# Maharashtra State Board of Technical Education, Mumbai TEACHING PLAN (TP)

**D-1**

## Academic Year: 2020-21

**Date:** 15/06/2020

**Institute Name &Code:** Late Annasheb(NIT’S) Polytecnic, Nashik (1479))

**Programme and Code**: Electronics and Telecommunication (EJ) **Course Index:** 505

**Course Name**: : **Industrial Automation Course Abbr-Code**: ITU-22534

**Semester**: Vth **Scheme**: ‘I’ **Allocated Hrs:** 48 **Name of Faculty**: Mrs. S.K.Khaire

# Class: TYEJ

**\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\***

## Course Objectives:

1. Identify different components of an automation system.
2. Interface the given I/O device with appropriate PLC module.
3. Prepare a PLC ladder program for the given application.
4. Select the suitable motor drives for the specified application.
5. Prepare a simple SCADA application.

## Course Outcomes (COs) and Unit Outcomes: Theory & Practical

By learning course **Industrial Automation** (ITU-22534), Third Year students will be able to:

|  |  |  |
| --- | --- | --- |
| **CO No.** | **UO** | **Course Outcomes (COs) / Unit Outcomes (UOs)** |
| **CO505.1** |  | **Introduction To Industrial Automation** |
|  | 1a | Describe the benefits of the given Industrial automation system |
| 1b | Describe functions of the given components of automation system |
| 1c | Compare the characteristics of the given type of automation systems |
| 1d | Describe applications of the given automation system. |
| **CO505.2** |  | **PLC Fundamentals** |
|  | 2a | Explain with sketches the redundancy concept for the given PLC |
| 2b | Identify the specified parts of the given PLC along with its function |
| 2c | Describe with sketches the steps to interface appropriate Input module of the given PLC with the given input device. |
| 2d | Explain the criteria to select appropriate module for the given I/O devices |
| 2e | Describe with sketches the steps to interface appropriate output device with the given output |
| **CO505.3** |  | **PLC Programming and applications** |
|  | 3a | Specify the proper I/O addressing format of the given PLC. |
| 3b | Explain the use of different relay type instructions for the given operation |
| 3c | Use timer and counter instructions to write a program to perform the given operation |
| 3d | Use Logical and Comparison instruction to write a program to perform the given operation |
| 3e | Describe with example the given type of data handling instructions |
| 3f | Describe the given elements of different programming languages used to program PLC |
| 3g | Develop PLC ladder program for the given simple application. |
| 3h | Describe a PLC ladder program |

|  |  |  |
| --- | --- | --- |
| **CO505.4** |  | **Electric drives and special machines** |
|  | 4a | Describe with sketches the working of the given type of drive(s |
| 4b | State the functions of the given type of V/F converter |
| 4c | Compare given parameters of the specified type of motor drives |
| 4d | Describe the application of the given type of drive(s). |
| **CO505.5** |  | **SCADA** |
|  | 5a | Describe the function of the given element of SCADA |
| 5b | Describe the steps to develop a simple SCADA screen for the given application |
| 5c | Interface the given PLC with the SCADA system using OPC. |
| 5d | Describe the steps to develop SCADA system for the given industrial application |

* + Teaching Plan:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Unit No.**  **(Allotted Hrs.)** | **Object ives**. | **Title/Topic Details and Course Outcome (CO)** | **Plan (From – To & No. of Lectures** |  | | |
| **Actual Execution (From-To & No. of Lectures)** | **Teaching Method/ Media/ Tools** | **Remark** |
|  |  |  |  |  |  |  |
| 4 | CO  505.1 | 1.1 Need and benefits of Industrial  Automation |  |  |  |  |
|  |  | 1.2 Different Tools for Industrial  automation ,Automation Hierarchy |  |  |  |  |
|  |  | 1.3 Block diagram and description of following parts of PLC: CPU, Memory  Specialty I/O Modules, Power supply |  |  |  |  |
|  |  | 1.4 Fixed and Modular PLC and Their  types. ,Redundancy in PLC module |  |  |  |  |
| 12 | CO  505.2 | 2.1 Discrete Input modules ) |  |  |  |  |
|  |  | 2.2 Analog Input module 2.3 Discrete  output module |  |  |  |  |
|  |  | 2.4 Analog output module (Block diagram , description, typical wiring  details with different I/O devices of above modules |  |  |  |  |
|  |  | 2.5 I/O module selection criteria 2.6  Design of PLC hardware configuration. |  |  |  |  |
| 16 | CO 505.3 | 3.1 PLC I/O addressing. 3.8 Arithmetic  Instructions:Addition, subtraction, multiplication and division |  |  |  |  |
|  |  | 3.2 Relay type instructions: NO, NC,  One Shot, Latch and Unlatch , Timer instructions: On delay, off delay, |  |  |  |  |
|  |  | 3.3 Counter Instructions: Up, Down,  High speed. , Logical instructions: AND,OR,EX- OR,NOT |  |  |  |  |
|  |  | 3.4 Comparison Instructions: Equal, Not equal, Greater, Greater than equal,  less,less than equal |  |  |  |  |
|  |  | 3.5 Data handling Instructions:Move, Masked Move and Limit test |  |  |  |  |
| 8 | CO 505.4 | 4.1 Different PLC programming languages (Only Introduction) – FBD, Instruction List, Structured text,  Sequential function chart, and ladder |  |  |  |  |
|  |  | 4.2 Simple Programming examples using ladder programming language based on relay, timer counter, logical,  comparison, arithmetic |  |  |  |  |
|  |  | 4.3 Application Development based on Description such as: Motor sequence  control, Traffic light control, elevator |  |  |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | Tank Level control, conveyor system, Stepper motor control (Any Specific application can be considered in each above area to develop a ladder |  |  |  |  |
| 8 | CO  505.5 | 5.1 Introduction to SCADA. |  |  |  |  |
|  |  | 5.2 Typical SCADA architecture. |  |  |  |  |
|  |  | 5.3 Benefits of SCADA |  |  |  |  |
|  |  | 5.4 Interfacing SCADA system with PLC: i. Typical connection diagram ii. OPC architecture iii. steps in Creating SCADA Screen for simple object iv. Steps for Linking SCADA object (defining Tags and Items) with PLC ladder program using OPC. , Application areas of SCADA |  |  |  |  |
|  |  |  |  |  |  |  |



**\*BS: Additional topic conducted considering beyond syllabus coverage.**

Contents of Beyond Syllabus (Additional Topic) imparted for the attainment of the COs/POs & fulfill the Course gap.

### Chapter wise CO Mapping:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **CO505.1** | **CO505.2** | **CO505.3** | **CO505.4** | **CO505.5** |
| **Chapter 1** |  |  |  |  |  |
| **Chapter 2** |  |  |  |  |  |
| **Chapter 3** |  |  |  |  |  |
| **Chapter 4** |  |  |  |  |  |
| **Chapter 5** |  |  |  |  |  |

* **Direct Assessment Criteria:**
  + **Rules for Theory Assessment:**

1. Weekly Test may be conducted in class. Student can’t access any study material during test.
2. An Open Book Test may be conducted in class. Student can access any material but no discussion with any one is allowed during test.
3. Total weightage of Theory Marks to the Course is 100. From 100 Marks 70 Marks are allotted to MSBTE TH Examination and 30 Marks are allotted to Theory Progressive Assessment (PA).
4. Under the theory PA; out of 30 Marks, 10 marks of theory PA are for micro-project assessment to facilitate integration of COs and the remaining 20 marks is the average of 2 test taken during the semester
5. MSBTE Theory Examination of 70 marks will be conducted by MSBTE at the end of semester. The schedule of MSBTE Examinations will be announced by MSBTE on the website [www.msbte.com.](http://www.msbte.com/)

### Rules for Practical assessment:

* 1. Progressive Assessment (P.A.) of each experiment will be done out of 25 marks on the basis of Use of appropriate tool to solve the problem, Quality of output achieved, Answer to sample questions and Submit report in time
  2. Final term work of 25 marks is calculated based on Progressive Assessment for each experiment
  3. Term Work Marks = ((Total Marks Obtained in P.A.) / (25 x Total Number of Experiments)) \*25
  4. A comprehensive Final Practical End Semester examination (of 25 Marks) will be conducted by MSBTE at the end of semester. Examiner for this examination will be appointed by MSBTE. The schedule of MSBTE Practical Examination will be display on Notice board prior to examination

### References:

|  |  |  |  |
| --- | --- | --- | --- |
| **Sr. No** | **Title** | **Author** | **Publisher** |
| 01 | Programmable Logic | Jadhav, V. R. | Khanna publishers, New Delhi, |
| 02 | Controller | 2017, ISBN : 9788174092281 |  |
| 03 | Programmable logic | Petruzella, F.D. | Tata — McGraw Hill India, New |
| 04 | Introduction to | Dunning, G. | Thomson /Delmar learning, New |
| 05 | Programmable logic | Delhi, 2005, |  |

**SOFTWARE/LEARNING WEBSITES**

* + 1. Software:- [www.fossee.com](http://www.fossee.com/)
    2. Software:- [www.logixpro.com](http://www.logixpro.com/)
    3. Software:- [www.plctutor.com](http://www.plctutor.com/)
    4. Software;-[www.ellipse.com](http://www.ellipse.com/)
    5. PLC lecture:- https://[www.youtube.com/watch?v=pPiXEfB02qo](http://www.youtube.com/watch?v=pPiXEfB02qo)
    6. PLC tutorial:-[http://users.isr.ist.utl.pt/Hag/aulas/api13/docs/API](http://users.isr.ist.utl.pt/hag/aulas/api13/docs/api/) I C3 3\_ST.pdf

Mrs. S.K.Khaire Mrs. S.K.Khaire

### (Name & signature of staff) (Name & signature of HOD)