

GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA IN POWER ELECTRONICS ENGINEERING

TEACHING SCHEME (w. e. f. 10th Jan,' 11)

SEMESTER- VI

Sr. No.	SUB. CODE	SUBJECT	TEACHING SCHEME (HOURS)			CREDITS
			THEORY	TUTORIAL	PRACTICAL	
1	362401	Electrical Drives & Control - II	4	0	2	6
2	362402	Industrial Automation	4	0	2	6
3	362403	Microcontroller and Microprocessor	4	0	2	6
4	362404	Industrial Training / Projects	0	0	12	12
		TOTAL	12	0	18	30

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ENGINEERING

SEMESTER- VI

Subject Code : 362401

Subject Name: ELECTRICAL DRIVES AND CONTROL- II

Sr. No.	Subject Content	Hrs.
1	<p>1.0 INTRODUCTION</p> <p>1.1 Review of Speed- Torque characteristics of AC motors, Evolution of AC drives.</p> <p>1.2 Advantages and disadvantages of drives, General drive specifications, Drive classifications and characteristics.</p> <p>1.3 Various speed control methods of AC motors.</p>	10
2	<p>2.0 STATOR VOLTAGE CONTROL OF INDUCTION MOTOR DRIVE</p> <p>2.1 Advantages of squirrel cage induction motors, AC voltage Controller for 3-ϕ induction motor, closed loop speed control of induction motor using stator voltage control, four quadrant AC voltage controller.</p>	10
3	<p>3.0 CONTROL OF INDUCTION MOTOR DRIVES THROUGH ROTOR FREQUENCY</p> <p>3.1 Introduction variable frequency characteristics, Block diagram of variable frequency speed control, Voltage source inverter control, Variable frequency control from a current source, Comparison of VSI and CSI drives, Cycloconverter fed induction motor drive, Closed loop speed control and converter rating for VSI and cycloconverter induction motor drives, Pulse width modulated inverter fed induction motor drive.</p>	12
4	<p>4.0 CONTROL OF INDUCTION MOTOR DRIVES FROM ROTOR SIDE</p> <p>4.1 Conventional rotor resistance control, its advantages and disadvantages, Static rotor resistance control</p> <p>4.2 Slip power recovery schemes: Static scherbius drive system, Static scherbius drives, Super synchronous speed control, Close loop control of static scherbius drives, Conventional Kramer system, Static Kramer drive, and Modified static Kramer's drive system.</p>	12

5	<p>5.0 CONTROL OF SYNCHRONOUS MOTOR DRIVES</p> <p>5.1 Introduction to synchronous motors, Synchronous operation from fixed frequency supply, Speed control of synchronous machines with separate control and closed loop self control.</p> <p>5.2 Load commutated inverter fed synchronous motor drive, closed loop speed control LCI synchronous motor drive, Voltage source inverter fed synchronous motor drive, Cycloconverter fed synchronous motor drive, Features of cycloconverter fed synchronous motor drives.</p>	12
	TOTAL	56

Reference Books:

1. Power semiconductor Drives, PHI by S. Sivanagaraju, M. balasubba reddy and A. Mallikarjuna Prasad.
2. Fundamentals of Electric Drives, CENGAGE Learning, by Mohamed A. El-Sharkawi.
3. Modern Power Electronics and AC Drives, PHI, Bimal K. Bose.

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Subject Code : 362402

Subject Name: INDUSTRIAL AUTOMATION

Sr. No.	Subject Content	Hrs.
1	<p>1.0 Communication standards</p> <p>Introduction, Evolution Of Industrial Control Process , Types Of Communication Interface, Types Of Networking Channels, Parallel Communication Interface, IEEE-488 Bus, Devices Useable with IEEE – 488, Handshaking Process, Interface Management Lines, Serial Communication Interface, Balanced And Unbalanced Systems, Communication Mode, Simplex Mode, Half Duplex Mode, Full Duplex Mode, Synchronization And Timing In Communication, Synchronous Transmission, Enchronous Transmission, Isochronous Transmission, Asynchronous Transmission, Synchronous And Asynchronous Transmissions Compared, Standard Interface, Serial Interface RS 232C, Serial Interface RS 422, Serial Interface EIA 485, Different Recommended Standards Compared, Software Protocol, ASCII Protocol, HART Protocol, Manufacturer Specific Protocol</p>	12
2	<p>2.0 Communication Network</p> <p>Industrial Network, Network Topology, Bus Topology, Ring Topology, Star Topology, Tree Topology, Media Access Methods , CSMA/CD (Collision Sense Multiple Access/Collision Detection), CSMA/BA (Collision Sense Multiple Access/Bitwise Arbitration), Master-Slave-One , Token Passing , Open System Interconnection (OSI) Network Model , Network Components , Control Network Issues, Advantage Of Standardized Industrial Network , Intelligent Devices, Industrial Network, Bus Network, Device Bus Network Vs. Process Bus Network, Controller Area Network (CAN), Characteristics of CAN Protocol, CAN Data Frame and Communication , CAN Error Detection and Confinement, Devicenet, Physical Layer Features, Communication Features, A Devicenet Network, Controlnet, Ethernet Protocol , Proprietary Network, Smart Distributed System</p>	12

3	3.0 Advanced Control Techniques and Applications: Optimal control, Adaptive control system, Distributed Control System, Supervisory Control, SCADA Systems	12
4	4.0 PLC: Programmable Controllers, Principle, Ladder Logic, Architecture, Software, Programming of PLC, Applications	10
5	5.0 Industrial Automation: Study of industrial control applications like cement plant, thermal power plant, steel plant, water treatment, irrigation, textiles etc	10
	TOTAL	56

Reference Books:

4. Computer Based Industrial Control Krishna Kant PHI
5. Digital Control and State Variable Methods M Gopal TMH
6. Computer Controlled Systems-Theory and Design K J Astrom and Witternmark

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Subject Code : 362403

Subject Name: MICROCONTROLLER AND MICROPROCESSOR

Sr. No.	Subject Content	Hrs.
1	<p>1.0 MICROPROCESSORS AND MICRO CONTROLLERS</p> <p>1.1 Microprocessors - general idea and block diagram 1.2 Architecture of the 8085 microprocessor 1.3 Micro controller, Block diagram of a micro controller, Operating principle 1.4 Comparison between microprocessor and micro controller</p>	8
2	<p>2.0 8051 MICRO CONTROLLER HARDWARE</p> <p>2.1 8051 micro controller hardware, 8051 block diagram, Function of each block , 8051 Programming model, 8051 DIP Pin assignment 2.2 8051 oscillator and clock, Ceramic resonator oscillator circuit, Program counter and data pointer 2.3 CPU registers, Flags and the program status word PSW, Internal memory, Internal RAM, Internal RAM organization, Stack and stack pointer, Special function registers, Internal ROM 2.4 Input / output Pins Ports and circuits and its configuration, External memory, Connecting external memory, Counters and timer 2.5 TCON and TMOD function registers, Timer counter interrupts, Timer modes, Serial Data input / output 2.6 Interrupts, Types of interrupts</p>	12
3	<p>3.0 MOVING DATA</p> <p>3.1 Introduction, Addressing Modes, External Data Moves, Code memory Read-only Data Moves, Push and Pop opcodes, Data exchanges, Example programs</p>	6

4	4.0 LOGICAL ARITHMETIC OPERATIONS 4.1 Introduction, Byte level logical operation, Bit level logical operation, Rotate and swap operation, Flags, Incrementing and decrementing, Additions, Subtraction, Multiplications and division, Decimal arithmetic, Example programs, Jump and call program range, Calls and subroutines, Interrupts and returns	10
5	5.0 8051 MICRO CONTROLLER DESIGN 5.1 Introduction, Micro controller specifications, A micro controller design, External memory and memory space decoding, Reset and clock circuit, Expanding I/O, Timing Subroutines 5.2 Lookup table for 8051, Serial data transmission	10
6	6.0 APPLICATIONS 6.0 Interface keyboards to 8051 based micro controller 6.1 Interface LED & LCD display 6.2 Interface the micro controller system to A/D and D/A converters 6.4 Stepper motor driver using 8051 microcontroller 6.5 Drives application of 8051 6.6 Data acquisition systems	10
	TOTAL	56

Reference Books:

1. The 8051 Micro controller Architecture, Programming and Applications - Kenneth J. Ayala
2. Microprocessor and Micro controllers - B. P. Singh
3. Microprocessor Programming & Applications BY R. S. Gaonkar

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Subject Code : 362404

Subject Name: Industrial Training /Projects

Students have to carry out practical project work in the college or in the industry.
The work should be related to their study or Advanced technology in the Power
Electronics Field.