**20EE32E4-POWER SEMICONDUCTOR DRIVES**

**(EEE)**

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| **Course Category:** | Professional core | **Credits:** | 3 |
| **Course Type:** | Theory | **Lecture-Tutorial-practical:** | 3-0-0 |
| **Pre-requisite:** | Fundamentals of electrical circuits and networks, Power Electronics and Electrical Motors(A.C and D.C motor) | **Sessional Evaluation:**  **Univ.Exam Evaluation:**  **Total Marks:** | 40  60  100 |

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| **Course Objectives:** | Students undergoing this course are expected to learn: | |
| 1. The importance of electrical drives.  2. The control of D.C motor by single phase and three phase converters.  3. The control of D.C motor by three phase converters and dual  Converters.  4. The control of induction motor in four quadrants by controllers.  5. The losses and importance of energy conservation in electric drives.  6. The control of synchronous motor using voltage & current source  inverters. | |
| **Course Outcomes:** | After completing the course the student will be able to | |
| **CO1** | Understand the importance of electrical drives. |
| **CO2** | Gain knowledge on D.C motor control by Single phase and three phase converters. |
| **CO3** | Analyse the D.C motor control by three phase converters and dual converters. |
| **CO4** | Demonstrate the Induction motor control in four quadrants by controllers. |
| **CO5** | Describe the importance of energy conservation in electric drives. |
| **CO6** | Design the synchronous motor control using voltage and current source inverters. |
| **Course Content:** | **UNIT-I**  **Electric drives:** Concept of electric drive, classification, advantages and choice of electric drives, parts of electric drives, electric motor, power modulators, sources and control unit, steady state speed and torque expressions of various D.C motors, speed, torque characteristics.  **UNIT-II**  **Converter controlled D.C drives:** Single phase semi and fully controlled converters connected to D.C separately excited, continuous and discontinuous current operation  **DC motor Drives:** Introduction to four quadrant operation, motoring operations, electric braking, plugging, dynamic and regenerative braking operations, four quadrant operation of D.C motors.  **UNIT-III**  **Converter controlled D.C drives:** Three phase semi and fully controlled converters connected to D.C separately excited motor, single quadrant.  **Chopper controlled D.C drives:** Two quadrant and four quadrant chopper fed DC separately excited and series excited motors, continuous current operation, speed torque expressions, speed torque characteristics.  **UNIT –IV**  **Induction motor drives:** Speed torque characteristics, variable voltage characteristics, control of induction motor by A.C voltage controllers .variable frequency characteristics, variable frequency control of induction motor by voltage source and current source inverter and cyclo converters, PWM control, comparison of VSI and CSI operations, closed loop operation of induction motor drives (block diagram only).  **UNIT-V**  **Slip power recovery schemes:** Static Scherbius drive, static kramer drive, their performance and speed torque characteristics, advantages applications, problems.  **UNIT-VI**  **Synchronous motor drives:** Speed-torque characteristics, separate control and self-control of synchronous motors, operation of self-controlled synchronous motors by VSI and CSI cyclo-converters, load commutated CSI fed closed loop control operation, variable frequency control using cyclo-converter. | |
| **Text books**  **&**  **Reference books:** | **Text books:**  1. “Fundamentals of electric drives”, by G K Dubey,Narosa  Publications.  2. “Power electronic circuits, devices and applications”, by  M.H.Rashid, PHI.  **Reference books:**  1. “Power electronic”, by MD Singh and K B Khanchandani, Tata – McGraw-Hill Publishing company,1998  2. “Modern power electronics and A.C drives”, by B.K.Bose, PHI publishers.  3. “Thyristor control of electric drives”,by Vedam Subramanyam, Tata McGraw Hill Publications.  4. “A First course on Electrical Drives”, by S K Pillai, New Age International(Pvt.) Ltd. 2nd Edition. | |
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