Marwadi University
Marwadi Chandarana Group

Syllabus for Diploma Engineering

Electrical Engineering

Semester – V

Subject Name: Automation and Control in Industrial Applications

Subject Code: 09EE0509

Diploma Branches in which this subject is offered: Electrical Engineering

Objective: As development of any nation depends on its industrial development and profit created by that industries. For large scale production with less errors industries are accepting automation. Science last decade use of industrial automation has increased much faster. In order to grow as diploma electrical engineer in this fast-developing automation market it is require to have knowledge of automation. To fulfil the requirement of industry this course is useful for diploma engineers to create knowledge about industrial automation.

Credits Earned: 4 Credits

Course Outcomes: After completion of this course, student will be able

1. To identify and differentiate between different automation system.
2. To prepare ladder diagram for PLC
3. To connect interfacing devices with PLC
4. To draw mimic diagram of SCADA system for different application.

Pre-requisite of course: Basic knowledge of electrical measurement and instrumentation skill.

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term work	
2	0	4	4	50	30	20	25	25	150

Contents:

Unit	Topics	Contact hours	Weightage (%)
1	**Basics of Industrial Automation** • Introduction • What is need of automation? • Advantage of automation • Disadvantage of automation • Different types of automation system Fixed, Programable and flexible • Industrial automation system	02	07

	• PLC, HMI, SCADA, DCS, Drives		
2	**Basics of PLC (Programable Logic Control)** • Introduction • What is PLC • Advantage of PLC • Block diagram of PLC • Power supply, CPU, Memory organization, input and output modules, Special input and output modules • Different types of PLC Fixed and modular PLC • What is redundancy • PLC I/O redundancy • Selection criterion of PLC I/O module • Interfacing of different input output device with PLC I/O module • Addressing of PLC input and output • PLC functional block diagram • Different instruction for PLC programing Arithmetic instruction Addition, subtraction, multiplication, division, double division logical instruction, comparison instruction, data handling instruction, timer instruction • Sequential function chart • Ladder diagram • Different program using ladder diagram • Different application based on PLC	**14**	**50**
3	**SCADA system** • Introduction • Importance of SCADA system • Functional block diagram/Architecture of SCADA • Interface SCADA with PLC • Connection diagram • What is OPC • Process control architecture embedding and object linking • Creating SCADA screen creating steps • Steps for linking SCADA with PLC • Application of SCADA	**12**	**43**

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyse	Evaluate	Create
35%	35%	15%	15%	0%	0%

Suggested List of Experiments:

Sr. No.	Unit No.	Name of Topics	Contact Hours
1	1	Study and identify different automation system in everyday use	4
2	2	Detailed study of PLC	4
3	2	Implement basic logic using PLC	4
4	2	To prepare ladder program for PLC	8
5	2	To implement given ladder in PLC	4
6	2	To control given device using PLC	8
7	2	To prepare ladder program for control of DC motor	4
8	2	To prepare ladder program for traffic light control	4
9	2	To prepare ladder program for given two sensors for two different application.	8
10	3	To develop SCADA mimic diagram for temperature control	4
11	3	To develop SCADA mimic diagram for flow control	4

Instructional Method:

a. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

b. The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.

c. Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

d. Students will use supplementary resources such as online videos, NPTEL videos, e-courses.

References:

1. Frank Petruzella, "*Programable logic controllers*", TATA McGrawhill, Third edition.
2. George Bolton, "*Programable logic controllers*", Elsevier India, Fifth edition.
3. Webb John W, Reis Ronald A, "*Programable logic controllers*", Phi learning pvt ltd, First edition
4. Hackworth, *"Programmable Logic Controllers: Programming Methods and Applications",* Pearson India.
5. Madhuchhanda Mitra, Samarjt Semgupta, *"Programmable Logic Controllers and Industrial Automation",* Penram International Publishing (India) Pvt. Ltd.; Second edition, 2017.

Supplementary Resources:

1. https://unitronicsplc.com/what-is-plc-programmable-logic-controller/
2. https://library.automationdirect.com/ladder-logic-instructions-basics/
3. http://www.gozuk.com/forum/what-is-the-meaning-of-redundancy-in-i-o-cards-of-plc-system-513860.html
4. https://www.watelectronics.com/how-to-program-the-programmable-logic-controllers/
5. https://www.mobileautomation.com.au/plc-industrial-application/
6. https://www.webopedia.com/TERM/S/SCADA.html
7. https://www.watelectronics.com/scada-system-architecture-types-applications/
8. https://www.dpstele.com/scada/introduction-fundamentals-implementation.php