

Trade - Mec. R.A. C.

Syllabus Breakup Daily

Week	Day	Subject	Theory (02 hours)	Practical (05 hours)
1	1	Theory	Introduction to trade and related industries. General safety precautions and first aids, fire fighting equipments and electrical safety.	Identify workshop & machineries.
	2		History of Refrigeration and Air conditioning.	Demonstrate Safety precautions and First aid.
	3	W/Shop calculation	Classification of Unit System Fundamental and Derived Units F.P.S, C.G.S, M.K.S and SI Units ,Measurement Units and Conversion,Factors, HCF, LCM and Problems	Demonstrate fire fighting
	4	Engg. Drawing	Engineering Drawing – Introduction Introduction to Engineering Drawing and Drawing Instruments – ->Conventions ->Viewing of engineering drawing sheets. ->Method of Folding of printed Drawing sheet as per BIS SP: 46-2003	Demonstrate working at height using PPE's and identify the hazards and take personal safety precautions.
	5	ES	Behavioural Skill-Creating a focused and responsible learning environment-Chart paper Activity.	Extra Curricular activity : 2 Hrs Theory : 3 Hrs. Function, use and specifications of refrigeration tools, instruments and equipment. Grooming of technicians.
	6	ES	Self-awareness and confidence building, display professionalism at the institute and work place	Demonstrate working at height using PPE's and identify the hazards and take personal safety precautions. (10 hrs)

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2	1	Theory	Fitting Different types of Fitting hand tools, power tools, - their use. Function, construction, Specification & their	Identify general tools, instruments & equipments.
	2		Machineries and equipments used in fittings like drilling machines	Care and maintenance of tool, instruments and equipments.
	3	W/Shop calculation	Fractions – Addition, Subtraction, Multiplication and Division ->Decimal Fractions - Addition, Subtraction, Multiplication and Division ->Solving Problems by using calculator	Perform flat filing, marking, punching and hack sawing to make a job as per drawing
	4	Engg. Drawing	Drawing Instrument ->Drawing board, T-square, Drafter (Drafting M/c), Set squares, Protector, Drawing Instrument Box (Compass, Dividers, Scale, Diagonal Scales etc.), pencils of different grades, Drawing pins/ Clips.	Perform flat filing, marking, punching and hack sawing to make a job as per drawing
	5	ES	Increased Social initiations relationships and networks . Acceptance of peers from different cultures and social groups and work with them . Collaboration with team to prioritise the common goal and compromise individual priorities.	Extra Curricular activity : 2 Hrs Theory : 3 Hrs. . grinding machines – types, specifications and care and maintenance.
	6	ES	Characteristic of a responsible citizen- Display the same by respecting self, others, environment, care for duty and value for time.	Perform flat filing, marking, punching and hack sawing to make a job as per drawing

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3	1	Theory	Fitting Precision measuring instruments – Function, construction, Specification & their application.	Perform flat filing, marking, punching, hack sawing, drilling, tapping, reaming, dieing to make a job as per drawing
	2		Fitting Precision measuring instruments – Function, construction, Specification & their application.	Perform flat filing, marking, punching, hack sawing, drilling, tapping, reaming, dieing to make a job as per drawing
	3	W/Shop calculation	Square and Square Root ->Simple problems using calculator ->Application of Pythagoras Theorem and related problems	Perform flat filing, marking, punching, hack sawing, drilling, tapping, reaming, dieing to make a job as per drawing
	4	Engg. Drawing	Free hand drawing of – ->Lines, polygons, ellipse etc.	check using precision measuring instruments Viz. Vernier calliper, Micrometer,
	5	ES	Adopting best practices and aspire to follow success stories of individual for personal development.	Extra Curricular activity : 2 Hrs Theory : 3 Hrs. Fitting Precision measuring instruments – Function, construction, Specification & their application.
	6	ES	English literacy:-Importance of learning english	check using precision measuring instruments Viz. Vernier calliper, Micrometer,

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4	1	Theory	Sheet metal Function, construction, working, use, and application, specification of Sheet metal tools, instruments and equipment. Care and maintenance of tool	Perform Sheet Cutting by straight snip as per drawing. Perform Sheet Cutting by bent
	2		Types of sheet metal joints (cold and hot) and their use. Care and maintenance of tools. Types of sheet metal joints (cold and hot) and their use. Rivet & riveting, their	as per drawing. Bend, fold and join metal sheets in different process. Join sheet metal by using rivet set and snap
	3	W/Shop calculation	Monthly Test WCS	Solder sheets of metal. Prepare a box or funnel with sheet metal as per drawing
	4	Engg. Drawing	Monthly Test ED	Solder sheets of metal. Prepare a box or funnel with sheet metal as per drawing
	5	ES	Monthly Test ES	Monthly Test theory
	6	ES	Different naming words, word used for replacing names, action words, describing people, place and their use.	Monthly Test Practical

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5	1	Theory	Electrical Electrical terms such as AC and DC supply, Voltage, Current, Resistance, Power, Energy, Frequency etc.	Demonstrate Electrical safety precautions and First aid. Identify, use and maintain electrical tools.
	2		Safety precautions to be observed while working on electricity. Conductors and Insulators, Materials used as conductors. Series and parallel circuit, open circuit, short circuit, etc.	Prepare simple twist joints of wires. Prepare married joints of wires.
	3	W/Shop calculation	Ratio and Proportions ->Direct and Indirect proportion ->Percentage ->Changing percentage to decimal	Measure current, voltage, resistance, power, frequency, energy using analog and digital meter through a single phase circuit.
	4	Engg. Drawing	Geometrical figures and blocks with dimension	Measure current, voltage, resistance, power, frequency, energy using analog and digital meter through a single phase circuit.
	5	ES	Introduction to punctuation-comma, full stop, question mark.	Extra Curricular activity : 2 Hrs Theory : 3 Hrs. Measuring Instruments such as voltmeter, ammeter, ohm meter, watt meter, energy meter and frequency meter. Earthing and its importance. Earth resistance. Insulation and continuity test
	6	ES	Singular plural	Test insulation and earth resistance using Megger.

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6	1	Theory	Inductors and capacitors. Effects of inductor and capacitors in an AC circuit. Inductive reactance, capacitive reactance, Impedance and power factor.	Star & Delta connection on a three phase motor and show line voltage, line current, phase voltage and phase current.
	2		Lagging and leading power factors. Single phase and Three phase supply system.	Star & Delta connection on a three phase motor and show line voltage, line current, phase voltage and phase current.
	3	W/Shop calculation	Types of metals ->Physical and Mechanical Properties of metals	Star & Delta connection on a three phase motor and show line voltage, line current, phase voltage and phase current.
	4	Engg. Drawing	Transferring measurement from the given object to the free hand sketches.	Three phase power & power factor measurement
	5	ES	Change of tense-simple present, past; present, past progressive	Theory : 3 Hrs Star and Delta connection and their comparison. Line voltage, Line current, Phase voltage and Phase current. Methods of improving power factor. Extra curricular activity : 2 hrs
	6	ES	Construction of simple sentences-kinds of sentences	Three phase power & power factor measurement

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7	1	Theory	Electronics Introduction to Electronics.	Identify electronic components, tools & instrument.
	2		Basic Principles of semiconductors	Colour coding of resistors. Verify Ohm's Law.
	3	W/Shop calculation	Types of ferrous and non-ferrous metals ->Introduction of iron and cast iron	Use voltmeter, ammeter and multimeter.
	4	Engg. Drawing	Solid objects – Cube, Cuboids, Cone, Prism, Pyramid, Frustum of Cone with dimensions.	Practice soldering & desoldering.
	5	ES	Usege of appropriate words to express themselves	Theory : 3 Hrs Principles and application of Diodes. Solder – its composition and paste. Extra curricular activity : 2 hrs
	6	ES	Greetings & self indroduction	Practice soldering & desoldering.

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8	1	Theory	Rectification, Zener diode as voltage regulator	Identify transistors, resistors, capacitors, diodes, S.C.R., U.J.T., amplifier and I.C.
	2		transistors parameters- CB, CE, CC,	Construct and test full wave rectifier using diodes
	3	W/Shop calculation	Monthly Test WCS	Construct and test a bridge rectifier
	4	Engg. Drawing	Monthly Test ED	Construct and test series voltage regulator circuit.
	5	ES	Monthly Test ES	Monthly Test theory
	6	ES	Asking & self indtroduction	Monthly Test Practical

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9	1	Theory	configuration, amplification	Construct and test power supply using fixed voltage regulator lcs.
	2		SCR Photo diodes, photo transistors	Identify and test SCR
	3	W/Shop calculation	Difference between iron and steel, alloy steel and carbon steel ->Properties and uses of rubber, timber and insulating materials	Construct and test an electronic timer using UJT & SCR.
	4	Engg. Drawing	Free hand drawing of hand tools and measuring tools, simple fasteners (nuts, bolts, rivets etc.) trade related sketches	Apply OP-AMP, photo transistor and test performance
	5	ES	Asking & responding to question	Theory : 3 Hrs multi – vibrator, CR & LR circuit. SCRs, UJTs, ICs. Extra curricular activity : 2 hrs
	6	ES	Sharing information with others	Apply OP-AMP, photo transistor and test performance

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10	1	Theory	Welding Introduction to basic principles of commonly used Welding processes oxy fuel gas welding / cutting, brazing & soldering, nozzles	Identify gas welding equipments & accessories. Demonstrate safety precaution in handling of Oxy-acetylene cylinders, regulators etc.
	2		base metal and filler metal. Use of flux.	Setting up of AIR-LPG, O2-LPG and O2-C2H2 using can type portable flame set.
	3	W/Shop calculation	Mass, volume, density, weight & specific gravity	Oxy-acetylene gas welding, brazing and cutting on thin sheet metal.(
	4	Engg. Drawing	Lines ->Definition, types and applications in drawing as per BIS: 46-2003 ->Classification of lines (Hidden, centre, construction, extension, Dimension, Section)	Oxy-acetylene gas welding, brazing and cutting on thin sheet metal.(
	5	ES	Formal and informal communication	Theory : 3 Hrs Welding tools and equipment type specification and use. Safety method in welding. Extra curricular activity : 2 hrs
	6	ES	Speak and provide information about workplace	Oxy-acetylene gas welding, brazing and cutting on thin sheet metal.(

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11	1	Theory	Method of gas welding, gas used and flames adjustment and pressure setting of O2 and DA.	Demonstrate Care & Safety of welding tools and equipments. Back fire arrester. Set Oxy-acetylene plant, use two stage regulator, adjustment of flame, gas pressure – O2 and DA.
	2		Difference between soldering and Brazing in terms of temperatures. filler materials, joint strengths and applications	Perform brazing between Cu to Cu and Cu to MS, Cu to aluminium pipes.
	3	W/Shop calculation	Related problems for mass, volume, density, weight & specific gravity	Perform brazing between Cu to Cu and Cu to MS, Cu to aluminium pipes.
	4	Engg. Drawing	Drawing lines of given length (Straight, curved) ->Drawing of parallel lines, perpendicular line ->Methods of Division of line segment	Perform brazing between Cu to Cu and Cu to MS, Cu to aluminium pipes.
	5	ES	Discussions on current happenings. Self, Work, Environment	Theory : 3 Hrs Use of Oxy Acetylene, Oxy LPG, Air LPG and two stage regulator for brazing/soldering. Description of back fire arrester. Extra curricular activity : 2 hrs
	6	ES	Simple writing skills	Join metal plates by using gas welding (lap joint, butt joint, etc).

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12	1	Theory	Basic Refrigeration Basic principle of refrigeration, working, use, specifications of refrigeration tools	Join metal plates by using gas welding (lap joint, butt joint, etc).
	2		instruments and equipment. Fundamentals of Refrigeration, units and measurements	Join metal plates by using gas welding (lap joint, butt joint, etc).
	3	W/Shop calculation	Rest, motion, speed, velocity, difference between speed and velocity, acceleration and retardation	Identify & use of general hand tools, instruments & equipments used in refrigeration work.
	4	Engg. Drawing	Drawing of Geometrical figures: Definition, nomenclature and practice of – → Angle: Measurement and its types	Identify & use of general hand tools, instruments & equipments used in refrigeration work
	5	ES	Communication Skills:-Interview Skill/Confidence Building	Theory : 3 Hrs Pressure & its Measurements, Thermodynamics law. Extra curricular activity : 2 hrs
	6	ES	Professionalism and display of same at the institute and work place	Identify & use of general hand tools, instruments & equipments used in refrigeration work.

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13	1	Theory	Science related to refrigeration, work, power, energy, force, Heat and Temperature	Identify & use of general hand tools, instruments & equipments used in refrigeration work.
	2		Different temperature scales, Thermometers, Units of heat t, sensible heat, latent heat	Identify & use of special tools, instruments & equipments used in refrigeration work.(
	3	W/Shop calculation	Quarterly Test WCS	Identify & use of special tools, instruments & equipments used in refrigeration work.(
	4	Engg. Drawing	Quarterly Test ED	Identify & use of special tools, instruments & equipments used in refrigeration work.(
	5	ES	Quarterly Test ES	Quarterly Test theory
	6	ES	Understand the usage of appropriate words to express themselves communicate effectively on telephone.	Quarterly Test Practical

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14	1	Theory	super heating and sub-cooling, saturation temperature , pressure, types, units	Identify & use of special tools, instruments & equipments used in refrigeration work.(
	2		Types of Refrigeration systems	Identify various refrigeration equipments and components of vapour compression system like compressor, condenser, expansion device and evaporator. Identify and Check vapour absorption refrigeration cycle
	3	W/Shop calculation	Related problems on speed and velocity	Identify various refrigeration equipments and components of vapour compression system like compressor, condenser, expansion device and evaporator. Identify and Check vapour absorption refrigeration cycle
	4	Engg. Drawing	Triangle: different types	Identify various refrigeration equipments and components of vapour compression system like compressor, condenser, expansion device and evaporator. Identify and Check vapour absorption refrigeration cycle
	5	ES	Manage personal hygiene and presentation positive body language: adopt and use it appropriately to build a positive impression	Theory : 3 Hrs including Vapour absorption refrigeration cycle (VARC) . water – LiBr combination. Parents instructor meeting: 2 hrs
	6	ES	Different spatial zones: Understanding and need to maintain it, create safe zones for communication	Identify various refrigeration equipments and components of vapour compression system like compressor, condenser, expansion device and evaporator. Identify and Check vapour absorption refrigeration cycle

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15	1	Theory	Study the construction and working of vapor compression cycle, low side & high side of vapour compression system	Identify various refrigeration equipments and components of vapour compression system like compressor, condenser, expansion device and evaporator. Identify and Check vapour absorption refrigeration cycle
	2		Applications of vapour compression cycle. Coefficient of Performance (COP), Ton of Refrigeration.	Unroll, cut and bend soft copper tubes.
	3	W/Shop calculation	Potential energy, Kinetic Energy and related problems with related problems	Swage and make a brazed joint on copper tubing.
	4	Engg. Drawing	Rectangle, Square, Rhombus, Parallelogram	Make flare joints and test them with flare fittings.
	5	ES	Maintainig appropriate eye-contact in building trust and confidence	Theory : 3 Hrs Construction and working of V.C Cycle. fundamental operations, sub cooling and super heating. Study of Ph, Ts, Pv diagram. Extra curricular activity : 2 hrs
	6	ES	Impact of touch in a formal environment. Acceptable and unacceptable touch.	Pinch off copper tubing. Use lock ringtool and various fittings of lockring for servicing of appliances

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16	1	Theory	Refrigerator (Direct cool) Function, construction ,working of single door direct cool refrigerator	Use lock ringtool and various fittings of lockring for servicing of appliances
	2		specifications, trouble shooting, care and maintenance.	Use lock ringtool and various fittings of lockring for servicing of appliances
	3	W/Shop calculation	Work, power, energy, HP, IHP, BHP and efficiency	Brazing of Cu to Cu, Cu to steel, Cu to brass using AIR LPG suitable in RAC machine.
	4	Engg. Drawing	Circle and its elements	Brazing of Cu to Cu, Cu to steel, Cu to brass using OxyLPG.
	5	ES	Time mangagement and planning skills interview skills its phases & ways to crack interview	Theory : 3 Hrs Requirement of Vacuum and level of vacuum. Extra curricular activity : 2 hrs
	6	ES	Handing setbacks/rejection and recover from it with an action plan.	Brazing of Cu to Cu, Cu to steel, Cu to brass using OxyAcetylene.

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17	1	Theory	Refrigerator (Direct cool) Study the construction & working of direct cool Refrigerator.	Identify electrical and mechanical components of refrigerator. Check and replace electrical components of refrigerators.
	2		Study the electrical components of refrigerator. Study the mechanical components of refrigerator and their types.	Leak test, evacuation, gas charging in refrigerators.
	3	W/Shop calculation	Monthly Test WCS	Wiring circuit of refrigerator. Installation of refrigerator.
	4	Engg. Drawing	Monthly Test ED	Identify electrical components of direct cool refrigerator.
	5	ES	Monthly test ES	Monthly Test theory
	6	ES	Developing strong professional contract/network to gain support in learning process and career as a whole	Monthly Test Practical

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18	1	Theory	Study the heat exchanger, door gaskets, Heat Insulation materials. Care and maintenance of refrigerator.	Identify mechanical components of direct cool refrigerator. Installation of refrigerator.
	2		Importance of flushing in evaporator and condenser, use of dry nitrogen for flushing, necessity of replacing capillary and drier.	Checking door alignment, adjustment of door switch operation & replacing of gaskets. Tracing the mechanical components of refrigerator.
	3	W/Shop calculation	Concept of heat and temperature, effects of heat, difference between heat and temperature ->Scales of temperature, Celsius, Farenhieght, Kelvin and Conversion between scales of temperature	Check, Find Fault and test the electrical and other system components of refrigerator.
	4	Engg. Drawing	Different polygon and their values of included angles. Inscribed and circumscribed polygons	testing of compressor. Identification of motor terminals. Start of compressor with and without relay.
	5	ES	Literacy:- Indtroduction to computers and its applications hardware and peripherals, srarting and shutting down of computer, basic ofn computer networks.	Theory : 3 Hrs Evacuation, leak testing, gas charging method in refrigerator, Refrigerants used in Refrigerators and its properties. Desiccant drying agent. Extra curricular activity : 2 hrs
	6	ES	Basics of Operating System, Types of operating systems, user interface of widows OS/ latest create, copy move and delete files and folders, use of external memory like pen drive, CD,DVD etc, introduction toinbuilt windows apps, tools and features.	Test performance of direct start refrigerator. Cleaning and flushing of evaporator and condenser with dry nitrogen. Replacement of capillary tube and drier.

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19	1	Theory	Frost Free Refrigerator Study the construction and working of Frost Free (2 or 3 door) Refrigerator parts particularly, the forced draft cooling, Air Duct circuit	Installation of gauge manifold in the system. Leak testing, evacuation and gas charging in refrigerator.
	2		temperature control in Freezer & cabinet of Refrigerator, air flapper / louver used in refrigerator section, automatic defrost system.	Tracing electrical circuit of Frost Free refrigerator.
	3	W/Shop calculation	Temperature measuring instruments, types of thermometer, pyrometer and transmission of heat - Conduction, convection and radiation	Checking, fault finding and testing of electrical accessories like thermostat, timer, defrost heaters, bi-metal, air louvers etc. and other system components.
	4	Engg. Drawing	Lettering & Numbering – ->Single Stroke	Checking, fault finding and testing of electrical accessories like thermostat, timer, defrost heaters, bi-metal, air louvers etc. and other system components.
	5	ES	Basic operating of word processing, creating, opening and closing documents, use of shortcuts, creating and editing of text, formatting the text	Theory : 3 Hrs Study of Electrical accessories & their functions (Timer, Heater, Bimetal, Relay, OLP, T/S etc..) Refrigerator cabinet volume calculation. Extra curricular activity : 2 hrs
	6	ES	Creating simple documents like resum, letter writing, job application etc., printing document	Checking air distribution system. Servicing of refrigerator. Testing the performance of refrigerator.

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20	1	Theory	Refrigerator (Inverter Technology) Study the construction and its working of two and three door frost free refrigerator.	Identify three and four door no frost refrigerator
	2		Care and maintenance,	Stripping of components.
	3	W/Shop calculation	Co-efficient of linear expansion and related problems with assignments	Tracing electric circuit.
	4	Engg. Drawing	Lettering & Numbering – Double Stroke	Testing components
	5	ES	Basic of excel worksheet and its importance creating simple worksheets adding and average function, printing of simple excel sheet.	Theory : 3 Hrs installation method. Extra curricular activity : 2 hrs
	6	ES	Indroduction to world wide web. (www) usefull websides web browser-usege, search engine etc. Using popular sites like bharat skills, skill traing related govt. portals, nokari.com, and other job portals.	Leak testing, evacuation, gas charging.

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21	1	Theory	Compressor Function, construction, working, application of compressor, (Ecquainting w2ith hermetic compressor of Refrigerator or window type AC. Cut the compressor and
	2		(Fixed speed and variable speed compressor) like Reciprocating, rotary, scroll and inverter type.	Identify different compressor and Service it.
	3	W/Shop calculation	Monthly Test WCS	Lap necessary parts and cut the gasket.
	4	Engg. Drawing	Monthly Test ED	Assemble the compressor with the new gasket.
	5	ES	Monthly Test ES	Monthly Test theory
	6	ES	Cits Applications , apprenticeship portal (naps), resize images, singing up, online fund transfer, using UPI gateway	Monthly Test Practical

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23	1	Theory	AC motors and their types. Advantages of AC motor over DC motor. Revolving field theory. Phase splitting theory. Capacitor method and inductor method used to split the single phase. Torque –starting torque and running torque. Split phase induction motors, working principle and construction.	Identify terminal sequence of hermetic compressor motor by using digital multimeter and start by DOL starter and measure starting current and running current by using ammeter and AVO meter.
	2		Starting winding and running winding. Starting current and running current. Method of changing the direction of rotation (DOR)	Identification of terminal sequence of CSIR motor by using digital multimeter and start by DOL starter and measure starting current and running current by using Ammeter and AVO meter. Direct start using ammeter and voltmeter
	3	W/Shop calculation	Boiling point and melting point of different metals and Nonmetals ->Concept of pressure and its units in different system	Identification of terminal sequence of CSIR motor by using digital multimeter and start by DOL starter and measure starting current and running current by using Ammeter and AVO meter. Direct start using ammeter and voltmeter
	4	Engg. Drawing	Dimensioning and its Practice ->Definition, types and methods of dimensioning (functional, non-functional and auxiliary), ->Position of dimensioning (Unidirectional, Aligned)	Start CSR motor through DOL starter and measure starting current and running current and changing of DOR.
	5	ES	Entrepreneur skills:- Need of becoming entrepreneur	Theory 3 Hrs: .Capacitor starts induction run motor, working principle and construction. Centrifugal switch and its function. Starter and its necessity.DOL starter and the safety devices incorporated in it. Description of hermetic compressor motor. Extra curricular activity : 2 hrs
	6	ES	Ways to becoming a good entrepreneur	Start CSR motor through DOL starter and measure starting current and running current and changing of DOR.

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24	1	Theory	Capacitor starts capacitor run motor, working principle and construction.	Start CSR motor through DOL starter and measure starting current and running current and changing of DOR.
	2		Starting capacitor and running capacitor Shaded pole motors, working principle and construction.	Start shaded pole motor through DOL starter and measure starting current and running current and changing of DOR,
	3	W/Shop calculation	Introduction and uses of electricity, molecule, atom, how electricity is produced, electric current AC, DC and their comparison, voltage , resistance and their units	Start shaded pole motor through DOL starter and measure starting current and running current and changing of DOR,
	4	Engg. Drawing	Types of arrowhead ->Leader line with text ->Symbols preceding the value of dimension and dimensional tolerance.	dismantle motor identify parts and assemble.
	5	ES	Enabling environment available to vecome an entrepreneur	Theory : 3 Hrs Torque comparison among various single phase AC motors. Common faults, causes and remedies in motors. Extra curricular activity : 2 hrs
	6	ES	Different Govt. institutions/schemes promoting entrepreneur viz., Gramin bank, PMMY-MUDRA loan, DIC, SIDA SISI, NSIC, SIDO.	dismantle motor identify parts and assemble.

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26	1	Theory	Production of rotating magnetic field by three phase AC supply. Working principle of three phase induction motor. Terms such as torque, slip, rotor frequency and their relation.	Identify the terminals of a Squirrel cage induction motor.
	2		Construction of squirrel cage induction motor. Importance of phase sequence. Construction of slip ring induction motor Comparison between SCIM and SRIM.	Start the motor through DOL starter and measure starting current, running current and show changing of DOR.
	3	W/Shop calculation	Quarterly Test WCS	Start the motor through Star Delta or Auto transformer starter and measure starting current, running current and show changing of DOR.
	4	Engg. Drawing	Quarterly Test ED	Familiarise with Slip-ring induction motor and identify its terminals. Start the Slip-ring induction motor through Rotor resistance starter and measure starting current, running current and show changing of DOR.
	5	ES	Quarterly Test ES	Quarterly Test theory
	6	ES	Examples of successful and unsuccessful entrepreneurs.	Quarterly Test Practical

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27	1	Theory	Three phase motor starters such as DOL starter, Star – Delta starter, Auto transformer starter and Rotor resistance starter. Common faults, causes and remedies in three phase AC motors	Rectify fault through insulation test, continuity test, open circuit test and short circuit test.
	2		Working principle of inverter technology, advantages of variable speed technology over fixed speed.	Explain control circuit of variable speed air conditioners (Inverter ACs).
	3	W/Shop calculation	Electrical power, energy and their units, calculation with assignments	. Identify components of control system of Inverter ACs including printed circuit board (PCB) NTC,PTC e.g. Power PCB, Filter PCB, Heat sink reactor.
	4	Engg. Drawing	Method of presentation of Engg. Drawing ->Pictorial View ->Orthographic View ->Isometric View	Wiring of the control system.
	5	ES	Maintaning efficiency at workplace:- Factors affecting productivity	Theory : 3 Hrs Working principle of control system for inverter Air Conditioners (ACs). Printed circuit board (PCB), including power PCB, filter PCB, heat sink and reactor. Wiring diagram. Parents instructor meeting: 2 hrs
	6	ES	Improving productivity	Wiring of the control system.

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Week	Day	Subject	Theory (02 hours)	Practical (05 hours)
28	1	Theory	Condenser Function of condenser, types, Construction of air cooled condenser.	Familiarise with different types of condensers used in refrigerators, Bottle coolers, visible coolers, deep freezers, Window and Split AC.
	2		Effect of choked condenser. Advantages, de scaling of air cooled condenser. Effects of air fouling and bypass air in condenser	Clean, flush, service and leak test different type of air-cooled condensers, micro channel condensers.
	3	W/Shop calculation	Magnetic induction, self and mutual inductance and EMF generation ->Electrical Power, HP, Energy and units of electrical energy	Remove dust from fins in air cooled condenser, micro channel condensers.
	4	Engg. Drawing	Symbolic representation – different symbols used in the trades ->Fastener (Rivets, Bolts and Nuts)	Identify with different types of water cooled condensers like Shell and Tube type, Tube within tube type, shell, coil & evaporative type, etc
	5	ES	Personal finance literacy planning, saving, tax govt. schemes for financial safety e.g. Pradhan Mantri Jeevan Jyoti Bima Yojana (PMJJBY) etc.	Theory : 3 Hrs . Types of water cooled condenser, application, and advantages. Extra curricular activity : 2 hrs
	6	ES	Occupational Safety, Health and environment Educaiton:-Introduction ton occupational safety & health at work place, occupational hygiene. Basuc Hazards, chemical, physical (elecrical. Temperature, illumination) ergonomic, biological, vibro acoustic, mechanical, psychosocial hazards, prevention of hazards	Identify different items necessary for de-scaling like diluted Hcl, Pump & motor, hose, etc.

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Syllabus Breakup Daily

Week	Day	Subject	Theory (02 hours)	Practical (05 hours)
29	1	Theory	Liquid receiver, pump down, application, types, function and working.	Dilute acid and water according to amount of scaling and perform de-scaling.
	2		Description of water cooled condenser.	. Fit the pump motor with condenser and start. Take safety measure on concentration of acid which may damage tube.
	3	W/Shop calculation	Area and perimeter of square, rectangle and parallelogram ->Area an Perimeter of Triangle	. Fit the pump motor with condenser and start. Take safety measure on concentration of acid which may damage tube.
	4	Engg. Drawing	Bars and profile sections ->Weld, Brazed and soldered joints	Identify drier and capillary tube used in different cooling machines.
	5	ES	Different types of personal protective eaupunment (PPE), Accident prevention techniques	Theory : 3 Hrs Drier Function of drier, types, application and its advantage. Description of desicants . Extra curricular activity : 2 hrs
	6	ES	Care of injured & sick at the workplace first-aid & transportation of sick person Basic provisions of safety & health	Replace drier and capillary tube at the time of gas charging according to manufacturer's direction.

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Syllabus Breakup Daily

Week	Day	Subject	Theory (02 hours)	Practical (05 hours)
30	1	Theory	Expansion valve Expansion valve used in domestic refrigeration and air conditioning systems	. Install different diameter capillary tube used in different type of cooling machines
	2		Capillaries, Automatic and Thermostatic Ex. Valves. electronic expansion valves.	Install with different types of expansion valves used in small cooling machines and central plant like Automatic expansion valve, Thermostatic expansion valve, hand expansion valve, and electronic expansion valves.etc.
	3	W/Shop calculation	Monthly Test WCS	Install with different types of expansion valves used in small cooling machines and central plant like Automatic expansion valve, Thermostatic expansion valve, hand expansion valve, and electronic expansion valves.etc.
	4	Engg. Drawing	Monthly Test ED	Test and adjust the expansion valves fitted with machines.
	5	ES	Monthly Test ES	Monthly Test theory
	6	ES	Introduction to environment, ecosystem and factors causing imbalance, pollution and pollutant including liquid, gaseous, solid and hazardous waste, protecting the environment-energy, conservation, groundwater, global warming, responsibility about the environment, segregation and disposal of waste	Monthly Test Practical

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Syllabus Breakup Daily

Week	Day	Subject	Theory (02 hours)	Practical (05 hours)
31	1	Theory	Evaporator Working principle, Function, types of evaporators used in refrigerator, water coolers, bottle coolers, window and split A.C	Evaporator :- Identify and service different types of evaporators like plate and tube type, Fin and tube type, etc. fitted in refrigerators, Bottle coolers, water cooler, Window and split AC.
	2		Super heating in evaporators	Evaporator :- Identify and service different types of evaporators like plate and tube type, Fin and tube type, etc. fitted in refrigerators, Bottle coolers, water cooler, Window and split AC.
	3	W/Shop calculation	Area and Perimeter of Circle, Semi-circle , circular ring, sector of circle, hexagon and ellipse	. Perform leak test, flush to remove oil by dry nitrogen.
	4	Engg. Drawing	Electrical and electronics element ->Piping joints and fitting	. Demonstrate different type of defrosting in different machines.
	5	ES	Different actions people that affect other and the environment.	Theory : 3 Hrs Function of accumulator and types. Methods of defrosting Extra curricular activity : 2 hrs
	6	ES	Types, causes & effects, areas in india that are prone to be affected, preparedness & mitigation, dos and don'ts-before, during and after any disaster, how to reduce man-made disasters.	. Demonstrate different type of defrosting in different machines.

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Syllabus Breakup Daily

Week	Day	Subject	Theory (02 hours)	Practical (05 hours)
32	1	Theory	Refrigerant Classification of refrigerants, nomenclature of refrigerants including chemical name and formulas, hydro chlorofluorocarbons (HCFCs), hydro fluorocarbons (HFCs) and hydro fluoroolefins (HFOs), blends of HFCs and blends of HFCs/HFOs.	. Identify and explain different colour code of different type refrigerant cylinder and lowGlobal Warming Potential (GWP) refrigerants and hydro fluoroolefins (HFOs: HFO1234yf, HFO-1234ze, HFO1233zd, HFO-1336mz), blends of HFCs and HFOs.
	2		Climatic impact of refrigerants: Stratospheric ozone depletion, global warming, mechanism of ozone depletion; the Montreal Protocol phase-out schedule of ozone depleting refrigerants (HCFCs) and high global warming refrigerants (HFCs). Brief introduction of Ozone Depleting Substances (Regulation and Control) Rules, 2000 and its amendments.	. Identify unknown refrigerant by its idle pressure using head pressure gauge
	3	W/Shop calculation	Surface area and Volume of solids- cube, cuboids, cylinder, sphere and hollow cylinder	. Recover refrigerant from a faulty machine
	4	Engg. Drawing	Projections ->Concept of axes plane and quadrant	Transfer/Recycle refrigerant from one cylinder to another using ice.
	5	ES	->Concept of axes plane and quadrant	Theory : 3 Hrs Introduction of properties of refrigerants; environment related properties: Ozone Depleting Potential (ODP), GWP; ODP and GWP of various refrigerants, thermo chemical properties: flammability and toxicity of refrigerants, Thermo physical properties : pressure temperature of different refrigerants. Extra curricular activity : 2 hrs
	6	ES	Self-Awareness, articulating personal values, value-based decision making, dilemma situations.	Measure pressure-temperature of refrigerants including HCFC22, ammonia, R-290, HFC-32, HFC-134a, R-404A, R-407C and R-410A, HFOs. Identify flammability and toxicity of A3 and A2L of refrigerants.

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Syllabus Breakup Daily

Week	Day	Subject	Theory (02 hours)	Practical (05 hours)
33	1	Theory	Safe handling of flammable refrigerants. Refrigerant leak detection methods, evacuation and charging of refrigerant, temperature glides of refrigerant blends	. Demonstrate safe handling of refrigeration cylinders. Demonstrate handling of cylinder valves.
	2		procedure of charging of refrigerant blends especially the zeotropic blends, hydrocarbon blends, HFC blends (R404A, R-407C, R-410A) and blends of HFC/HFO.	. Good servicing practices on Test leak, evacuation and charge refrigerant in refrigerator by weight in capillary system.
	3	W/Shop calculation	Finding lateral surface area , total surface area and capacity in liters of hexagonal, conical and cylindrical shaped vessels	. Good servicing practices on Test leak, evacuation and charge refrigerant in refrigerator by weight in capillary system.
	4	Engg. Drawing	Projections ->Concept of axes plane and quadrant	Recover CFC by recovery pump and cylinder on CFC filled domestic refrigerator
	5	ES	Identify sources and types of stress (positive/negative stress)	Theory : 3 Hrs Retrofitting Changes of components & practices while retrofitting CFC appliances with HC Refrigerants. Properties of HCs Extra curricular activity : 2 hrs
	6	ES	Managing stress (long term/ short-term)	Recover CFC by recovery pump and cylinder on CFC filled domestic refrigerator

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Syllabus Breakup Daily

Week	Day	Subject	Theory (02 hours)	Practical (05 hours)
34	1	Theory	Thermal Insulation Function, types, thermodynamic properties of heat insulation materials used in refrigeration and Air Conditioning systems.	Flush the system with dry nitrogen. Evacuate and charge hydrocarbons.
	2		Introduction of polyols and foam blowing agents (HCFC-141b, cyclopentane, water, CO ₂ , methyl formate, HFO-1233zd(E), HFO-1336mzz(Z)).	Test and Use sealed component (Electrical) like thermostat, relay, overload protector etc.
	3	W/Shop calculation	Monthly Test WCS	. Identify insulating foam (polyurethane rigid foam and polystyrene). Fill with insulation material like PUF and glass wool
	4	Engg. Drawing	Monthly Test ED	. Pack insulation inside door panel and adjust gasket to prevent air leak.
	5	ES	Monthly Test ES	Monthly Test theory
	6	ES	Handling rejection and building resilience, identify day wasters.	Monthly Test Practical

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Syllabus Breakup Daily

Week	Day	Subject	Theory (02 hours)	Practical (05 hours)
36	1	Theory	Installation of Window AC :-Advantages of proper installation of window AC with emphasis on proper functioning and avoidance of leakage of refrigerant.	Hands on practice on installation of window AC following step by step procedure.
	2		Selection of installation location considering safety, exclusive availability of power point and obstruction-free air flow from condenser.	Hands on practice on installation of window AC following step by step procedure.
	3	W/Shop calculation	relation between efficiency	Install gauge manifold in the syste
	4	Engg. Drawing	Orthographic projections	Install gauge manifold in the system.
	5	ES	Quality management:-Create awareness on introduction of quality concepts.	Theory : 3 Hrs Step by step procedure for proper installation, and proper inclination of AC cabinet backward/ outward for drainage of condensate. Extra curricular activity : 2 hrs
	6	ES	Concept of Quality Management(QMS), PDCA, Fishbone,5s,5d, kaizen.	Check performance of different parameters i.e. pressure, temperature, pull down time, air flow and current drawn.

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Syllabus Breakup Daily

Week	Day	Subject	Theory (02 hours)	Practical (05 hours)
37	1	Theory	Split AC :-Construction and working principle, types, trouble shooting & care and maintenance. Energy Efficiency Ratio (EER) - Energy-efficiency labeling on ACs. Advantages of proper installation with emphasis on proper functioning and avoidance of leakage of refrigerant	Split AC 145. Identify various components of split AC like mounted, floor and ceiling mounted, duct able and multi split AC.
	2		Selection of location of indoor and outdoor units ensuring minimum distance between the units, away from flammable materials, if any, good air flow within the cooling space as well as over the condenser.	. Identify electrical circuits.
	3	W/Shop calculation	velocity ratio and mechanical advantage	Test different components and fault finding
	4	Engg. Drawing	Method of first angle and third angle projections (definition and difference)	Leak testing of the system, evacuation and gas charging.
	5	ES	Indtroduction of ISO	Theory : 3 Hrs Locate power supply point considering safety and exclusiveness. Step by step procedure for installation both for indoor and outdoor unit. Ensure convenient access for drainage of condensate from the cooling coil . Extra curricular activity : 2 hrs
	6	ES	Preparation to the world of work:-Identify the difference between job and carrer	Hands on practice on Installation and trouble shooting.

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Syllabus Breakup Daily

Week	Day	Subject	Theory (02 hours)	Practical (05 hours)
38	1	Theory	Split AC (Wall Mounted):- Construction and working principle, types, trouble shooting.	Split AC (wall mounted). Identify various components of split AC like mounted, floor and ceiling mounted, duct able and multi split AC.
	2		Description of electrical components used in split A.C.	. Identify electrical circuits.
	3	W/Shop calculation	Lever and its types	Test different components and fault finding
	4	Engg. Drawing	Method of first angle and third angle projections (definition and difference)	Leak testing of the system, evacuation and gas charging.
	5	ES	Job roles available in respective traes	Theory : 3 Hrs Study the wiring circuit. Extra curricular activity : 2 hrs
	6	ES	Awareness of industries, and the respective professional pathways.	Hands on practice on Installation and trouble shooting.

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Syllabus Breakup Daily

Week	Day	Subject	Theory (02 hours)	Practical (05 hours)
39	1	Theory	SPLIT A.C (floor, Ceiling /Cassette mounted Split A.C) :-Construction and working principle, types, trouble shooting.	SPLIT A.C (floor, Ceiling /Cassette mounted Split A.C) . Identify various components of split AC like mounted, floor and ceiling mounted, duct able and multi split AC.
	2		Description of electrical components used in split A.C. Study the wiring circuit.	. Identify electrical circuits.
	3	W/Shop calculation	Quarterly Test WCS	Test different components and fault finding
	4	Engg. Drawing	Quarterly Test ED	Leak testing of the system, evacuation and gas charging.
	5	ES	Quarterly Test ES	Quarterly Test theory
	6	ES	Awareness of higher education/educaiton/up skilling (short-term) options Steps involved in online application for instructor course,	Quarterly Test Practical

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Syllabus Breakup Daily

Week	Day	Subject	Theory (02 hours)	Practical (05 hours)
40	1	Theory	SPLIT A.C (Ducted) Study of the Duct able split AC, its Construction and working principle, types, trouble shooting.	Split AC (ducted). Identify various components of split AC like mounted, floor and ceiling mounted, duct able and multi split AC.
	2		Description of electrical components used in split A.C.	. Identify electrical circuits.
	3	W/Shop calculation	Measurement of Angle, Trigonometrical Ratios	Test different components and fault finding
	4	Engg. Drawing	Symbol of 1st angle and 3rd angle projection in 3rd angle.	Leak testing of the system, evacuation and gas charging.
	5	ES	apprenticeship and different jobs in popular site like the indiagobs.com, naukari.com, monsterindian.com, GOVT.website.	Theory : 3 Hrs Study the wiring circuit . Parents instructor meeting: 2 hrs
	6	ES	forms of greeting	Hands on practice on Installation and trouble shooting.

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Syllabus Breakup Daily

Week	Day	Subject	Theory (02 hours)	Practical (05 hours)
41	1	Theory	MULTI SPLIT A.C :-Study the construction and working, various components	Multi Split AC:-.Identify various components of split AC like mounted, floor and ceiling mounted, duct able and multi split AC.
	2		electrical circuits, testing components, fault detection, leak testing,	. Identify electrical circuits.
	3	W/Shop calculation	Trigonometric Table	Test different components and fault finding
	4	Engg. Drawing	Orthographic projection from isometric projection	Leak testing of the system, evacuation and gas charging.
	5	ES	Use of positive body language	Theory : 3 Hrs evacuation, gas charging, Installation, trouble shooting Extra curricular activity : 2 hrs
	6	ES	Handling grievances (Use of ask-listen-repeat technique)	Hands on practice on Installation and trouble shooting.

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Syllabus Breakup Daily

Week	Day	Subject	Theory (02 hours)	Practical (05 hours)
42	1	Theory	INVERTER SPLIT A.C. :- Study of construction and working principle of inverter AC and its components	Inverter Split AC:- Identify various components of split AC like mounted, floor and ceiling mounted, duct able and multi split AC.
	2		electrical circuit and controls, installation, servicing, trouble shooting, fault detection, leak testing and gas charging.	. Identify electrical circuits.
	3	W/Shop calculation	Trigonometry-Application in calculating height and distance	Test different components and fault finding
	4	Engg. Drawing	Orthographic projection from isometric projection	Leak testing of the system, evacuation and gas charging.
	5	ES	Relationship building with customers, importance of probing.	Theory : 3 Hrs Concept of Indian Seasonal Energy Efficiency Ratio (ISEER). Energy Efficiency leveling on inverter AC. Extra curricular activity : 2 hrs
	6	ES	Use of open-ended/close-ended questions to gauge requirement.	Hands on practice on Installation and trouble shooting.

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Syllabus Breakup Daily

Week	Day	Subject	Theory (02 hours)	Practical (05 hours)
43	1	Theory	CAR AIR CONDITIONING:- Study various components, electrical circuits and wiring diagram, testing components, fault detection, leak testing. Study of good service practice	Identify various mechanical components used in car AC. Identify various electrical components used in electrical circuits in car AC. Testing of
	2		Installation, trouble shooting, Magnetic clutch operation, free movement of flywheel (non functioning of clutch), care and maintenance.	Install gauge manifold to check suction and discharge pressure in charging time and running time.. Leak testing using dry nitrogen, evacuation and gas charging (HFC-134a, HFO-1234yf and blends of HFCs and HFOs).
	3	W/Shop calculation	Quarterly Test WCS	Installation and trouble shooting
	4	Engg. Drawing	Quarterly Test ED	Testing magnetic clutch, compressor overhauling, condenser cleaning and add refrigerant. Regular maintenance.
	5	ES	Quarterly Test ES	Quarterly Test theory
	6	ES	Revision	Quarterly Test Practical

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Syllabus Breakup Daily

Week	Day	Subject	Theory (02 hours)	Practical (05 hours)
44	1	In-plant training / Project work: Broad Area: a) Assemble a car A.C Cycle b) Assemble window AC / Split AC		
	2			
	3	W/Shop calculation	Trigonometry-(Simple Applications)	Revision
	4	Engg. Drawing	Reading of fabrication drawing	Revision
	5	ES	Revision	Parents instructor meeting: 2 hrs
	6	ES	Revision	Revision