

I 97-80/2019/N105/VE/Electroplating

15/01/2019

Electroplating course – PCP (Theory & Practical) Training Schedule

Total course duration (320 hrs)		
PCP (120 hrs)		Self learning (200 hrs)
Practical (80 hrs)	Theory (40 hrs)	

Week	Schedule		PCP- Topic			Learning outcomes- After attending the PCP learner would be able to:-	
	Topic	Day	Duration (Hr)	Theory	Duration (Hr)		Practical
Week 1	Corrosion	DAY 1	2hrs	<ul style="list-style-type: none"> Introduction to corrosion Types of corrosion. Effects of corrosion Types of corrosion attacks. 	3hrs	<ul style="list-style-type: none"> Demonstration of corrosion in various metals. Spot identification of corrosion in a range of metallic parts. Physical discrimination of corrosive attacks. 	<ul style="list-style-type: none"> Locate ill effects of corrosion on a metal surface. Identifies the type of corrosion on affected metal. Differentiate among different type of corrosion attack.
	Electrochemical corrosion	DAY 2	2hrs	<ul style="list-style-type: none"> Introduction to electrochemical corrosion Factors on which corrosion effect Methods of prevention of corrosion 	3hrs	<ul style="list-style-type: none"> Physical display of the material suffered from electrochemical corrosion. prepare chart/ ppt to demonstrate the factors and methods for prevention of corrosion. 	<ul style="list-style-type: none"> Differentiate among the various types of electrochemical corrosion. Undertake corrosion preventive measures on affected surface.
Week 2	Electro-Chemistry	DAY 1	2hrs	<ul style="list-style-type: none"> Electrochemistry involved in electrochemical 	3hrs	<ul style="list-style-type: none"> Perform a simple experiment of electrochemical reaction. To determine movement of ions 	<ul style="list-style-type: none"> Identify a range of electrochemical reaction.

				reactions		by performing filter paper strip experiment.	<ul style="list-style-type: none"> Track the directions of ion flow Choose or select a range of electrodes required for a particular electroplating combination. Would be able to make connections of electrodes.
	Electro-Chemistry	DAY 2	1hrs	<ul style="list-style-type: none"> Faraday's laws Applications of electrochemistry 	3hrs	<ul style="list-style-type: none"> Perform experiment to validate Faraday's law and record the observations. Conduct a electroplating experiment by depositing copper on the metallic surface using copper sulphate as an electrolyte. To perform experiment to identify strong and weak electrolyte. 	<ul style="list-style-type: none"> Enumerate the concept of farraday's law and use it for conducting electroplating operations. Demonstrate the electrolysis phenomenon. Identify weak and strong electrolyte.
Week 3	Electroplating : Principle & Rate of deposition	DAY 1	2hrs	<ul style="list-style-type: none"> What is electroplating? Electroplating principle. Need of electroplating. 	3hrs	<ul style="list-style-type: none"> Visit a nearby electroplating plant to observe the electroplating process. 	<ul style="list-style-type: none"> Demonstrate the electroplating phenomenon. Observes the main components of electroplating operations.

		DAY 2	2hrs	<ul style="list-style-type: none"> • Faraday's law of electro deposition. • Rate of deposition of one metal in to another. • Chemical equivalent of various metals. 	3hrs	<ul style="list-style-type: none"> • Draw a neat label sketch showing the electro-deposition process. • Calculate the rate of deposition of a range of metals. • Perform the control electro-deposition process for deposition of copper on a small brass sample and observe the weight deposited and the time. 	<ul style="list-style-type: none"> • Calculate rate of deposition for a range of metal on the basis of Faraday's law of electro-deposition. • Choose a suitable electrolyte for the deposition of one metal in to another. • Carry out controlled electroplating process for a range of metals.
Week 4	Electroplating Its Aim and Importance	DAY 1	1hrs	<ul style="list-style-type: none"> • Importance of electroplating 	3hrs	<ul style="list-style-type: none"> • Experiment to observe the adoption of corrosion for a electroplated and a raw metal keeping both in the corroded atmosphere. 	<ul style="list-style-type: none"> • Able to identifying the electroplated and raw metallic parts of machinery. • Categories the electroplating metal according to their properties. • Identify the need of electroplating • Select the suitable metal for electroplating
	Chemical Metal surface preparation and chemical cleaning	DAY 2	2hrs	<ul style="list-style-type: none"> • Significance of chemical cleaning • A range of chemical cleaning 	4hrs	<ul style="list-style-type: none"> • To clean a metal piece by chemical cleaning methods • Compare the various chemical cleaning methods by observing the chemically cleaned metal specimens. 	<ul style="list-style-type: none"> • Prepare the metal surface by chemical cleaning. • Identify a range of cleaning solvents. • Identify different process of metal cleaning. • Carry out simple

							cleaning process on a metal piece.
Week 5	Metal surface preparation and cleaning - CHEMICAL CLEANING	Day 1	2hrs	<ul style="list-style-type: none"> • Importance of metal surface preparation before electroplating • Factors determining metal preparation. • Chemical cleaning. 	4hrs	<ul style="list-style-type: none"> • Perform a range of chemical cleaning processes on different metals and observe the metal surface for different chemical cleaning processes. 	<ul style="list-style-type: none"> • Identify the constituents of different chemical cleaning process. • Carry out chemical cleaning process for a range of metals. • Select appropriate chemical cleaning process for different metals.
	SALT BATH CLEANING	Day 2	2hrs	<p>Methods for surface cleaning:-</p> <ul style="list-style-type: none"> • Salt bath cleaning. • Different salt baths. • Principle of salt bath cleaning. 	4hrs	<ul style="list-style-type: none"> • Perform salt bath cleaning process on different metals. • Observe the range of salt bath cleaned metal surfaces and choose the method best suitable for a metal. • Prepare a chart showing the suitable methods for different metals by observing the cleaned metals. 	<ul style="list-style-type: none"> • Identify the constituents of different salt bath cleaning process. • Carry out salt bath cleaning process for a range of metals. • Select appropriate salt bath for cleaning of different metals.

Week 6	MECHANICAL CLEANING	Day 1	2hrs	<ul style="list-style-type: none"> • Significance of mechanical cleaning. • Constituents of mechanical cleaning. • Process of rust removal 	4hrs	<ul style="list-style-type: none"> • To remove the rust with the help of a suitable rust removing solution. 	<ul style="list-style-type: none"> • Identify the adhesives and abrasives used for mechanical cleaning process. • Carry out rust removal with the help of suitable rust removing solutions. • Prepare polishing composition for a range of metals
		Day 2	2hrs	<ul style="list-style-type: none"> • Finishing techniques to prepare the job for electroplating 	4hrs	<ul style="list-style-type: none"> • To polish a job piece with the help of buffing machine • To polish a given job piece by electropolishing method. 	<ul style="list-style-type: none"> • Polish a range of metals by using buffing machine. • Carry out polishing of a range of metals by using electropolishing.
Week 7	Electroplating sequences	Day 1	2hrs	<ul style="list-style-type: none"> • Significance of following proper sequence. • Preliminary treatment 	4hrs	<ul style="list-style-type: none"> • Demonstrate the electroplating sequences for a range of electroplating. • To electroplate a low carbon steel 	<ul style="list-style-type: none"> • Carry out electroplating of low carbon steel, copper & copper base alloys with different metals (nickel, chrome, gold silver, copper) by following specific sequence. • To prepare different electroplating solutions for a range of electroplating.
		Day 2	2hrs	<ul style="list-style-type: none"> • Plating of low carbon steel • Plating of copper and copper based alloy 	4hrs	<ul style="list-style-type: none"> • To electroplate copper metal piece. • To electroplate a copper based alloys. • To prepare the chart for composition of various salt solutions for preparing electrolyte for a range of 	

						electroplating.	
Week 8	Electroplating on plastics	Day 1	2hrs	<ul style="list-style-type: none"> Importance and purpose of electroplating on plastics 	4hrs	<ul style="list-style-type: none"> Prepare the plastic job piece for chrome electroplating:-making plastic conductive and electroplating 	<ul style="list-style-type: none"> Transform non-conductive plastic in to conductive plastic. Adopts the sequential steps for electroplating of plastic job. Undertake the chrome electroplating on a plastic job piece.
	Visit	Day 2	-----	<ul style="list-style-type: none"> Visit to nearby industry to observe plastic electroplating. 	4hrs	<ul style="list-style-type: none"> Observe the sequence, material, procedure and time required for electroplating. 	
Week 9	Electroplating equipment	Day 1	2hrs	<ul style="list-style-type: none"> Brief description of equipments used in electroplating process 	3hrs	<ul style="list-style-type: none"> Demonstration of equipments used in electroplating process. Demonstration of operating procedure of the electroplating equipment. 	<ul style="list-style-type: none"> Observes the function of all the electroplating equipment. Operate all the electroplating equipments as per their service manual. Carry out electrical connections from rectifier to electroplating tank and electrical panel to agitator and drier and buffing machine. Operate the drier, agitator, buffing
			Day 2	2hrs	<ul style="list-style-type: none"> Drying equipment Electrical equipment i.e. rectifier 	4hrs	

							<p>machine and filter.</p> <ul style="list-style-type: none"> • Carry out the periodic maintenance as per maintenance schedule. • Adopts appropriate safety measures while operating the equipments.
Week 10	Major defects in electroplating	Day 1	2hrs	<ul style="list-style-type: none"> • Major defects in electroplating. • Trouble shooting chart. 	4hrs	<ul style="list-style-type: none"> • identify the defect in a finished electroplated product by physical observation. • prepare a troubleshooting chart for the various defects that may occur during electroplating process. 	<ul style="list-style-type: none"> • identify a range of defects in electroplating. • observe the defect and select the appropriate rectification procedure. • carry appropriate trouble shoot operations in electroplating.
	Embossing process	Day 2	2hrs	<ul style="list-style-type: none"> • Principle of embossing. • Procedure of embossing. • Material and equipment used for embossing. • Characteristic of embossing surface. 	4hrs	<ul style="list-style-type: none"> • demonstrate the procedure of embossing. • demonstrate the various materials used for embossing. • To perform embossing process on aluminium and copper job piece. • Write your name plate by embossing process 	<ul style="list-style-type: none"> • identify & use the material and equipment used for embossing. • Preparing the metal surface for embossing. • Carry out embossing process on a range of metal.
Week 11	Safety precautions in	Day 1	2hrs	<ul style="list-style-type: none"> • A range of safety precautions. • Safety precautions 	4hrs	<ul style="list-style-type: none"> • Perform mock drill following a sequence of safety precautions taken during electroplating. 	<ul style="list-style-type: none"> • Observe the safety precaution required in

	electroplating shop			in Electroplating shop.		<ul style="list-style-type: none"> Visit any electroplating shop and note down the various steps for preparing electroplating bath. 	<p>electroplating process.</p> <ul style="list-style-type: none"> Complies with prescribed safety standards required during electroplating operation (like handling of cyanides solution). Prepare electroplating bath.
	Applications of electroplating	Day 2	2hrs	<ul style="list-style-type: none"> Different types of electroplating and their applications- Ornamental musical instruments, food container, laboratory equipments, nuts & bolts, battery parts, electronic equipments 	4hrs	<ul style="list-style-type: none"> Demonstration of various application of electroplating using audio/video aid. Practice of electroplating of silver gold, copper, cadmium, lead, zinc, nickel-copper, lead-tin, chromium e.t.c 	<ul style="list-style-type: none"> Identify various application of electroplating operations. Identify the material and metal used in different electroplating operations. Perform electroplating operations on a variety of combinations of metals.