



B.E DEGREE EXAMINATIONS: APRIL /MAY 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 wiring diagrams used in vehicles

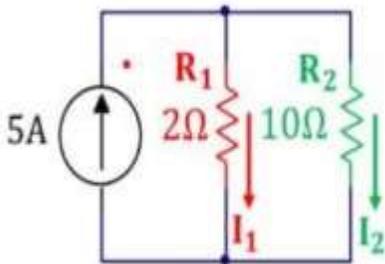
Time: Three Hours

Maximum Marks: 100

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

1. Find the current through the resistors R1 and R2 using current division rule.

CO1 [K₃]



2. Two impedances $10 \angle 60^\circ \Omega$ and $16 \angle 70^\circ \Omega$ are connected in series and pass an effective current of 5A. Determine the active power, and power factor.
3. Compare a squirrel cage induction motor with a slip ring induction motor.
4. List the advantages of a pre-engaged starter motor drive.
5. A series motor should not be started without load. Justify this statement with valid explanation.
6. Clearly explain the testing procedure to identify the faults in a charging system.

CO1 [K₃]

CO2 [K₂]

CO4 [K₂]

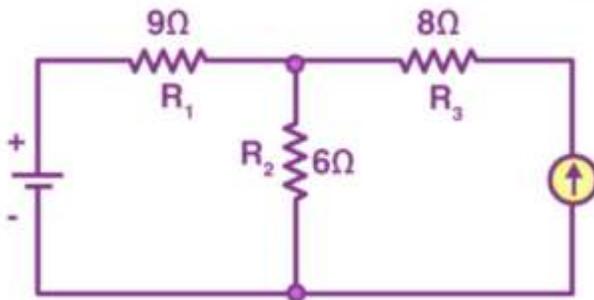
CO3 [K₂]

CO4 [K₃]

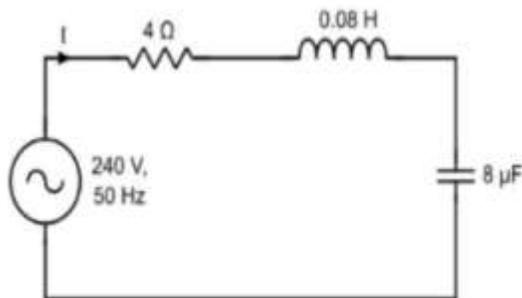
7. How many AA batteries does it take to power the Model S car of Tesla (85kWh) if the cell voltage is 1.5 V and capacity is 1500 mAh. CO5 [K₂]
8. If 12V, 20Ah battery is connected in 5S-5P configuration, apply series parallel combination to obtain the total voltage and capacity of the battery pack. Also determine the energy of the battery pack with the given data. CO5 [K₃]
9. Apply the concept of multiplexing in vehicles. CO6 [K₃]
10. Elaborate on the color codes adopted in automotive wiring with example. CO6 [K₂]

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

11. a) In the given circuit 90v is the battery value, 5A is the current source and the three resistors are 9 ohms, 6 ohms, and 8 ohms. Apply Kirchoff's voltage law to solve the mesh analysis, and determine the current across each resistor and potential difference. 8 CO1 [K₃]



- b) A 240 V, 50 Hz AC supply is applied to a coil of 0.08 H inductance and 4 Ω resistance connected in series with a capacitor of 8 μF. Calculate the following: Impedance, Circuit current, Phase angle between voltage and current, Power factor, Power consumed. 8 CO1 [K₃]



12.	a)	Explain the different methods used for controlling the speed of a DC series and shunt motor, with relevant equation.	8	CO2	[K ₂]
	b)	Elaborate on the electrical and mechanical characteristics of a dc motor with necessary equations and characteristic curves.	8	CO2	[K ₂]
13.	a)	Explain the charging system of an automobile with relevant circuit diagram.	8	CO4	[K ₂]
	b)	Explain the working of any one type of starter drive mechanism.	8	CO4	[K ₂]
14.		Classify the different types of motor as applied to different systems of an IC engine vehicles.	16	CO3	[K ₃]
15.	a)	Discuss about the construction and working of Lead acid battery with relevant diagrams and equations stating the charging and discharging operations.	8	CO5	[K ₂]
	b)	Apply the Constant Current-Constant Voltage (CCCV) charging to a battery and explain the working of CCCV with neat curves.	8	CO5	[K ₃]
16.	a)	Write a short notes on Electromagnetic Compatibility.	8	CO6	[K ₂]
	b)	Explain the wiring of head lamp and indicator lamps.	8	CO6	[K ₂]
