GOVERNMENT OF TAMILNADU

DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI-25

STATE PROJECT COORDINATION UNIT

(Established under Canada India Institutional Cooperation Project)

CURRICULUM

Course Name	**SELECTION AND TESTING OF INDUSTRIAL SENSORS**
Course Code	**EE/2020/012**
Course Duration	40 Hours
Minimum Eligibility Criteria	10th/+2 /ITI/Diploma/Graduates
Pre-requisites (if any)	-
Course Objectives	Training module has been designed for the participants to • Understand the Construction and working of Proximity sensors • Understand the Construction and Working of Magnetic and Ultrasonic Sensors • Measurement of switching distance of various proximity sensors. • Application and selection of sensors of Industrial applications.
Course Outcomes	At the end of training, the trainees will be able to • Explain the construction and working of Inductive, Capacitive, Magnetic, Photoelectric and Ultrasonic Proximity Sensors. • Obtain the switching distance and hysteresis of above sensors • Select the sensor for particular industrial applications.
Expected Job Roles	Industrial Sensor Technician

TEACHING AND SCHEME OF EXAMINATION						
Course Code	Course Name	Hours		Assessment Marks		Duration of Examination
				Min	Max	
EE/2020/012	SELECTION AND TESTING OF INDUSTRIAL SENSORS	Theory	16	10	20	3 Hours
		Practical	24	40	80	
		Total	40	50	100	

EE/2020/0012-SELECTION AND TESTING OF INDUSTRIAL SENSORS

DETAILED SYLLABUS

Unit No	Modules	No.of.Hours	
		Theory	Practical
I	**Behaviour of Inductive and Capacitive Proximity Sensor:**	**15 Hours**	
1.1	Introduction	05	10
1.2	Proximity sensors		
1.3	Types		
1.4	**Practical:** Behaviour of Inductive sensor and capacitive sensor		
1.5	**Practical:** Switching distance and hysteresis of the Inductive and Capacitive		
1.6	**Practical:** Switching frequency, Reduction factor and Response curve of Inductive sensor and capacitive sensor		
1.7	**Practical:** Recording filling level of liquid using capacitive sensors		
1.8	Selection of Sensor for particular operation		
1.9	**Practical:** Interfacing sensor with relay circuit		
1.10	Applications		
II	**Behaviour of Magnetic and Ultrasonic Sensor:**	**13 Hours**	
2.1	Introduction	05	08
2.2	**Practical:** Behaviour of magnetic field sensor		
2.3	**Practical:** Behaviour of Ultrasonic Sensor		
2.4	**Practical:** Switching distance and hysteresis of the Magnetic field sensor and Ultrasonic sensor		
2.5	**Practical:** Switching frequency, Reduction factor and Response curve of magnetic field sensor and Ultrasonic sensor		
2.6	**Practical:** Recording filling level of liquid using Ultrasonic sensors		
2.7	**Practical:** Interfacing sensor with relay circuit		
2.8	Applications		
III	**Behaviour of Photoelectric Sensor:**	**12 Hours**	
3.1	Introduction	06	06
3.2	Photo Electric Sensor		
3.3	Types		
3.4	**Practical:** Behaviour of Photoelectric sensor		
3.5	**Practical:** Detection area and hysteresis of photoelectric sensor		
3.6	**Practical:** Interfacing of Colour sensor and Contrast sensor with relays		
3.7	Specification of Sensors		
3.8	Sinking and Sourcing operation		
3.9	**Practical:** Identification of terminals of sensor		
3.10	Applications		
	Total Theory and Practical Hours	**16**	**24**
	Total hours	**40**	

HARDWARE REQUIREMENT

S.NO	LIST OF TOOLS /EQUIPMENTS
1	Inductive and Capacitive Proximity Sensor
2	Magnetic and Ultrasonic Sensor
3	Different types of Photoelectric sensors
4	Material samples
5	Multimeter
6	Distance Measurement system

SOFTWARE REQUIREMENT

NIL

REFERENCE BOOKS

S.NO	NAME OF THE BOOK	AUTHOR	PUBLISHER
1	Sensor Technology and Devices	LjubišaRistić	Sensor Artech House, 1994
2	Sensor Technologies: Healthcare, Wellness and Environmental Applications	Michael J. McGrath, Cliodhna Ni Scanaill, Dawn Nafus	Apress
3	Sensor Technology Handbook,	Jon S. Wilson	Newnes.
4	Optical Fiber Sensor Technology: Advanced Applications	K. T. V. Grattan, L.S. Grattan, B. T. Meggitt	Springer Science & Business Media.

ASSESSMENT AND CERTIFICATION

S.No	Criteria for assessment
1.	A trainee will be assessed based on the performance in End Examination for Theory and Practical conducted internally in the CIICP Project Polytechnic College for a duration of 3 hours
2.	A trainee must have 75% of attendance to appear for End examination in Theory and Practical.
3.	The assessment for theory part will be based on the marks scored in the end examination on the knowledge bank of questions (1 word/objective type questions)
4.	The assessment for practical part will be based on the marks scored in the end examination conducted by the CIICP Project Polytechnic and assessed by the Examiners approved by Strategic Plan Implementation Committee (SPIC) of the project polytechnic.
5.	The passing criteria for successful completion of training is every trainee should score 50% of marks in theory and practical examination.
6.	On successful completion of training, Certificate will be issued to the participants by the Directorate of Technical Education through the Project Polytechnics.

END EXAMINATION

ALLOCATION OF MARKS

S.NO	Description	Max. Marks
1.	Theory Examination	20
2.	Practical Examination	
	a)Objective and Circuit Diagram	20
	b)Procedure and Connections / Execution	20
	c)Result and Viva	20
	d) Record	20
	Total Marks	**100**

THEORY MODEL QUESTION PAPER

EE/2020/012 SELECTION AND TESTING OF INDUSTRIAL SENSORS

(Maximum Marks: 20)

(N.B: Answer any Twenty questions) **20x1= 20 Marks**

1. What is the behaviour of Inductive Proximity Sensor?
2. What is the behaviour of Capacitive Proximity Sensor?
3. Suggest suitable type of Proximity sensor to detect the Metal object?
4. Suggest suitable type of Proximity sensor to detect the Non-Metal object?
5. Suggest suitable type of Proximity sensor to detect the Metal object from long distance?
6. Suggest suitable type of Proximity sensor to detect the level of liquid in tank?
7. What is meant by switching distance in Proximity sensors?
8. What is meant by hysteresis in Proximity sensors?
9. What is meant by reduction factor in Proximity sensors?
10. State the difference between flush type non-flush type proximity sensor?
11. What is the behaviour of Magnetic Field Proximity Sensor?
12. What is the behaviour of Ultrasonic Sensor?
13. What are the applications of Ultrasonic sensor?
14. What are the types of Photoelectric Sensor?
15. What is meant thru-beam photoelectric sensor?
16. What is meant retro-reflective photoelectric sensor?
17. State any two advantages of photo electric sensor.
18. State any two applications of diffuse type photo electric sensor.
19. What is meant thru-beam photoelectric sensor?
20. What is meant by color sensor?
21. What is meant by contrast sensor?
22. State any two specification of Proximity Sensor?
23. Suggest suitable type of sensor to sense the presence of object made of copper.
24. State the difference between PNP and NPN type of Proximity Sensor.
25. What is meant by teach-in in colour sensor?