GUJARAT TECHNOLOGICAL UNIVERSITY
Syllabus for Bachelor of Vocation (B.Voc), 5th Semester
Branch: Solar & Renewable Energy
Subject Name: Introduction to Industrial Automation
Subject Code: 1150702

Type of course: Core

Pre requisite: Fundamental of Industrial Automation

Rationale: Automation is playing a key role in Industries. Industries rely heavily on automation for economic viability and mass production. It is important for the students to learn basic of automation, how system works and importance of PLC, SCADA and robots in automation together with Microprocessor & 8051 Microcontroller**.** This course will provide opportunity to learn industrial automation techniques.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE(E)	PA(M)	ESE(V)	PA(I)	
3	0	0	3	50	0	0	0	50

Sr. No.	Topic	No. of Hours	Module Weightage
01	**Introduction:** Automation overview, Requirement of automation systems, Architecture of Industrial Automation system, Introduction of PLC and supervisory control and data acquisition (SCADA). Role of computers in measurement and control.	05	**10%**
02	**Automation components:** Sensors for temperature, pressure, force, displacement, speed, flow, level Measurement. Actuators, process control valves, power electronics devices DIAC, TRIAC, power MOSFET and IGBT.	10	**25%**
03	**Programmable logic controllers:** Programmable controllers, Programmable logic controllers, Analog digital input and output modules, PLC programming, Ladder diagram, PLC selection, PLC Installation, Advantage of using PLC for Industrial automation, Application of PLC to process control industries.	10	**25%**
04	**Distributed Control System & Industry 4.0** Overview of DCS, DCS block diagram, DCS Supervisory Computer Tasks, Features of DCS, Advantages of DCS. Internet of things for plant automation and overview of Industry 4.0	07	**15%**
05	**8085 Microprocessor & 8051 Microcontroller:** Architectural Block Diagram, Schematic and Pin diagrams, Pin functions, Introduction to MCS-51 Family Micro-controllers, Architectural block Diagram of 8051, Pin diagram and Pin Functions, General Purpose and Special Function Registers, RAM Structure.	10	**25%**
	Total	42	**100%**

Distribution of marks weightage for cognitive level:

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	20	20	-	-	-

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze, E: Evaluate C: Create Above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. Industrial Instrumentation and Control By. S.K. Singh The McGraw Hill Companies A.K.Sawhney, "Electrical and Electronic Measurements and Instrumentation", DHANPAT RAI & CO.
2. Process Control Instrumentation Technology By. C.D. Johnson, PHI
3. Microprocessor Architecture, Programming, and Applications with the 8085, By Romesh Gaonkar, Penram International Publishing (India) LTD.
4. The 8051 Microcontroller & Embedded Systems using Assembly and C By K. J. Ayala, D. V. Gadre (Cengage Learning , India Edition).

Course Outcome:

Sr. no.	CO Statement	Marks% weightage
CO1	Explain automation components and systems application	10
CO2	Measure industrial parameters like temperature, pressure, force, displacement, speed, flow, level.	25
CO3	Explain Basics of PLC & its Programming	25
CO4	Describe basic DCS System & Industry 4.0	15
CO5	Describe 8085 microprocessor and microcontroller architecture of MCS51 family.	25