SLOT: C2+TC2: FN1

REG.NO.:

VIT®
Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

SCHOOL OF MECHANICAL ENGINEERING
CONTINUOUS ASSESSMENT TEST (CAT) -II
FALL SEMESTER 2026-2027

Programme Name & Branch	**: B. Tech BMV**
Course Code	**: BAMEE405**
Course Name	**: Automotive Electrical and Electronics**
Faculty Name(s)	**: Dr P Suresh Kumar**
Class Number(s)	**: VL2026270101338**
Date of Examination	**: 29th September 2026; FN1: 08:30 AM - 10:00 AM**
Exam Duration	**: 90 minutes** **Maximum Marks: 50**

General instruction(s):

- Answer All Questions
- Course Outcome Statements:
  CO 3: Apply the concepts of electronic sensors, actuators, and control strategies in the operation of modern powertrain systems.
  CO 4: Examine and interpret the role of electronic control systems in enhancing braking, steering, suspension, and overall vehicle dynamics.

Q. No	Question	M	CO	BL
1.	Explain the major Electronic Control Units used in an Electric Vehicle. Discuss the functions of VCU, BMS, MCU, OBC, DC–DC converter controller, Thermal Management ECU, Brake Control Unit, BCM, and ADAS ECU.	10	CO3	BL3
2.	An automotive manufacturer plans to convert an existing Internal Combustion Engine (ICE) vehicle platform into an Electric Vehicle (EV). Draw a functional migration diagram illustrating how the Engine ECU architecture is replaced by multiple EV control units, and explain the changes in energy source, major inputs and outputs, torque control, energy management, and the number and interaction of ECUs. Use suitable block diagrams and examples from the study material to support your answer.	10	CO3	BL4
3.	Discuss the role of signal processing and I/O in an ECU. Discuss filtering, signal conditioning, plausibility checks, sensor fusion, ADC, PWM, digital I/O, timers	10	CO3	BL3
4.	Consider an electric vehicle travelling over a road containing potholes, speed breakers and uneven surfaces. Propose an adaptive	10	CO4	BL3

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	suspension control strategy that can automatically modify suspension characteristics according to road conditions. Identify the required sensors, actuators and control variables, and sketch its block diagram.			
5.	During a collision, the occupants experience a sudden deceleration. Explain how the vehicle's airbag and seat-belt tensioner control systems should operate in a coordinated manner. Discuss sensing, decision-making, deployment timing and safety considerations with a neat diagram	10	CO4	BL4