



**B.E DEGREE EXAMINATIONS: APRIL / MAY 2023**

(Regulation 2018)

Sixth Semester

**MECHATRONICS ENGINEERING**

U18MCE0001: Automotive Electronics

**COURSE OUTCOMES**

- CO1:** Explain the basics concepts of automobile engines (K2)  
**CO2:** Describe the components of Engine Control system (K2)  
**CO3:** State the working principle of automotive sensors. (K2)  
**CO4:** Describe the principle of vehicle network protocols (K3)  
**CO5:** Explain the working of various comfort system embedded in automobile (K2)  
**CO6:** Describe the working principle of automobile safety systems (K2)

**Time: Three Hours**

**Maximum Marks: 100**

**Answer all the Questions:-**

**PART A (10 x 2 = 20 Marks)**

**(Answer not more than 40 words)**

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|--|-----------------------|
| 1. List 7 major components of Automobiles                                      | CO1 [K <sub>2</sub> ] |
| 2. Illustrate engine management system   | CO1 [K <sub>2</sub> ] |
| 3. List the major closed loop control systems of automobiles.                  | CO2 [K <sub>2</sub> ] |
| 4. Draw a block diagram of ignition control system                             | CO2 [K <sub>2</sub> ] |
| 5. Illustrate manifold absolute pressure measurement system using strain gauge | CO3 [K <sub>2</sub> ] |
| 6. Differentiate I2C and SPI protocol  | CO4 [K <sub>2</sub> ] |
| 7. Distinguish duplex and half duplex communication with examples              | CO4 [K <sub>2</sub> ] |
| 8. Justify why comfort system is not mandated in vehicles.                     | CO5 [K <sub>2</sub> ] |
| 9. Differentiate active and passive safety system of automobiles               | CO6 [K <sub>2</sub> ] |
| 10. List the safety feature upgrades in Bharat Stage –VI.                      | CO6 [K <sub>2</sub> ] |

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

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|-----|----|---|----|-----|-------------------|
| 11. | a) | State the different parts of the Power Train system in an automobile. With a neat sketch, explain how does an Automated Manual Transmission work? | 12 | CO1 | [K <sub>2</sub> ] |
|     | b) | What are the three functions of the exhaust system, with a neat sketch, explain the working principle of a exhaust system in a car?               | 4  | CO1 | [K <sub>2</sub> ] |
| 12. | a) | State the importance of an engine management system in an Automotive Vehicle  | 4  | CO2 | [K <sub>2</sub> ] |
|     | b) | Derive a block diagram of air-fuel ratio control system by defining the parameters affecting the air-fuel mixture ratio.                          | 12 | CO2 | [K <sub>2</sub> ] |
| 13. | a) | Explain the principle of crank speed measurement system.  | 8  | CO3 | [K <sub>2</sub> ] |
|     | b) | Explain the intake air temperature sensors used in automobiles also argue why thermocouple are not used in automobiles.                           | 8  | CO3 | [K <sub>2</sub> ] |
| 14. |    | List the communication protocols used in automobiles and explain each protocol with their bit configuration with appropriate sketches.            | 16 | CO4 | [K <sub>2</sub> ] |
| 15. | a) | With neat sketches explain the adaptive cruise control system.  | 8  | CO5 | [K <sub>2</sub> ] |
|     | b) | With neat sketches explain the electronic stability control.  | 8  | CO5 | [K <sub>2</sub> ] |
| 16. | a) | Develop a block diagram for Anti lock braking system and explain the principle of operation.  | 8  | CO6 | [K <sub>2</sub> ] |
|     | b) | Construct a block diagram for Lane departure warning system and explain how it works.   | 8  | CO6 | [K <sub>2</sub> ] |

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