



B.E. DEGREE EXAMINATIONS: APRIL / MAY 2023

(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

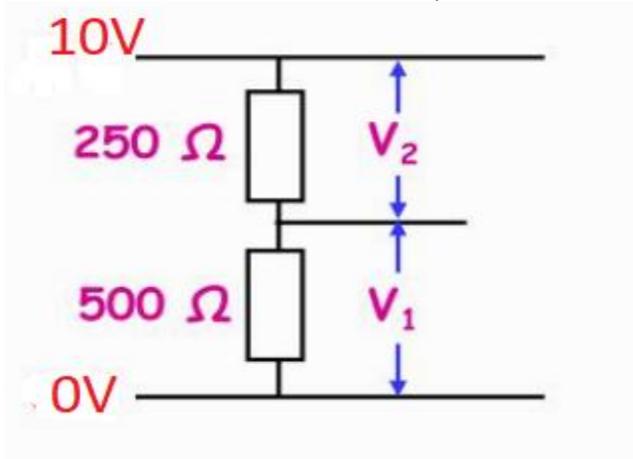
Answer all the Questions:-

PART A (10 x 2 = 20 Marks)

(Answer not more than 40 words)

1.

CO1 [K₂]



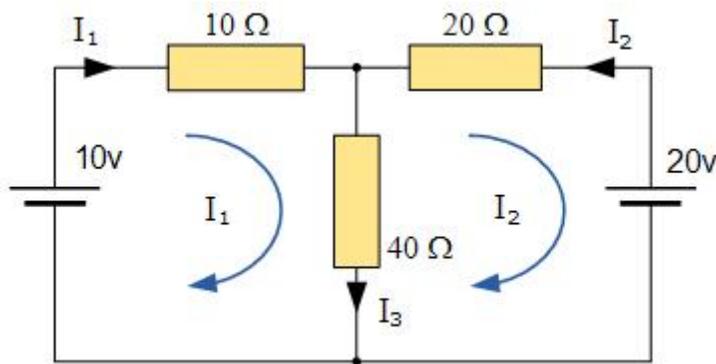
A 10V supply is connected across the supply. Find the voltages V1 and V2 using voltage division rule.

2. Explain the power factor in an ac circuit. Also give the equation and significance. CO1 [K₂]
 3. Give the significance of back emf in a motor. CO2 [K₂]
 4. Select a suitable dc motor for high traction applications and justify your selection. CO3 [K₂]
 5. State few advantages of a pre-engaged starter motor drive. CO4 [K₂]
 6. List few charging system faults and its associated symptoms. CO4 [K₂]
 7. How many AA batteries does it take to power the Model-S car of Tesla (85kWh) if the cell voltage is 9V and capacity is 750 mAh. CO5 [K₂]

8. Analyze the factors to be considered while selecting a suitable battery for automotive applications? CO5 [K₄]
9. Draw a simplified circuit of a lighting system showing the side- and headlight bulbs, light switch, dip switch and main beam warning light. CO6 [K₂]
10. List some of the new developments in the lighting system. CO6 [K₂]

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

11. Apply the Kirchoff's voltage law to mesh analysis, and find the voltage across each resistor. 16 CO1 [K₃]



12. a) Differentiate the different types of braking adopted in DC motor with necessary circuit diagram. 8 CO2 [K₃]
- b) Explain the speed torque characteristics of different types of dc motors with appropriate equations. 8 CO2 [K₂]
13. a) Discuss about any one type of starter drive systems with neat sketch. 8 CO4 [K₂]
- b) Elaborate on the fault diagnosis of the starting system with complete explanation on the testing procedure to identify the faults. 8 CO4 [K₃]
14. a) Explain the construction and working of alternators. 10 CO4 [K₂]
- b) Brief the role of rectifiers and the different rectifier circuits in a charging system with necessary circuit diagram. 6 CO4 [K₂]
15. a) Explain the construction and working of any one type of lithium-ion battery with relevant diagrams and equations stating the charging and discharging operations. 10 CO5 [K₂]

- b) Illustrate the Constant Current Constant Voltage (CC-CV) charging of lithium batteries with neat sketch. 6 CO5 [K₂]
16. a) What is meant by EMC? Explain the sources of EMC, elements of EMC and solution to overcome the effects of interference. 8 CO6 [K₂]
- b) Apply the knowledge of wiring to calculate the rating of the fuse required in a brake light wiring circuit which includes two 21 W bulbs, a relay, fuse and brake light switch. Draw the wiring diagram of brake light circuit. 8 CO6 [K₃]
