


Name:			
Enrolment No:			
UPES End Semester Examination, December 2024			
Course: Automotive Electrical and Electronics Program: B.Tech ADE Course Code: MECH2076		Semester: III Time : 03 hrs. Max. Marks: 100	
Instructions: Read all the questions carefully. You can do it. All the best!			
SECTION A (5Qx4M=20Marks)			
S. No.		Marks	CO
Q 1	Draw the block diagram of a microcontroller system used in automotive vehicles. Explain the functions of each sub-block in brief.	4	CO1
Q 2	Describe different types of motors used in automotive with their applications.	4	CO2
Q 3	The three-phase alternating voltage generated by an engine is described by $V=415 \times \sin(314t-\alpha)$. Calculate a) frequency in Hz b) line voltage c) phase voltage d) phase current for a load of 300W and at $\alpha=0$ e) phase current for a load of 300W and 400VAR at $\alpha=30^\circ$	4	CO2
Q 4	What is BMS? Explain the functionalities briefly.	4	CO1
Q 5	What is a thermistor and how does an automotive thermistor work?	4	CO1
SECTION B (4Qx10M= 40 Marks)			
Q 6	Explain the working principle of a lithium-ion cell with the help of equations and neat sketch.	10	CO3
Q 7	What are the different logic gates? Draw electrical and electronics circuits of fundamentals logic gates.	10	CO4
Q 8	Explain the working principle of a DC motor used in automotive vehicles with the help of suitable figures.	10	CO4

Q 9	State what is meant by active and passive safety.	10	CO3
SECTION-C (2Qx20M=40 Marks)			
Q 10	Develop a half wave rectifier connected to an EV (RLE) load and draw the various waveforms. <p style="text-align: center;">Or</p> Design a 4-bit counter by using T Flip-Flops and discuss the applications of these counters.	20	CO5
Q 11	The configuration of a grid-connected charging station is shown below. Give justification of different blocks in detail with related waveforms.	20	CO5

