Register Number:……..

KUMARAGURU
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B.E/B.TECH DEGREE EXAMINATIONS: NOV /DEC 2024

(Regulation 2018)

Fourth Semester

AUTOMOBILE ENGINEERING

U18AUT4005**:** Automotive Electrical Engineering

COURSE OUTCOMES

CO1: Apply the fundamental of ac and dc circuits to real time applications

CO2: Classify the different types of motors and generators based on different parameters

CO3: Select a suitable motor for automotive application

CO4: Distinguish the various basic electrical and electronics systems of an automobile

CO5: Outline the working of different batteries available and select them based on the application

CO6: Recognize and build small wiring applications / wiring diagrams used in vehicles.

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions: -
PART A (10 x 2 = 20 Marks)
(Answer not more than 40 words)

1.	Define Ohm's Law and its application in electrical circuits	CO1	[K_1]
2.	Distinguish independent and dependent sources in circuit analysis.	CO2	[K_4]
3.	Compare the speed-torque characteristics of DC motors and AC induction motors	CO2	[K_2]
4.	Classify different types of DC machines based on their applications in electrical systems.	CO3	[K_2]
5.	Label the components of a starter motor and explain their functions	CO3	[K_1]
6.	Discuss the importance of starter drive mechanisms in automotive starting systems.	CO4	[K_2]
7.	Distinguish alternators and generators in automotive charging systems.	CO4	[K_2]
8.	Outline the function of a voltage regulator in an alternator charging circuit	CO5	[K_2]
9.	Classify different types of batteries used in automotive applications	CO6	[K_2]
10.	Relate the importance of electromagnetic compatibility (EMC) in automotive wiring systems.	CO6	[K_2]

Answer any FIVE Questions: -
PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)

11.	a)	Explain the concept of RMS (Root Mean Square) value in AC circuits. How is it calculated, and why is it important in electrical engineering applications?	8	CO1	[K_3]
	b)	Demonstrate the application of Kirchhoff's laws in solving complex electrical circuits. Provide an example and show step-by-step analysis using Kirchhoff's laws.	8	CO1	[K_3]
12.	a)	Analyze the construction and working principles of transformers. How do single-phase and three-phase transformers differ in their operation and applications?	8	CO2	[K_2]
	b)	Discuss the advantages of synchronous motors over induction motors in specific industrial applications. Include a discussion on speed control and efficiency.	8	CO2	[K_2]
13.	a)	Explain the role of solenoids and overrunning clutches in starter motors. How do these components contribute to efficient engine starting?	8	CO3	[K_5]
	b)	Illustrate the process of starter motor fault diagnosis. What are the common faults encountered, and how are they identified and rectified?	8	CO3	[K_2]
14.	a)	Explain the construction and working principles of alternators. How do they convert AC to DC for charging batteries?	8	CO4	[K_2]
	b)	Compare different charging methods for lead-acid batteries. What are the advantages and disadvantages of each method?	8	CO4	[K_2]
15.	a)	Discuss the construction and working principles of lithium-ion batteries. What are their advantages over traditional lead-acid batteries?	8	CO5	[K_2]
	b)	Relate the importance of battery testing methods and fault diagnosis in maintaining a reliable electrical system in vehicles	8	CO5	[K_2]
16.	a)	Discuss the role of multiplexed wiring systems in modern vehicles. How do they enhance functionality and reduce wiring complexity?	8	CO6	[K_2]
	b)	Explain the components and functionality of a basic automotive lighting system. How are headlamps, indicator lamps, and signaling systems integrated into the wiring system?	8	CO6	[K_2]

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