GOVERNMENT OF TAMILNADU

DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI-25

STATE PROJECT COORDINATION UNIT

(Established under Canada India Institutional Cooperation Project)

CURRICULUM

Course Name	**INSTALLATION OF MOTOR CONTROL CIRCUIT**
Course Code	**EE/2020/016**
Course Duration	60 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 components of Control Circuit • Understand the concept of 2 wire and 3 wire control circuits • Procedure of Constructing AC Motor Control Circuit for various operations. • Procedure of Constructing DC Motor Control Circuit for various operations. • Procedure of Constructing Single phase Motor Control Circuit for various operations.
Course Outcomes	At the end of training, the trainees will be able to • Explain the functions of components of Motor Control Circuits • Explain the sequence of operation of Motor Control Circuit • Construct Motor Control Circuit for Starting, Stopping and Reversing of AC Motor, DC Motor and Single Phase Motor. • Troubleshoot fault in the Motor Control Circuits.
Expected Job Roles	Motor Control Circuit Technician

TEACHING AND SCHEME OF EXAMINATION						
Course Code	Course Name	Hours		Assessment Marks		Duration of Examination
				Min	Max	
EE/2020/016	INSTALLATION OF MOTOR CONTROL CIRCUIT	Theory	24	10	20	3 Hours
		Practical	36	40	80	
		Total	60	50	100	

EE/2020/016–INSTALLATION OF MOTOR CONTROL CIRCUIT

DETAILED SYLLABUS

Unit No	Modules	No.of.Hours	
		Theory	Practical
I	**Components of Control Circuit**	**10 Hours**	
1.1	Manually operated switches	08	02
1.2	Primary and pilot control devices		
1.3	Symbols		
1.4	Operation of Electromechanical control relay		
1.5	Solenoid type contactor		
1.6	Time delay relays – Counter		
1.7	Bimetallic thermal OLR		
1.8	Identification of Relay coil		
1.9	NO Contact and NC Contact		
1.10	Selection of Contactor		
1.11	Maintenance of Contactor		
II	**Basics of Control Circuit:**	**15 Hours**	
2.1	Function of motor control circuit	04	11
2.2	Control circuit Vs Power circuit		
2.3	2 wire and 3 wire control circuit		
2.4	Development of 3 wire control circuit		
	Practical:		
2.5	Single motor starter with one push button control station		
2.6	Single motor starter with two pushbutton control station		
2.7	Motor control with auxiliary contact controlled status indicator lamp		
2.8	One motor automatically starting a second motor using auxiliary contact		
2.9	One motor automatically starting second motor after time delay		
2.10	Electrically interlocking two motors to prevent simultaneous operation		
III	**Practical: AC Motor Control Circuit:**	**15 Hours**	
3.1	Full voltage starting of AC induction motor	04	11
3.2	Semi automatic start delta starter		
3.3	Automatic star delta starter		
3.4	Reversing the direction of rotation of induction motor		
3.5	Jogging in cage induction motor		
3.6	Plug stop of induction motor		
3.7	Dynamic braking of cage induction motor		
3.8	Starter for two speed two winding motor		
3.9	Three step rotor resistance starter for wound induction motor		
3.10	Troubleshooting in control circuit.		

IV	DC Motor Control Circuit:	10 Hours	
4.1	Types of DC Motor and their Applications	04	06
4.2	Principle do DC Motor		
4.3	Manual Starter for DC Motor : 3 point and 4 point starter		
4.4	Types of Starter for Automatic Acceleration		
4.5	**Practical:** Reversing of DC Motor		
4.6	**Practical:** Jogging operation of DC Motor		
4.7	**Practical:** Dynamic Baking of DC Motor		
4.8	**Practical:** Plugging Circuit of DC Motor		
V	**Control of Single Phase AC Motor**	**10 Hours**	
5.1	Types of AC Motor	04	06
5.2	Starter for two value capacitor motor using current relay and Auto transformer		
5.3	**Practical:** Plug reversing of Capacitor start motor		
5.4	Speed control of split phase motor		
5.5	**Practical:** Protection of AC Motor: Over load, Short circuit, Over voltage and under voltage		
	Total Theory and Practical Hours	**24**	**36**
	Total hours	**60**	

HARDWARE REQUIREMENT

S.NO	LIST OF TOOLS /EQUIPMENTS
1	AC and DC Contactor
2	Push buttons
3	Timers
4	Plugging switch
5	Multimeter and Test and Screw Driver

SOFTWARE REQUIREMENT

NIL

REFERENCE BOOKS

S.NO	NAME OF THE BOOK	AUTHOR	PUBLISHER
1	A Text Book of Electrical Machines	Rajput	Firewall Media.
2	Electrical machines: theory and practice	M. N. BANDO	PHI Learning Pvt. Ltd.
3	Electrical Machines - I	U.A.Bakshi, V.U.Bakshi	Technical Publications.
4	Electric Machines	Kothari	Tata McGraw-Hill Education.
5	Control of Electrical Machines	S.K. Bhattacharya	New Age International

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/2020/016 - INSTALLATION OF MOTOR CONTROL CIRCUIT

(Maximum Marks: 20)

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

1. What are the two types of motor control devices?
2. Draw the symbol of push button.
3. What is a relay?
4. What is an ON delay timer?
5. What is the purpose of shading ring on magnetic pole faces of AC contactor.
6. What are the types of motor control circuits?
7. Are symbols in a schematic diagram shown in their energized or de-energized condition?
8. How will you connect remote stop with local stop?
9. What is a rated voltage for main circuit and control circuit of a contactor?
10. Mention the functions of motor control circuits.
11. DOL starter is used to reduce the starting current. State True or False.
12. What is meant by jogging in induction motor?
13. What is the function of timer in automatic star delta starter?
14. How will you reverse the direction of rotation of 3 phase induction motor?
15. Which braking causes less heat generation?
16. What are the types DC Motor?
17. Can a timer be used for the plugging circuit of a dc motor?
18. How is dynamic braking achieved in DC Motors?
19. Write the expression of Counter emf in DC Motor.
20. What is meant by definite time limit starter?
21. What are the types single phase induction motors?
22. Expand: OLR.
23. List the specification of contactor to be mentioned during purchase it particular application.
24. Write the methods of speed control of Spilt Phase Motors.
25. What are the two basic protections are always provided for every motor?