AUTO-ELECTRIC TECHNICIAN (AUETA)

Syllabus

(Safety Practices 25 Hrs, Theory 100 Hrs, Practical 450 Hrs, Employability Skill 75 Hrs)

Details of Theory & Practical Syllabus

Sl. No	CONTENT	DETAILS	HOURS
1	**Maintain safety at the work site and housekeeping (25 Hrs)**		
	Theory	1. Reading of 'Instruction Manual of tools' while using them. 2. Keep the tools in working condition and ensure the required maintenance. 3. Know electrical hazards and its types. 4. Use different electric protection methods. 5. Classification of fire. 6. Electric fire and the method of extinguishing. 7. Different types of fire extinguishers. 8. First-Aid box and its use. 9. First-Aid for burning, electric shock, etc. 10. Safety devices used for protection of auto-electricians.	**10**
	Practical	1. Demonstrate Knowledge of Safe working practices on construction sites, 2. Demonstrate first-aid box and its components. 3. Identify hazards and procedures to avoid accidents at work sites. 4. Identify fire extinguishers for different fires. 5. Operate fire extinguisher. 6. Demonstrate first aid for the victim undergoing burning and electric shock. 7. Demonstrate the use of helmet, gloves, goggles, shoe, apron, etc.	**15**
2	**Measurement of electrical parameters by using proper instruments (57 Hrs)**		
	Theory	1. Voltage & Current – AC , DC 2. Units of Voltage and Current, relationship between m V, V, mA, A, 3. Instruments used to measure current, voltage, power, their connection and application 4. Relationship between voltage, current, power, energy, simple calculation 5. Sources of electrical power in an automobile. 6. Capacitor , Resistor & Inductor 7. Concept of insulator, conductor, semiconductor. 8. Fuse (AC , DC) & application in Automobiles 9. Basic ·electro-magnetism, concept of inductance. 10. Relay, Switches and application in Automobiles 11. Concept of service, parallel and mixed circuits, simple calculation.	**12**
	Practical	1. Measurement of current. 2. Measurement of voltage. 3. Measurement of power.	**45**

		4. Measurement of resistance. 5. Measurement of impedance. Identify the measuring instruments and know their specifications.	
3	**Compare circuit diagram shown in drawing with real circuit diagram (36 Hrs)**		
	Theory	1. Symbol and notations of electrical/electronic components used in Automobiles. 2. Tracing of circuits, use a multimeter for tracing. 3. Wire colour code, verification using multimeter	**6**
	Practical	Demonstrate : 1. Trace a portion of harness/circuit in the automobile compared from the circuit shown in a drawing.. 2. Translate & electrical circuit of an automobile into an electrical drawing with specifications marked.	**30**
4	**Electrical Systems in an automobile (40 Hrs)**		
	Theory	**1.** Introduction to Basic Architecture of Vehicle (2W,3W,4W): IC Engine (Petrol, Diesel), HEV, EV **2.** Major electrical components such as : ● Different motors (AC & DC), application of them in vehicle ● Battery ● Ignition components: name and application, ● Different light and ● Different important sensors & actuator **:** name & applications **3.** Alternator & application in Vehicle **4.** Safety precaution in driving 5. Electrical system in an automobile	**10**
	Practical	Drive vehicle test. 1. Drive a vehicle forward *and backward*. 2. Drive a vehicle turning movement. **3.** Drive a vehicle in parking condition.	**30**
5	**Plan of an Auto Electrical workshop (19 Hrs)**		
	Theory	1. Criteria for layout of a workshop 2. Maintenance considerations.	**4**
	Practical	1. Draw one plan view of a standard auto-Electric workshop and level the components.	**15**
6	**Major electrical and mechanical components of a vehicle (43 Hrs)**		
	Theory	**Introduction,** 1. Name, location & function of major mechanical components of a vehicle such as engine, body, chassis, axle, transmission, etc. 2. Name, location & function of major electrical components of a vehicle such as battery, starting motor, different types of light, harness, wiper motor, dashboard, etc. 3. Difference between petrol and diesel engine, 4. Difference between two cars having petrol engine to one and	**8**

		the other having diesel engine.	
	Practical	1. Identify major electrical components and circuits in a vehicle and draw a block diagram **2.** Identify the differences between major components of diesel engine and petrol engine. On the basis of which, identify diesel/petrol engine	**35**
7.	**Testing, repairing & Charging of a battery (48 Hrs)**		
	Theory	1. Function of a battery 2. Standard troubleshooting: charging, discharging, overcharging, rating and application 3. Need for Charging 4. Specification under discharged, charged and over charged condition. 5. Battery components 6. Battery maintenance 7. Service Bay Diagnostic Tools 8. Multimeter & application 9. Tools Box	**8**
	Practical	1. Identify the faults correctly and advise customers accordingly, if required. 2. Repair/remove faults. 3. Test the - battery to ensure fault has been removed. 4. Measure the voltage of each cell and battery correctly. 5. Set the battery charger as per the charging requirement. 6. Connect the battery property for charging. 7. Prepare estimates for repairs of lead acid batteries with different faults. 8. Prepare estimates for charging the battery.	**40**
8	**Overhaul Troubleshoot and testing a starter Motor, wiper Motor & dynastart. (64 Hrs)**		
	Theory	1. FlowChart – Troubleshooting 2. Location and function of starter motor & wiper motor 3. Electrical circuit between battery and starter motor as well as wiper motor 4. Standard troubleshooting procedures for starting system and starting motor 5. Standard trouble shooting procedures for wiping system and wiper motor 6. Location and functions of a dynastart. 7. Dynastart wiring diagram.	**14**
	Practical	1. Overhaul starter drive. 2. Test and overhaul solenoid 3. Conduct on drive test of starter. 4. Identify and rectify it starter fails to rotate, rotates slowly, does not crack the engine, unable to engage and disengage. 5. Overhaul Wiper Motor following manufacture's manual. 6. Overhaul dynastart following manufacture's manual. 7. Test performance after overhauling.	**50**

9	**Reassemble a D.C Generator. & A.C Generator (62)**		
	Theory	1. Construction details of D.C Generator & A. C Generator. 2. Working principle, specifications of D.C & AC Generator. 3. Standard trouble shooting for DC & AC generator. 4. Procedure of dismantling, disassembling and .reassembling of DC & AC generator. 5. Rectification of standard faults occurred in DC & AC generator. 6. Precautions are to be taken for better service life of DC & AC generator. 7. Soldering done in electrical connection.	**12**
	Practical	1. Dismantle AC and DC Generator from the monitoring using appropriate tools properly, adopting precautionary measures. 2. Disassemble the AC & DC Generator using appropriate tools properly, adopting safety measures. 3. Reassemble the AC & DC Generator.	**50**
10	**Auxiliary Circuits** (26)		
	Theory	1. Different auxiliary circuits used in automobile. 2. Identification, location and basic functions of different auxiliary circuit. 3. Method of tracing circuit. 4. Fault Codes checked service station 5. OBD, Scanners and Analysers	**6**
	Practical	**1.** Trace auxiliary circuits using a multimeter and or test lamp	**20**
11.	**Wearing Harness (36)**		
	Theory	1. Wiring diagram with colour code 2. Wiring diagram with wire size with terminal code 3. Different accessories and their connection with harness 4. Testing of harness	**6**
	Practical	1. Prepare wiring harness as per wiring diagram properly. 2. Test the wiring using multimeter *I* or a test lamp	**30**
12.	**Ignition System (46)**		
	Theory	1. Types of ignition system 2. Location and function of different components of ignition system 3. Testing of different components belong to ignition system 4. Magnetic pulse distributor electronic ignition system: location, advantage, application 5. Troubleshooting procedure for ignition system 6. Function and location of engine analyzer, auto oscilloscope	**6**
	Practical	1. Trace electronics ignition system from the vehicle 2. Prepare ignition circuit with CB point and Set CB point 3. Test ignition coil and condenser with test jig 4. Test, clean and set spark plug 5. Rectify sparking defects in ignition system	**40**
13.	**Trace lighting circuit (46)**		
	Theory	1. Types of light used in automobile and their function 2. Layout of different lighting circuits 3. Checking of faults in lighting circuits, fault location &	**6**

		rectification	
	Practical	1. Identify an EI check layout of various lighting circuits of the vehicle 2. Identify and rectify faults of various electrical circuits of a vehicle 3. Identify various circuits for gauges and indicators	**40**
14.	**Market survey (27)**		
	Theory	1. Market survey: definition and utility 2. Market survey technics: different examples 3. Preformat of a standard survey 4. Survey report preparation: example case study	**2**
	Practical	1. List of formalities for setting up auto electric workshop and file in documents	**25**
		Total Theory **Total Practical** **Total**	**110 hr.** **465 hr.** **575 hr.**

Detail of Employability Skills Syllabus (75 Hrs)

Sl. No.	Content	Details
1.	English Literacy & Communication Skills	Accentuation (mode of pronunciation) on simple words, Diction (use of word and speech) Transformation of sentences, Voice change, Change of tense, Spellings. Reading and understanding simple sentences about self, work and environment. Construction of simple sentences, Writing simple English. Speaking with preparation on self, on family, on friends, classmates, picture reading gain confidence through role-playing . Taking messages, passing messages on and filling in message forms Greeting and introductions office hospitality, Resumes or curriculum vita essential parts, letters of application reference to previous communication. Manners, Etiquettes, Dress code for an interview, Do's & Don'ts for an interview.
2.	I.T. Literacy	Introduction, Computer and its applications, Hardware and peripherals, Switching on-Starting and shutting down of computer. Basics of Operating System, WINDOWS, ~~The user interface of Windows OS~~, Create, Copy, Move and delete Files and Folders, Use of External memory like pen drive, CD, DVD etc, Basic operating of Word Processing, Creating, opening and closing Documents, use of shortcuts, Creating and Editing of Text, Formatting the Text, Insertion & creation of Tables Printing document. Basics of Excel worksheet, understanding basic commands, creating simple worksheets, understanding sample worksheets, use of simple formulas and functions, Printing of simple excel sheets Internet, Concept of Internet (Network of Networks),

		Meaning of World Wide Web (WWW), Web Browser, Web Site, Web page and Search Engines. Accessing the Internet using Web Browser, Downloading and Printing Web Pages, Opening an email account and use of email. Social media sites and its implication. Information Security and antivirus tools, Do's and Don'ts in Information Security, Awareness of IT – ACT, types of cyber crimes.
3.	Entrepreneurship Skills	Entrepreneurship vs. management, Entrepreneurial motivation. Sales & distribution Management. Difference Between Small Scale & Large Scale Business, Market Survey, Method of marketing, Publicity and advertisement, Marketing Mix. Preparation of Project. Role of Various Schemes and Institutes for self-employment i.e. DIC, SIDA, SISI, NSIC, SIDO, Idea for financing/ non financing support agencies to familiarizes with the Policies /Programmes & procedure & the available scheme. Project formation, Feasibility, Legal formalities i.e., Shop Act, Estimation & Costing, Investment procedure – Loan procurement – Banking Processes.
4.	Productivity & Quality Tools	Banking processes, Handling ATM, KYC registration, safe cash handling, Personal risk and Insurance. Purpose of Housekeeping, Practice of good House keeping. Basic quality tools with a few examples

Outcomes

Outcomes to be assessed/ NOS to be assessed	Assessment criteria for the outcome
1. Maintain safety at the work site and housekeeping	1.1 Trainees will be able to follow and maintain procedures to achieve a safe working environment in line with occupational health and safety regulations and requirements and according to site policy.
	1.2 Trainees will be able to identify and take necessary precautions on fire and safety.
	1.3 Trainees will be able to identify, handle and store / dispose dangerous goods and substances according to safety regulations and requirements.
	1.4 Trainees will be able to report supervisor/ Competent authority in the event of accident or sickness of any staff and record accident details correctly according to site accident/injury procedures.
	1.5 Trainees will be able to identify and observe site evacuation procedures according to site policy.
	1.6 Trainees will be able to identify Personal Productive Equipment (PPE) and use the same as per related working environment.
	1.7 Trainees will be able to identify basic first aid and use them under different circumstances.
	1.8 Trainees will be able to identify different fire extinguishers and use the same as per requirement.

	1.9 Trainee will be able to describe different components and their functions in a first-aid box
	1.10 Trainees will be able to demonstrate first-aid for a burn patient as well as for a victim undergone electric shock.
	1.11 Trainees will be able to demonstrate safe driving practice in forward/backward, turning, and in parking conditions.
2. Perform precision measurements on the components and compare parameters with specifications used in automotive workshop practices.	2.1 Trainees will be able to explain insulators, conductor, semiconductor, inductance, capacitors.
	2.2 Trainees will be able to explain the meaning of current, voltage along with relation with power.
	2.3 Trainees will be able to measure different basic electrical parameters such as current, voltage, power, resistance,
	2.4 Trainees will be able to identify electrical and mechanical tools and demonstrate their use in automotive industry
	2.5. Trainees will be able to name different instruments (like Hydraulic jack, battery charger, digital multimeter etc.) and illustrate their use.
	2.6 Trainees will be able to explain parallel and mixed circuits and their service.
3. Locate and troubleshoot electrical components like starter motor, wiper motor and dynastart.	3.1 Trainees will be able to name different symbol and notations of electrical/electronic components along with wire colour code used in Automobile
	3.2 Trainees will be able to demonstrate the use of multimeter used for tracing different circuit
	3.3 Trainees will be able to demonstrate development of different circuits used in automobiles with the help of drawing.
	3.4 Trainees will be able to demonstrate troubleshooting of batteries and their remedies.
	3.5 Trainees will be able to state location and function of starter motor, wiper motor and dynastart
	3.6 Trainees will be able to demonstrate troubleshooting of starter motors, wiper motors and their remedies.
	3.7 Trainees will be able to demonstrate overhauling of dynastart following manufacturer's manual
4. Diagnose and troubleshoot faults in different electrical and electronics subsystems of a vehicle.	4.1 Trainees will be able to describe location, application of different electrical components like ● Different motors (AC & DC) ● Battery ● Ignition components: name and application, ● Different light and ● Different important sensors & actuator **:** name & applications ● Alternator & application in Vehicle

	4.2 Trainees will be able to describe construction details of D.C Generator & A. C Generator
	4.3 Trainees will be able to describe working principle, specifications of D.C & AC Generator
	4.4 Trainees will be able to demonstrate overhauling of D.C & AC Generator
	4.5 Trainees will be able to prepare wiring harness as per wiring diagram properly
	4.6 Trainees will be able to state types, location and function of ignition system
	4.7 Trainees will be able to state location, advantage, application of Magnetic pulse distributor electronic ignition system
	4.8 Trainees will be able to demonstrate trouble shooting of ignition system including rectification of sparking problems
5. Diagnose and troubleshoot faults in electrical and electronics accessories of a vehicle**.**	5.1 Trainees will be able to describe types of light used in automobile and their function
	5.2 Trainees will be able to demonstrate checking of faults in lighting circuits, fault location & rectification
	5.3 Trainees will be able to demonstrate identifying an EI check layout of various lighting circuits of the vehicle
6. Perform servicing, repairing, adjusting, testing and maintenance of electrical and electronics devices of a vehicle	6.1 Trainees will be able to state function and location of engine analyzer, auto oscilloscope
	6.2 Trainees will be able to state Fault Codes checked in a service station
	6.3 Trainees will be able to define OBD, Scanners and Analysers and their function
7. Work in a real job situation with special emphasis on basic safety and hazards in this domain.	7.1 Assessor will check reports prepared for this component of Practical training of the course and assess whether competency has been developed to work in the real job situation with special emphasis on basic safety and hazards in this domain.
8. Understand and practice soft skills along with IT literacy	(8.1) Trainees will be able to communicate clearly in day to day work with team and with higher authority (8.2) Trainees will be able to use a computer (Turn on/Turn off safely) (8.3) Traineees will be able to create / move/ copy/ delete folders (8.4) Trainees will be able to create / use simple word/excel file. (8.5) Trainees will be able to take print out of his work (8,6) Trainees will be able to send and receive email (8.7) Trainees will be able to search using online search engines like google. (8.8) Trainees will be able to use external hard disk / pendrive (8.9) Trainees will be able to use antivirus software

	(8.10) Trainees will be able to explain various cyber crime
9. Demonstrate knowledge of concept and principles of basic arithmetic and financial calculation and apply knowledge of specific area to perform practical operations.	(9.1) Trainees will be able to apply basic arithmetic calculations for arriving dimensional parameters as per drawing. (9.2) Trainees will be able to apply basic financial calculation to understand cost of materials & labour and basic concepts of profit/loss, (9.3) Trainees will be able to engage in basic banking transactions as customer
10. Explain time management, entrepreneurship and manage/ organize related task in day to day work for personal & social growth.	(10.1) Ascertain appropriate time for the assigned task. (10.2) Trainees will be able to execute the assigned task within the time frame. (10.3) Trainees will be able to manage their own work within specified time. (10.4) Trainees will be able to explain the importance & factors affecting the development of entrepreneurship. (10.5) Trainees will be able to identify service providers for developing entrepreneurs/business establishments.