week	Topic/content	Course outcomes	Sample questions	Teaching-learning stategy	Assesment method & schedule
Week-1	Introduction to Electric drives Electrical Drives, Advantages of Electrical drives, Parts of Electrical Drives, Choice of electrical Drives, Status of ac and dc drives.	CO-1	1) What are the advantages of Electric Drives 2) Status of Ac & Dc Drives	Lecture/discussion	Mid Assignment Quiz
Week-2	Fundamental torque equation, multi-quadrant operation ,Components of load torques, Nature and classification of load torques	CO-1	1.What are the different component of load torque 2.Explain four quadrant operation with hoist	Lecture/discussion	Mid Assignment Quiz
Week-3	Braking of DC motor-Dynamic braking, plugging and regenerative braking	CO-1	1.Expalain dynamic braking of Dc series motor 2.Explain Plugging of DC SE motor	Lecture/discussion	Mid Assignment Quiz
Week-4	Three phase semi and fully controlled converters connected to D.C. separately excited motor	CO-1	A DC SE motor is controlled from a 3 phase full converter. Explain its principle of operation. Also draw the Speed-torque characteristics	Lecture/discussion	Mid Assignment Quiz
Week-5	Three phase semi and fully controlled converters connected to D.C. series motors, Output voltage and current waveforms, Speed and Torque expressions, Speed – Torque characteristics, Numerical problems,	CO-1	A DC series motor is controlled from a 3 phase full converter. Explain its principle of operation with necessary waveforms	Lecture/discussion	Mid Assignment Quiz
Week-6	Four quadrant operation of D.C motors by dual converters, Closed loop operation of DC motor, Single	CO-1,CO-2	A DC SE motor is controlled from a 3 phase dual converter. Explain its	Lecture/discussion	Mid Assignment Quiz

	quadrant chopper fed dc separately excited motors		principle of operation with necessary waveforms		
Week-7	Two quadrant and four quadrant chopper fed dc separately excited motors, Continuous current operation, Output voltage and current wave forms, Speed torque expressions, Speed-torque characteristics, Problems on Chopper fed D.C Motors	CO-2	A SE DC motor is fed from a Class-C chopper, Explain its principle of operation and draw the speed-torque characteristics	Lecture/discussion	Mid Assignment Quiz
Week-8	Single quadrant, Two quadrant and four quadrant chopper fed dc series excited motors, Closed loop operation Continuous current operation, Output voltage and current wave forms, speed torque expressions, Speed-torque characteristics	CO-2	A DC series motor is fed from a class first quadrant chopper. Explain its principle of operation and draw the speed-torque characteristics	Lecture/discussion	Mid Assignment Quiz
Week-9	**Mid-1**				
Week-10	Three phase Induction motor-analysis and performance, Braking-Plugging, Dynamic braking	CO-3	Explain AC dynamic braking of IM What is regenerative braking	Lecture/discussion	Mid Assignment Quiz
Week-11	Speed Control of Induction motor using AC voltage controllers; Soft starting an induction motor, Speed torque characteristics, Numerical problems.	CO-3	What is soft starting? Why speed control by ACVC is not suitable for constant load torque	Lecture/discussion	Mid Assignment Quiz
Week-12	Variable frequency characteristics, Variable frequency control of induction motor by voltage source inverter, PWM control, Speed torque characteristics, Numerical problems on induction motor drives,	CO-4	A three phase IM is fed from a 3 phase VSI in 180 degree conduction mode. Explain its principle of operation operation with necessary waveforms	Lecture/discussion	Mid Assignment Quiz
Week-13	Variable frequency control of induction motor by current source inverter, Comparison of VSI and CSI operations, Closed loop operation of induction motor drives (Block Diagram Only).	CO-4	A three phase IM is fed from a 3 phase CSI. Explain its principle of operation with necessary waveforms	Lecture/discussion	Mid Assignment Quiz
Week-14	Static rotor resistance control-rotor resistance variation in slip ring Induction motor using a chopper,	CO-4	With neat diagram explain the principle of operation of static rotor resistance control	Lecture/discussion	Mid Assignment Quiz
Week-15	Slip power recovery scheme, Static Scherbius drive, Static Kramer Drive, their performance and speed torque characteristics, Advantages, Applications,	CO-4	1.What is slip energy recovery scheme? 2.Explain static Kramer drive 3. Explain Static Scherbius drive	Lecture/discussion	Mid Assignment Quiz

	Numerical problems.				
Week-16	Separate control & self control of synchronous motors, Operation of self controlled synchronous motors by VSI	CO-5	Explain the Operation of self controlled synchronous motors by VSI & CSI	Lecture/ discussion	Mid Assignment Quiz
Week-17	Load commutated CSI fed Synchronous Motor, Operation, Waveforms, Speed-torque characteristics, Applications, Advantages and Numerical Problems, Closed-loop control operation of synchronous motor drives	CO-5	Explain Load commutated CSI fed Synchronous Motor Explain the closed loop speed control of SM drive	Lecture/ discussion	Mid Assignment Quiz
Week-18	**Mid-2**				