

**NB: -** Question No.1 is compulsory.  
Solve **any three** questions from remaining.  
Assume suitable data wherever necessary.

Q.1 Answer the following questions:

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| a) Explain On board Diagnostic system and its limitations.                     | 04 |
| b) Explain Instruments RTD sensor calibration min max setting steps.           | 04 |
| c) Compare microprocessor and microcontroller.                                 | 04 |
| d) What do you understand by interrupts in relation to memory?                 | 04 |
| e) Explain ADC accuracy and resolution 8 bit to 32 bit if input is 0 to +20Ma. | 04 |

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| Q.2 a) Explain in detail different layouts of Electric vehicle with neat labeled diagrams for each.  | 10 |
| b) How speed-power characteristics of traction motor is important in drive train design of Electric vehicle. Justify your answer with suitable graphs. | 10 |

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| Q.3 a) Explain Parallel Hybrid Electric drive train and its different types in detail.                    | 10 |
| b) With neat diagram explain Series Hybrid Electric drive train? List advantages and disadvantages of it. | 10 |

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| Q.4 a) Explain construction working and position of Lambda sensor and Crank shaft position sensor with neat diagram. | 10 |
| b) Explain with neat sketch working of any 3 actuators used in vehicles.   | 10 |

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| Q.5 a) Explain electronically controlled automatic transmission system. | 10 |
| b) Explain different parameters to be controlled in SI and CI engine.   | 10 |

Q.6 Write short notes on:

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| a) Adaptive control in Automobiles            | 04 |
| b) Lithium ion batteries in electric vehicles | 04 |
| c) Engine Control Module                      | 04 |
| d) Engine cooling and warm up control         | 04 |
| e) PID Controller in Automobiles              | 04 |

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