Lok Jagruti Kendra University
University with a Difference

Diploma in Automobile Engineering

LJ Polytechnic

Course Code: 025010401

Automobile Electrical System

Programme / Branch Name	Diploma in Automobile Engineering					
Course Name	Automobile Electrical System				**Course Code**	025030401
Course Type	HSSC	BSC	ESC	PCC	OEC	PEC

Legends: HSSC: Humanities and Social Sciences Courses BSC: Basic Science Courses
ESC: Engineering Science Courses PCC: Program Core Courses
OEC: Open Elective Courses PEC: Program Elective Courses

1. Teaching and Evaluation Scheme

Teaching Hours / Week					**Evaluation Scheme**				
L	**T**	**P**	**Total Teaching Hours**	**Total Credit**	**CA**	**CCE**	**SEE (TH)**	**SEE (PR)**	**Total**
3	0	2	5	4	10	40	50	50	150

Legends: L: Lectures T: Tutorial P: Practical
CA: Continuous Assessment (Attendance + Activity)
CCE: Continuous & Comprehensive Evaluation
SEE (Th): Semester End Evaluation (Theory)
SEE (Pr): Semester End Evaluation (Practical)

2. Prerequisite

- ✓ Physics
- ✓ Mathematics

3. Rationale

Modern automobiles have many instruments for indicating different quantities such as speed, level of fuel, temperature and automatic control systems for doors/windows etc. The ignition system and lighting system also require power. It is therefore essential for automobile engineers to have the fundamental knowledge of automobile electrical systems. This course tries to develop this knowledge and skills in the students, which would help them in the installation of various electrical components, and operation and maintenance of automobile electrical systems. Understanding this course will also be helpful for the diagnosis and testing of the electrical system.

4. Objectives

- ✓ To develop different types of skills so that students can acquire knowledge about the basic principles of Automobile electrical system.
- ✓ To develop the competency in students to install, inspect and maintain auto electrical systems.

5. Contents

Unit No.	Unit Name	Topics	Learning Outcome	% Weightage	Hours
1	**Electricity, Magnetism And Automobile Wiring**	1.1 A short history of auto-electrical system, constructional and functional details of conductors, semiconductors and insulators. 1.2 Application & principle of Multimeters, Measurement of DC-Current, Voltage & resistance. 1.3 Meaning of magnetism and law of Magnetism. 1.4 Types of wiring system, wiring harness, Different electrical system.	• Describe current voltage, magnetism, conductors, semi-conductors, insulation & automobile wiring system. • Use various instruments for measuring current, voltage & resistance. • Describe wiring harness & different wiring connections.	**15**	8
2	**Automobile Battery**	2.1 Types of battery (dry & wet batteries), Construction of battery, Function of lead acid battery. 2.2 Various charging processes, Maintenance of battery. 2.3 Modern developments in battery, Procedure of commissioning of new Battery in vehicle. The various battery rating, Battery performance.	• Explain principle and construction of Lead acid battery. • Describe characteristics of battery, rating and capacity. • Describe charging methods and Battery maintenance.	**25**	9
3	**Ignition System**	3.1 Types of ignition system and its layouts, wiring diagram. 3.2 Coil, Magneto & Capacitor discharge ignition system: construction and working. Comparison of systems. 3.3 H.T. Coil & Distributor: Types, Construction and working. 3.4 Distributor less electronic & direct ignition system, mechanical & electronic spark advance mechanism. Hall Effect switch. 3.5 Components of Ignition system. 3.6 Modern Spark Ignition system (D.T.S.I., T.D.S.I., Multi electrode etc. System)	• Explain wiring diagram of various Ignition System. • Describe construction & working of different types of Ignition system. • Describe various spark advance mechanism. • Describe Principal of Hall effect switch.	**15**	9

Unit No.	Unit Name	Topics	Learning Outcome	% Weightage	Hours
4	**Starting System**	4.1 Principal of Starter Motor 4.2 Constructional and functional details of starter, 4.3 Torque characteristic of starter, Starter drive mechanism: its types (bendix, and folothru & over running Clutch Drives, axial drive), construction, function and comparison of different drive mechanism.	• Describe construction & working of Starter motor. • Describe different types of Starting units & starter switch.	**25**	8
5	**Charging System**	5.1 Necessity of Charging system. 5.2 Introduction & basic principle of generators, Function, Circuit arrangement. 5.3 Working Principle of Alternator Charging System, Differences between Generator & Alternator, and Advantages of alternator over DC generator. 5.4 Advanced charging system technology & new developments.	• Describe necessity, construction & working of various charging system. • Describe voltage & current regulatory system.	**20**	8
				Total Hours	**42**

6. Suggested Specification Table for Evaluation Scheme

Unit No.	Unit Name	Distribution of Topics According to Bloom's Taxonomy					
		R %	U %	App %	C %	E %	An %
1.	Electricity, Magnetism & Automobile wiring	50	20	20	0	10	0
2.	Automobile Battery	35	20	35	0	10	0
3.	Ignition System	35	20	35	0	10	0
4.	Starting System	35	20	35	0	10	0
5.	Charging System	35	20	35	0	10	0

Legends: R: Remembering U: Understanding
App: Applying C: Creating
E: Evaluating An: Analyzing

7. List of Practicals / Exercises

Sr. No	Practical / Exercises	Key Competency	Hours
1	Demonstrate cable size, color code, wiring and symbols used in auto wiring.	Identifying the type of cable used for different automobile electrical parts and learning various symbols.	2
2	Demonstrate construction and working of automobile batteries.	Identifying different types of batteries used in automobile.	2
3	Demonstrate various Battery maintenance processes.	Learning various methods for battery maintenance.	2
4	Demonstrate different types of Battery testing	Identifying different types of tests done on batteries to check the health of battery.	2
5	Demonstrate construction and working of different types of ignition systems.	Identifying different types of Ignition system used in modern automobile.	2
6	Demonstrate construction and working of different types of starter motor and switches.	Identifying different types of Starter motor and switches used to start the motor.	2
7	Study of working principle of D.C. generator.	Learning the working of a D.C. generator to charge the battery.	2
8	Demonstrate working principle of A.C. generator and its regulators.	Learning about AC generator.	2
9	Demonstration of Bendix drive and Over-running Clutch drive.	Identifying different drives and their working principle.	2
10	Demonstration of different types of Spark plugs.	Identifying different type of Spark plugs.	2

Total Hours **20**

8. Reference Books

1) Automobile Electrical Equipments by P.L. Kholi, Tata McGraw-Hill (Text Book)
2) Automobile Engineering by R.B. Gupta, Satya Prakashan.
3) Automobile Engineering by K.M. Gupta, Umesh Publication
4) Automobile Engineering by Dr. Kirpal Singh, Strandard Publishers
5) Automobile Engineering by Jain K.K., Asthana R.B., Tata McGraw Hill
6) Automobile Technology by H.M. Sheti, Tata McGraw Hill
7) Automotive Mechanics by W.H. Crouse & D.L. Anglin, Tata McGraw-Hill

9. Open Sources (Video, Website, Movie)

1) http://www.youtube.com/watch?v=a_nsgzlrZGU
2) http://www.youtube.com/watch?v=RzDqEorOXxk
3) http://www.youtube.com/watch?v=XDWGtWmB1D0
4) http://mail.faribault.k12.mn.us/~Mark_Lessman/S00CF9F37.4/STARTING%20SYSTEM.pt
5) Howstuffworks.com
6) Wikipedia.com