

Course Title: <b>Automobile Electrical &amp; Electronics System lab</b>	Course Code: <b>15AT44P</b>
Credits (L:T:P) : <b>0:2:4</b>	<b>Credit-3</b>
Type of course: <b>Tutorials and Practices</b>	Total Contact Hours: <b>78</b>
CIE- 25 Marks	SEE- 50 marks

**Prerequisites:** Knowledge of Automobile Electrical system being studied in IV semester.

**Course Objectives:**

The student should be able to perform servicing, trouble shooting and testing of various automobile electrical and electronics systems and components.

*On successful completion of the course, the students will be able to attain CO'S:*

Course Outcome		CL	Experiments linked	Linked PO	Teaching Hrs
CO1	Perform the basic procedures to check different electrical and electronics components.	U/A	1,2,3,4	1,2,3,4,8,9,10	21
CO2	Perform the different test on battery, analyze & maintain the battery.	U/A	5,6	1,2,3,4,8,9,10	06
CO3	Overhaul/service the generators, alternators and starting motors by conducting necessary/standard tests and repairs.	U/A	7,8,9	1,2,3,4,8,9,10	18
CO4	Identify different components of ignition system, diagnose the fault, rectify it and set the ignition timing.	U/A	10	1,2,3,4,8,9,10	06
CO5	Service and trouble shoot lighting system and all the basic electrical accessories.	U/A	11,12,13,14,15	1,2,3,4,8,9,10	18
CO6	prepare circuits of different electrical systems by understanding wiring diagrams of different vehicles.	U/A	17	1,2,3,4,8,9,10	09
		<b>Total sessions</b>			<b>78</b>

## COURSE PO ATTAINMENT MATRIX

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
<b>Automobile Electrical and Electronics systems lab</b>	3	3	3	3	-	-	-	3	3	3

**Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.**

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

If  $\geq 40\%$  of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3

If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2

If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1

If  $< 5\%$  of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

### Course Content:

#### UNIT-I

#### Tutorials:

Tutorial class for every graded exercise should include the following

1. Precautions to be taken during conduction of each exercise.
2. Proper tools to be used and sequence to conduct each exercise.
3. Relevant circuit diagrams with tabular columns and formulae.
4. Any measurements/adjustments to be made in each exercise.
5. Discussion on trouble shooting of each system.

#### UNIT-II

SI No	List of Graded Exercises:	Hours
1	<b>a.</b> Find the resistance of given resistor using colour code and multi meter. <b>b.</b> Find the equivalent resistance in series and parallel circuits. <b>c.</b> Find the voltage drop in series and parallel circuits. <b>d.</b> Check the value of unknown resistance by using Wheatstone bridge circuit.	<b>06</b>
2	<b>a.</b> Practice on checking the condition of Capacitor. <b>b.</b> Practice on checking the condition of diode. <b>c.</b> Check the Zener diode used to regulate the cut off voltage.	<b>06</b>
3	Practice on creating circuits of half wave rectifier, Full wave bridge rectifier	<b>06</b>
4	Practice on creating circuit to demonstrate Transistor as a switch function.	<b>03</b>
5	Test the battery charge condition using hydrometer, Voltmeter.	<b>03</b>
6	<b>a.</b> Practice on preparation of electrolyte. <b>b.</b> Charging of Lead acid battery by constant voltage method, charging multiple batteries and trickle charging.	<b>03</b>
7	<b>a.</b> Practice on Servicing of the D C generator.	<b>06</b>

	<b>b.</b> Test field windings, brush holders armature for continuity, short and open circuit using growler/ Multifunction Tester.	
8	a. Practice on servicing of the Alternator. <b>b.</b> Test stator, rotor and rectifier for continuity, short and open circuit using Multifunction Tester / Test lamp	<b>06</b>
9	a. Practice on servicing of the Starter motor. <b>b.</b> Test field windings, brush holders armature and solenoid switch for continuity, short and open circuit using growler/ Multifunction Tester	<b>06</b>
10	a. Practice on servicing of the distributor, setting CB point's gap and checking dwell angle. b. Servicing of the sparkplug cleaning, testing and adjusting gap. c. Checking and setting ignition timing and starting the engine.	<b>09</b>
11	Practice on servicing and tuning of horns.	<b>03</b>
12	Practice on servicing of the Wiper motor.	<b>03</b>
13	Practice on aiming of head lights.	<b>03</b>
14	Practice on testing of fuel gauge and Temperature gauge.	<b>03</b>
15	Practice on replacement of bulbs, fuses and relays.	<b>03</b>
16	Construction of different circuits like: a. Ignition Circuit b. Charging Circuit. c. Starting circuit. d. Wind screen wiper circuit e. Horn circuit f. Fuel and Temperature gauges circuits g. Head lights, parking lights, direction indicators circuits.	<b>09</b>
	<b>Total hours</b>	<b>78</b>

**Course Delivery:** The course will be delivered through lectures, presentations and classroom

### Course Assessment and Evaluation Scheme:

Method	What		To whom	When/Where (Frequency in the course)	Max Marks	Evidence collected	Course outcomes
DIRECT ASSESSMENT	CIE (Continuous Internal Evaluation)	IA Tests	Students	Two IA Tests (Average of two Tests)	10	Blue books	1,2,3,4,5,6
				Mini Projects	10	Models	1,2,3,4,5,6
				Lab Records (Average to be computed)	05	Lab Records	1,2,3,4,5,6
				<b>TOTAL</b>	25		
	SEE (Semester End Examination)	End Exam		End of the course	50	Answer scripts at BTE	1,2,3,4,5,6
INDIRECT ASSESSMENT	Student Feedback on course		Students	Middle of the course		Feedback forms	1, 2 & 3 Delivery of course
	End of Course Survey			End of the course		Questionnaires	1,2,3, 4,5,6 Effectiveness of Delivery of instructions & Assessment Methods

\*CIE – Continuous Internal Evaluation

\*SEE – Semester End Examination

#### Note:

1. I.A. test shall be conducted as per SEE scheme of valuation. However obtained marks shall be reduced to 10 marks. Average marks of two tests shall be rounded off to the next higher digit.
2. Rubrics to be devised appropriately by the concerned faculty to assess Mini project/Student activities.

## MODEL OF RUBRICS FOR ASSESSING STUDENT ACTIVITY/ASSIGNMENT/MINI PROJECT

**Note: The dimensions in the below table are representative only and lecturer has to design/decide suitable dimensions based on the activity given.**

Dimension	Scale					Students Score				
	Unsatisfactory 1marks	Developing 2marks	Satisfactory 3marks	Good 4marks	Exemplary 5marks	1	2	3	4	5
1. Research and gather information	Does not collect information relate to topic	Collects very limited information, some relate to topic	Collects basic information, most refer to the topic	Collects more information, most refer to the topic	Collects a great deals of information, all refer to the topic	2				
2.Full fills teams roles and duties	Does not perform any duties assigned to the team role	Performs very little duties	Performs nearly all duties	Performs almost all duties	Performs all duties of assigned team roles	3				
3.Shares work equally	Always relies on others to do the work	Rarely does the assigned work, often needs reminding	Usually does the assigned work, rarely needs reminding	Always does the assigned work, rarely needs reminding.	Always does the assigned work, without needing reminding	4				
4. listen to other team mates	Is always talking, never allows anyone to else to speak	Usually does most of the talking, rarely allows others to speak	Listens, but some times talk too much,	Listens and talks a little more than needed.	Listens and talks a fare amount	5				
<b>Grand Average/Total=2+3+4+5/4=14/4=3.5=4</b>						4				

**Resources:****Reference books:**

SI No	Title of the book	Author Name	Publisher
01	Mechanic Motor Vehicle Trade theory and Practical	-----	National Instructional Media Institute, Chennai
02	Automobile Engineering Practices.	N.Malhotra	Asian publishers
03	Vehicle Maintenance &Garage Practice	Jigar A Doshi	PHI Learning,Delhi
04	Automotive Mechanics	- W. H. Crouse & Anglin	Tata MCgraw-Hill
05	Diesel Engineering	Sean Bennett	CENGAGE Learning
06	Automotive Technology	Jack Erjavec	CENGAGE Learning
07	Automobile Engineering	Harban Singh Rayath	S Chand
08	Charts and cut section models		

**SCHEME OF EVALUATION**

<b>Serial no</b>	<b>Description</b>	<b>Marks</b>
1	<b>Writing procedure</b> a) One exercise from list of exercises 01-04 b) One exercise from list of exercises 05-16	(05+05) = <b>10</b>
2	<b>Conducting &amp; Performance</b> a) One exercise from list of exercises 01-04 b) One exercise from list of exercises 05-16	(20+10) = <b>30</b>
3	<b>Viva-voice</b>	<b>10</b>
	<b>Total</b>	<b>50</b>

## **TOOLS & EQUIPMENT LIST**

1. Mechanic tool kit
2. Arbour press
3. Volt meter, Ammeter, Multi meter, Tong tester, feeler gauges,
4. Air compressor
5. Tripod stands
6. Three jaw bearing pullers
7. Growler
8. Multifunction tester
9. Battery Charger
10. Spark plug cleaning & testing machine
11. Neon timing light
12. Tacho-dwell tester
13. Hydrometer
14. Cell tester
15. Test lamps
16. Auto electrical test bench

## **LIST OF COMPONENTS REQUIRED**

1. Lead Acid Batteries.
2. Dynamos
3. Alternators
4. Starting motors of different starting drives (Bendix, Axially sliding armature, over running clutch type).
5. Spark plugs
6. Distributor assemblies
7. Ignition coils
8. Magneto assembly
9. Fuel, Oil, Temperature gauges.
10. wiper motors
11. Horns different types
12. All types of bulbs, fuses, relays.
13. Diodes 15V-30A, 15V-5A
14. Zener diodes 15V – 30A
15. Resistors of different values
16. Transistors PNP, NPN
17. Capacitors 1000  $\mu$ F -15V.
18. Petrol engine with coil ignition system.
19. Recent Make 4 Wheeler.



## **MODEL QUESTION BANK**

1. Conduct the experiment to find equivalent resistance of the given series and parallel circuits using multi meter and verify it with theoretical results (find resistance of resistors with their color codes)
2. Conduct the experiment to find the voltage drop across each resistor in given series and parallel circuit and verify with theoretical values.
3. Conduct the experiment to find the unknown resistance in the Wheat stone bridge network of resistors and verify with theoretical values.
4. Conduct the experiment to find condition of given capacitor and diode.
5. Conduct the experiment to show the function of zener diode as a voltage regulator with a circuit.
6. Conduct the experiments to create half wave rectifier circuit to show the function of diode as rectifier.
7. Conduct the experiments to create full wave bridge rectifier circuit to show the function of diodes as rectifier.
8. Conduct the experiments to create a circuit to show the function of transistor as rectifier.
9. Conduct the experiments to Test the battery charge condition using hydrometer, Voltmeter.
10. Conduct the experiment to service the given DC generator and list worn/missing parts also conduct various tests to check different components.
11. Conduct the experiment to service the given Alternator and list worn/missing parts also conduct various tests to check different components.
12. Conduct the experiment to service the given Starter motor and list worn/missing parts also conduct various tests to check different components.
13. Conduct the experiment to service the given Distributor and list worn/missing parts also conduct various tests to check different components.
14. Conduct the experiment to service the given spark plug and check the condition using spark plug testing machine.
15. Conduct the experiment to check and set the ignition timing of a given engine using test lamp/ timing light.
16. Conduct the experiment to service the given electric horn and list worn/missing parts.
17. Conduct the experiment to service the given wiper motor and list worn/missing parts also conduct various tests to check different components.
18. Conduct the experiment to service the given fuel gauge and temperature gauge and list worn/missing parts also conduct various tests to check different components.
19. Conduct the experiment to Aim the head lights.
20. Conduct the experiments to create Ignition Circuit.
21. Conduct the experiments to create Charging Circuit.
22. Conduct the experiments to create Starting circuit.
23. Conduct the experiments to create Wind screen wiper circuit
24. Conduct the experiments to create Horn circuit
25. Conduct the experiments to create Fuel and Temperature gauges circuits
26. Conduct the experiments to create Head lights circuit.
27. Conduct the experiments to create direction indicator circuits.