



Chhattisgarh Swami Vivekanand Technical University (CSVTU), Bhilai (CG)

Scheme of Teaching and Examination

Courses of Study and Scheme of Examination of Diploma in Vocation (D.Voc.) in Refrigeration and Air conditioning (2019-20)

Level 4 Semester-III

S. No.	Board of Studies (BoS)	Subject Code	Subject	Periods per week			Scheme of Examination	Total Marks	Credit
				L	T	P			
1.	Mechanical Engineering	9106411 (037)	Engineering Science	4	1	-	ESE 50	50	3
2.	Mechanical Engineering	9106412 (037)	Manufacturing Technology	4	1	-	50	50	3
3.	Mechanical Engineering	9106413 (037)	Basics of Applied Thermodynamics	4	1	-	50	50	3
4.	Electrical Engineering	9106414 (024)	Electrical Machines	4	1	-	50	50	3
5.	Mechanical Engineering	9106421 (037)	Engineering Science (Lab)	-	-	3	50	50	1.5
6.	Mechanical Engineering	9106422 (037)	Production Practice (Lab)	-	-	3	50	50	1.5
On-Job-Training (OJT)/Qualification Packs									
1.	Mechanical Engineering	9106431(037)	Fitter – Mechanical Assembly	-	-	-	Any one	200	15
2.	Mechanical Engineering	9106432(037)	Manual Soldering Technician	-	-	-			
3.	Mechanical Engineering	9106433(037)	Draftsman Mechanical	-	-	-			

L-Lecture, T-Tutorial, P-Practical, ESE-End Semester Exam

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Semester – III

Branch: D. Voc. (Refrigeration and Air conditioning)

Subject: Engineering Science

Subject Code: 9106411(037)

Total theory periods: 40

Total tutorial periods: 12

Total marks in End semester examination: 50

UNIT -1: Soldering and Brazing

General characteristics of soldering, brazing joints, processes and their characteristics, brief description of soldering and brazing tools equipment, types of solders and fluxes and their uses, soldering defects and their remedies, brazing materials, advantages and disadvantages of soldering and brazing. Introduction to PCB, PCB designing, wet etching, dry etching, track correction, wiring, single sided and double-sided PCB.

UNIT -2: Measuring Instruments

Construction and working principles of moving iron and moving coil voltmeters and ammeters, dynamometer type wattmeter, ohm meter, megger and induction type energy meter- their circuit connection and application for measurement of electrical quantities.

UNIT -3: Electrical Engineering Drawing

Schematic and wiring diagram for domestic simple wiring, symbols used for different electrical devices and equipments.

UNIT -4: Electrical wiring

Types of wiring – cleat wiring, casing and capping, C.T.S./T.R.S. wiring, metal sheath wiring, conduit wiring and concealed wiring – their procedure. Factors of selection of a particular wiring system, importance of switch, fuse.

UNIT -5: Earthing

Earthing of wiring system, types of faults, their causes and remedies, Types of earthing- plate earthing and Pipe earthing, their procedure and application. Methods of finding numbers of circuits and circuit distribution by distribution board system loop in system of wiring connections IE rules related to wiring.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Semester – III

Branch: D. Voc. (Refrigeration and Air conditioning)

Subject: Manufacturing Technology

Subject Code: 9106412(037)

Total theory periods: 40

Total tutorial periods: 12

Total marks in End semester examination: 50

UNIT-1: Introduction to manufacturing technology

- (a) Scope of subject "Manufacturing Technology" in engineering
- (b) Different shop activities and broad division of the shops on the basis of nature of work done such as (i) Wooden Fabrication-carpentry (ii) Metal Fabrication (shaping and Forming, Smithy, sheet metal and Joining-welding, Riveting, Fitting and Plumbing).

UNIT-2: Carpentry

- (a) Fundamental of wood working operations (i) marking & measuring (ii) Holding & Supporting (iii) Cutting & Sawing (iv) drilling& boring (v) Turning (vi) Joining
- (b) Common Carpentry Tools.
- (c) Joining of Timber Components and tools used

UNIT-3: Metal Fabrication

Metal Shaping-Smithy Operations and tools used - Preparation of fire, Supporting and holding the metal, cutting the metal in size, heating, drawing down or fullering, upsetting, swaging, bending, punching, drifting and forge welding. Foundry - elementary idea of patterns, green sand moulds and moulding, tools and equipment used in green sand moulding. Sheet metal working: Tools and operation: joining processes Operations involved, Laying out, marking and measuring, cutting, Shearing and blanking, Straightening bending and seaming, Punching and piercing, burring, Stamping. Sheet metal joints-Lap, seam, Locked seam, hemp, wired-edge, cup or circular, Flange, angular and cap.

UNIT-4: Metal Joining processes

Permanent Joining: (i) Welding methods- forge welding, gas welding, high and low pressure-oxy-acetylene welding, types of flames. (ii) Electric welding - D.C. & A.C., Connected tools operation, materials and safety measures. Introduction to non-ferrous welding-Soldering & Brazing.

UNIT-5: Various Tools Used in Mechanical Engineering Workshop

Marking & Measuring tools, striking tools, cutting tools, holding tools, Miscellaneous Tools-Wrenches, keys, Spanners, pliers, Screw drivers their specifications, special tools.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Semester – III

Branch: D. Voc. (Refrigeration and Air conditioning)

Subject: Basics of Applied Thermodynamics

Subject Code: 9106413(037)

Total theory periods: 40

Total tutorial periods: 12

Total marks in End semester examination: 50

UNIT-1: Basic Thermodynamics: Definition, concept of thermodynamic system and surroundings, closed system, open system, isolated system thermodynamics, definition of work, Zeroth law of thermodynamics, First law of thermodynamics for cyclic and noncyclical processes, Idea of internal energy and enthalpy, Applicability of first law on various thermodynamics processes, simple numerical problems.

UNIT-2: Steady state flow process, its equation and its applications: Second law of thermodynamics, Thermodynamics concept of perpetual motion machine of first order and that of second order, Concept of heat engine, heat pump and refrigerator, Carnot cycle efficiency for heat engine and C.O.P for refrigerator and heat pump, Entropy: Its physical concept and significance.

UNIT-3: Steam Generators: Types of steam generators - Fire tube, water tube boilers, boiler mountings and accessories, Equivalent evaporation, boiler efficiency, elements of power plant.

Reciprocating Steam Engines: Working principles, classification, a brief idea and concept only.

Steam Turbines: Classification, principle of operation of Impulse reaction steam turbines.

UNIT-4: Steam Condensers: Principle of operation, classification, a brief concept, condenser details, applications.

Air Compressors: Definition and their use, Difference between reciprocating and rotary compressors, their types and working, Inter cooling in two stage compression volumetric efficiency, Compressor lubrication. Simple numerical problems.

UNIT-5: Internal Combustion (I.C.) Engines: Meaning and classification of I.C. engines, I.C. engines mechanism, -four stroke cycle engine and two stroke cylinder engine mechanism. Knowledge of important parts, their functions and terminology, positions of operating piston, its stroke or stroke length, Swept volume and clearance volumes, Cylinder volumes and Compression ratio.

Air standard cycles for I.C. engines-Otto and Diesel cycle and also Dual cycle, expression for their efficiencies, Concept of means effective pressure and specific fuel consumption (Simple Numerical Problems)

Brief idea of engine lubricating and cooling system.

Reference Books:

1. Thermal Engineering: Khurmi& Gupta
2. Thermal Engineering: AS Sarao

Chhattisgarh Swami Vivekanand Technical University, Bilai

Semester – III

Branch: D. Voc. (Refrigeration and Air conditioning)

Subject: Electrical Machines

Subject Code: 9106414(024)

Total theory periods: 40

Total tutorial periods: 12

Total marks in End semester examination: 50

UNIT-1: Single-Phase Transformer

Types of transformer - step-up and step-down transformer, voltage and current transformer, autotransformer, Construction, working principles and applications of different types of transformers, rewinding of transformers, cooling of transformers.

UNIT-2: D.C. Motors

Types of motor - series, shunt, compound and universal, construction, working principles, characteristics, winding details and applications of different types of motors including fractional horsepower, starting and starters for D.C. motors, Installation of D.C. motor and testing, speed reversal and speed control of D.C. motors, common faults, their causes, testing and repairs.

UNIT-3: Three Phase Induction Motors

Principle, working & starting of three phase induction motor.

UNIT-4: Single Phase A.C. Motor

Types of A.C. Motors – induction motor (Split phase and repulsion start), capacitor motor, shaded pole motor, universal motor, construction, working principles, special characteristics, winding details and applications of different types of fractional horse power motors, Starting and starters for different motors. Speed reversal and speed control of A.C. Motors, installation of A.C. motor and testing, common faults, their causes, testing and repairs, rewinding of fractional h.p. motors.

UNIT-5: Electrical Solders

Types of Solders, flux and methods, techniques of soldering

Reference Books:

1. Electrical Machines – P. S. Bimbhra, Khanna Publishing House
2. Electrical Machines – I – G. C. Garg, Khanna Publishing House

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Semester – III

Branch: D. Voc. (Refrigeration and Air conditioning)

Subject: Engineering Science (Lab)

Subject Code: 9106421(037)

Total marks in End semester examination: 50

Total Practical periods: 36

List of Practicals:

1. Introduction to tools and measuring instruments, their safe keeping, safety precautions.
2. Measurement of resistance by ammeter and voltmeter method and Ohm meter.
3. Dismantling and reassembly of dynamo.
4. Calibration of ammeter, voltmeter and wattmeter with the help of standard meters.
5. Calibration of single phase energy meter with the help of standard wattmeter and stop watch.
6. Controlling lamps in series, parallel and series parallel.
7. Controlling lamps for two or three places.
8. Drawing schematic diagram to give supply to consumers.
9. Practice on casing and capping wiring.
10. Practice on cleat wiring.
11. Practice on CTS/TRS wiring.
12. Practice on metal sheet weather proof rigid PVC wiring.
13. Practice on conduit wiring.
14. Practice on concealed wiring.
15. Measurement of insulation resistance of wiring installation by megger.
16. Polarity test of wiring installation.
17. Testing of wiring installation.
18. Installation of pipe earthing for wiring installation.
19. Installation of plate earthing for wiring installation.

Instruments Required

- Ammeter
- Voltmeter
- Ohm meter
- Dynamo
- Wattmeter,
- Stop watch controlling lamp

Chhattisgarh Swami Vivekanand Technical University, Bilai

Semester – III

Branch: D. Voc. (Refrigeration and Air conditioning)

Subject: Production Practice (Lab)

Subject Code: 9106422(037)

Total marks in End semester examination: 50

Total Practical periods: 36

List of Practicals:

Machine Shop

- To study lathe machine construction and various parts including attachments, lathe tools cutting speed, feed and depth of cut.
- To perform step turning, knurling and chamfering on lathe machine as per drawing.

Foundry Shop

- To prepare mould of a given pattern requiring core and to cast it in aluminum.
- To perform moisture test and clay content test.
- Strength Test (compressive, Tensile, Shear Transverse etc. in green and dry conditions) and Hardness Test (Mould and Core).

Welding Shop

- Hands-on practice on spot welding.
- Hands-on practice on submerged arc welding
- Hands-on practice on metal inert gas welding (MIG) and tungsten inert gas welding (TIG).