School of Technology, Institute of Technology
B. Tech (Instrumentation & Control Engineering)
Semester VI

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3	0	2	4

Course Code	**2IC601**
Course Title	**Industrial Drives and Control**

Course Learning Outcome:

At the end of the course, students will be able to –

- illustrate the operation of various power converters and electric drives
- simulate and analyze various power converters and electric drives
- design different circuits to meet the requirements of given conditions
- realize the role of power converters and electric drives in industrial applications

Syllabus **Teaching Hours**

UNIT 1: Introduction to power electronic converters **01**

Overview of different types of power converters and their importance in industrial applications

UNIT 2: Choppers **08**

Introduction, basic classification – step down, step up and step up/down, basic chopper operation, control strategies, chopper configuration, thyristor chopper circuits, Jones' chopper, Morgan's chopper, related problems

UNIT 3: Inverters **08**

Introduction, classification of inverters, series inverters, parallel inverters, Single-phase half and full bridge inverters, Performance parameters of inverters, practical inverter circuits – McMurray inverter, McMurray-Bedford inverter, related problems

UNIT 4: Cycloconverters **04**

Introduction, basic principle of operation, single-phase to single-phase cycloconverter, three-phase half-wave cycloconverter.

UNIT 5: Introduction to electric drives **04**

Introduction, basic principle of operation, classification of electric drives, different types of loads.

UNIT 6: DC drives

Introduction, basic machine equations and characteristic curves, schemes for DC motor speed control, single-phase DC drives, three-phase DC drives, comparison of half-wave converter, semi-converter, full converter and dual converter drives, chopper drives, Introduction to stepper & servo drives. **10**

UNIT 7: AC drives

Introduction, basic principle of operation, speed torque characteristics, speed control of induction motor, stator voltage control, rotor resistance control, stator frequency control, v/f control, stator current control, slip power recovery scheme, Scherbius drive, Kramer drive. **10**

Self Study:

The self study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self study contents.

Laboratory Work:
Laboratory work will consist of minimum 10 experiments based on the above syllabus.

References:

1. M. D. Singh and K. B. Khanchandani, Power Electronics, Tata McGraw Hill Publication.
2. P. S. Bimbhra, Power Electronics, Khanna Publication.
3. M. Rashid, Power Electronics, Pearson Education.
4. Asghar M. S. Jamil, Power Electronics, PHI Publication.