

## Syllabus for Six Month Advance Course

### Module No-1

#### Process Plant Mechanical Maintenance and Repairing of Equipment

Week	Trade Theory	Practical
1.	Use of Measuring Instruments, Micrometer, Vernier caliper, Vernier micrometer, Depth Micrometer, Dial micro meter, Vernier height gauge.	Use of measuring Instruments according to theory chapter
2.	Vernier Bevel protector, Combination set, Sinebar, Dial Test Indicator, Slip Gauge, Angle gauge block.	Measurement of taper Job by taper Measuring instruments.
3.	Maintenance Introduction safety precaution in maintenance shop overhauling of any machine and there maintenance	Overhauling of Machine as lathe milling sapper etc.
4.	Maintenance of Pipe line, Pump repairing, Pump shaft coupling and motor shaft coupling alignment.	Pipe thread cutting pump motor alignment
5.	Maintenance of hydraulic system, Maintenance of pneumatic system, principal and working procurer of hydraulic and pneumatic system	Over hauling of Hydraulic & Pneumatic cylinder
6.	Some special machine maintenance as thread cutting, rolling, boring, broaching, sawing , spine cutting NC & CNC machine etc.	Any special machine overhauling
7.	Limit, Fit , Tolerance , types of limit, types of fit, types of tolerance , Allowance types of allowance , different types of limit, fit, Terence, system	Sift & bush bearing turning & fitting
8.	Terminology of limit, fir, tolerance, definition description of each with sketch, geometrical tolerance	Key way cutting & sift pully fitting
9.	Gauge necessity of gauge, Types of gauge there use and safety , Pluge gauge, ring gauge, snap gauge, thread gauge, wire gauge, radius gauge, filler gauge, telescopic gauge	Job making in fitting shop according to any one gauge
10.	Surface finish terminology of surface finish definition description any one with sketch roughness value, Roughness grade and roughness symbol, Explain surface structure with sketch by BIS	Grinding of anyone shaft
11.	Heat treatment, Necessity, Terminology of Heat Treatment, Hardening, Tempering, Annealing, Normalizing, Case Hardening different types of case hardening methods.	Flame hardening of MS Shaft.
12.	Power Transmission, Necessity , Advantage, Types of power Transmission belt , types of belts and there size and specification pulley and there kinds	Pully boring according to shaft
13	Coupling there types and use, chain, chain sprockets, wire rope and clutch for power transmission system and there analysis	Coupling Boring and fitting
14	Gear specification of Gear, Types of Gear and there use key and there types and there use.	Key way cutting on shaft and pulley.
15	Lubricant and coolest , Necessity of lubricant and coolest, types of lubricant and there use types of collect & there use different types of lubricating system	Preventing maintenance of machine

16.	Bearing, Introduction, Necessity types of bearing its construction and there use according to work	Bearing fitting for any technical system
17.	Gear Box, Different types of gear box and there uses Oil seal its use and there kinds gas kits	Gear Box overhauling
18.	Welding types of welding its uses in maintenance shop as a weared surface welding, Broken bolt remove by welding etc.	Weared shaft welding
19.	Basic concept of effective machining, Requirement of good machining practice factors effecting the performance of machine tool ability of work piece	Spare gear cutting
20.	Material to be machine cutting material and performance, tool life and factor affecting it tool failure problem of heat generation during machine power and stability of machine tools economics of machining	Milling cutter sharpening
21	Jig, Fixtures templates roll of jig and fixture in mass production, types of jig and types of fixture factor to be considered for selecting and designing jig or fixture. Template and there use	Boring and bushing
22	A special machine tools, Turret lathe, capstan lathe, coping lathe its working and maintenance	Multi operation of turret lathe
23	Preventive maintenance and installation, New machine installation factor and preventive maintenance advantage there uses	Oil groove in bushes brg
24	Metal physical and mechanical properties of metal , Iron removing process from ORE, Ferrous Metal, Non Ferrous Metal, Ferrus and non ferrous allow its advantage	Helical gear cutting
25	Revision & Test	Project work
26	Examination	Practical Examination

## Syllabus for Six Month Advance Course

### Module No-3

#### Process Plant Electrical Equipment Maintenance & Repairing

Week	Theory	Practical
1	Fundamental of electricity concept of circuits, definition units & effects of electric current ,ohms law & kirchhops low, electric power energy common electrical accessories their specification, cable & wires ,mob. Battery, their testing & maintenance.	Demonstration of Electrical Tools kits. Verification of ohm's law use of millimeter & wattmeter, Building /layout assemble of small ckts. Demonstration practice on fixing common Electrical accessories, identification measurement of wire, Overhauling battery.
2	Magnetic terms, electromagnetism, electromagnetic induction, faradays law Lenz's law, DC generator, types, characteristics armature reaction ,commutation, testing	Identification & testing cd generator, use of mugger, making load and no load characteristic curve of dc generator.
3	Dc motor, types their characteristic & use, starters, type of speed control method & their application Method of testing & repairing dc machine, troubleshooting ,routine maintenance	Identification & testing of dc motor, study of the character of dc motor, study of starter. Connection starting, speed control of starter of motor. Dissemble a dc machine.
4	Electrical wiring IEE rules, types of wiring, domestic & industrial wiring, accessories testing by mager, specification standard of conduits & accessories earthling laying diagram of industrial conduit wiring, colors code of cable.	Practicing different type of wiring by using wiring accessories,
5	Alternating current & related terms, generation of sine ware, phase, in phase out phase. Obstruction of A.C.'R'X <sub>L</sub> &X <sub>C</sub> impedance, power factor, average power, reactive power. Problems on ac ckts. Concept of poly phase star & delta connection.	Demonstration of sine ware, instantaneous values etc. study of the behavior of R, X <sub>L</sub> & X <sub>C</sub> in A.C.ckts.both in series &in parallel. Exact on poly phase ckts. Current, voltage &power measurement in poly phase ckts. Measurement of energy in single &poly -phase ckts.
6	Explanation of alternator. Prime/move type advantages, parts, regulation, and phase sequence, specification of alternators & practical of uses. three phase voltage generator, Test on alternator. General maintenance & routine test.	Demonstration on alternators, parts voltage building, load character& regulation Troubleshooting of alternator.

7	Explanation & defecation of Transformer, classification- C.T.,P.T. Instrument &auto/VARIAC construction, parts working, E.M.F. equations efficiency, parallel operation &poly phase types connection ,cooling, protective devices. Special transformers. Routine test on transformers.	Identification of transformers. connection of transformers efficiency of transformer, testing of transformer, parallel operation of transformer, use of C.T. & P.T. use of instrument transformer.
8	Working principal of A.C. motor parts of A.C. motor types {single &three face} their characteristic & application of A.C. motor testing	Demonstrate single phase & three phase Induction motor, measuring speed current& torque. Dissemble of AC motor.
9	Starters its necessity types basic control ckt, parts & function, BIS symbols pertaining to control & machine, rotary switch Maintenance service & trouble shoot. Of motor & starter.	Demonstrate starters Contactor program of different type of starters, assemble & connect & run an induction motor identify F/R switch.
10	A.C. winding terms, armature winding terms, coil side, end coil &grouping of coils. Connection to adjacent poles, connected armature winding, alternator pole connection armature winding –Lap & wave connected.	Making forma, coil insulation, slot insulation, insertion of coil in slots coil connection practice in single layer concentric winding.
11	D.C. winding terms, pole & pitch, coil back pitch, front pitch – progressive& retrogressive winding	Winding practice in distributed type, testing for faults, Growler testing –baking impregnating & varnishing.
12	Transformer construction & core winding shielding, auxiliary parts-breather, conservator buchltzrely, other protective devices cooling of transformer. it oil testing & tap changing off load & on load its bushings & termination.	Cleaning maintenance of transformer-changing of silica gel. Conducting no load & short ckt tests. Testing 1ph & poly ph. transformer.
13	Explain & definition of Amplifier, How a transistor, Amplifiers, signals, pulse, shapers cascade system, expl and definition of oscillator, working principal ex placation of stage and types	Assembly & testing of a single stage amplifier and checking in an oscilloscope study of types of wave shapes. Study of oscillator ckt. Voltage measurement current and study wave shapes in scope
14	Expl and working principal and practical application of UJT, FET, SCR Dias & Triac Motor speed control circuit using SCR power supply stabilizer	Study of simple ckts Contain UJT of triggering do FET as an amplifier Do power control by SCR & Triad & Dias Demonstration on power supply stabilizer
15	Define converter inverter MG set description characters, specification running & Maintenance	Starting running and building up voltage & Loading of MG set, maintenance of MG sets
16	Insulating material, their classification and their uses in industries, type of coupling, method of alignment, foundation for MG set, panels for electrical work.	Development of sequence of operation in detecting electrical & Mechanical Trouble in motors and generators, overhauling of AC and DC machine. Align MG set. Prepare foundation for MG set. Install & wire up a panel for MG set

17	Substation, Accessories mounted in substation types of substation, over head poles and method of jointing aluminum conductor. Specification, advantages, Line Insulators , underground cable & joints sealing the cable at the junctions	Identify different accessories in sub station, Erect overhead service line Draw overhead line Making different type of joint in under ground cable
18	Transmission Distribution & Generation. Circuit breakers, Electromagnetic clutches, method of maintenance & Servicing, Relays, Busbar system	Identify parts of circuits breakers, troubleshooting and servicing a circuit breaker, Identify parts of relay & relay setting, Erect over head busbar in a workshop
19	Introduction of precision measuring instrument (ie megger earth tester, frequency meter, energy meter etc)and their use and safety introduction of pipe cutting used of pipe fitting element	Measuring technique of precision measuring instrument. Pipe threading by die stock
20	Introduction of compressor Air Gauge and their use in plant safety valves. Pumps and their kind centrifuge and reciprocating pump use and their maintenance	Air Compressor Maintenance  Pump Maintenance
21	Fans F D Fans I D fans blowers injector and other bailer instrument motor maintenance and motor pump coupling Alignment	Fan and blower injector repairing motor maintenance
22	Gear Boxes different types of gear box its use and maintenance gauge Temperature measurement thermo meter Thermo Couple Pyro meter	Gear Box Over hauling  Repairing of Thermo couples
23	Metal – Physical and mechanical properties ferrous and Non Ferrous Metal Ferrous and Non ferrous Allows	Maintenance of Ferrous
24	Pressure gauge their use and safety flow measurement gauge use and their safety measurement speeds	Different types of Gauge Maintenance
25	Revision & Test	Project Work
26	Examination	Practical Examination

## Syllabus for Six Month Advance Course

### Module No-2

#### Process Plant Refrigeration & Air Conditioning Maintenance

Week	Trade Theory	Practical
1.	Workshop tools & Equipment there types & maintenance	Care maintenance and safety of workshop tools & equipment
2.	Thermodynamics of refrigeration operation cycles effects of super hitting, sub cooling etc.	Cutting, bending & coil making of hard copper and steel tube as used in refrigeration system
3.	Thermodynamics of refrigeration operation cycles effects of super hitting, sub cooling etc.	Silver scold ring copper tube brazing copper and mailed steel tube Gas and Ark welding steel tube
4.	Multi stage compressor and intercooler their function & application	Dismantling of commercial type compressor checking component parts.
5.	Condenser – Its principal and function capacity of condenser type of condenser, Air cool, Water cool & evaporative their construction & their application.	Servicing of water cooled condenser, receiver and filter testing leakage & repair
6.	Condenser – Its principal and function capacity of condenser type of condenser, Air cool, Water cool & evaporative their construction & their application.	Servicing and repairing of evaporative condenser and cooling tower
7.	Cooling tower – natural draught , Mechanical draught & forced draught their principal and application	Decaling of water cooled and evaporative condenser pressure testing and leak detection and repairing
8.	Pump and accessories reciprocating , rotary and centrifugal their function, operation use and maintenance	Care maintenance and repair of centrifugal pump
9.	Water regulating valve and Oil pressure switch their function and operation	Servicing of water regulating valve, high pressure safety cutout, Oil pressure Switch
10.	Evaporator Its principal and capacity air cooling and liquid chilling evaporator – their type, construction and application blower fan types description and various uses in the system	Servicing of commercial type evaporator , Blower Fan air filter
11	Evaporator Its principal and capacity air cooling and liquid chilling evaporator – their type, construction and application blower fan types description and various uses in the system	Servicing of commercial type evaporator , Blower Fan air filter
12	Refrigerant controls – their construction operation and use	Servicing repairing and adjusting of liquid refrigerant control
13	Meters starters and relays for refrigeration system	Servicing, repairing & adjusting

	their function, operation and maintenance	relay, starter time relay and thermostat.
14	Commercial type refrigerator – their constructional features and application	Care maintenance and repair of refrigerator compression type
15.	Ice making system, Raw water & Ice defect, capacity of an ice plant	Use of Indirect system, density measurement, use of agitator
16.	Ice making system, Raw water & Ice defect, capacity of an ice plant	Use of Indirect system, density measurement, use of agitator
17.	Study of air – dew point humidity specific humidity and relative humidity measurement of humidity	Care maintenance and use of sling psychomotor, humidistat and remote bulb thermometer
18.	Air Distribution Ducting size and construction Grille turning vane and diffuser their function application and maintenance.	Making of Air duct grille and air filter
19.	Air filter – Type of filter, their construction application and maintenance	Fixing of grill damper, Air filter & blower
20.	Insulating material their properties and type cork, glass wool, slag wool, plastic, reflecting material, water proofing & finishing material	Use of Insulating and water proofing material
21.	Installation of an air conditioning plant, testing and gas charging, trouble analysis	Electric Wiring of the condensing unit, pump, blower, solenoid valve, thermo state, Humid state and hitting elements
22	Installation of an air conditioning plant, testing and gas charging, trouble analysis	Evacuating the system pressure testing and detection of leak
23	Waters softening plant – constructional feature defect and their remedies determination of hardness of water treatment of water for softening	Water Distillation test impurity test , Dissolve oxygen test, PH test, Air depend carbonate
24	Waters softening plant – constructional feature defect and their remedies determination of hardness of water treatment of water for softening	Water Distillation test impurity test , Dissolve oxygen test, PH test, Air depend carbonate
25	Revision & Test	Project work
26	Examination	Practical Examination