



B.E/B.TECH DEGREE EXAMINATIONS: APRIL /MAY 2024

(Regulation 2018)

Sixth Semester

ELECTRONICS AND COMMUNICATION ENGINEERING

U18ECE0055: Automotive Electronics

COURSE OUTCOMES

- CO1:** Describe various mechanical systems in an automobile.
- CO2:** Illustrate different types of electronic systems in an automobile.
- CO3:** Outline the various stages of Integrated development environment to design an embedded system.
- CO4:** Explain the various embedded systems used in automotive applications.
- CO5:** Compare Vehicle Communication Protocols.

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. What are the two main types of fuel delivery systems used in automotive engines, and briefly explain the differences between them? | CO1 | [K ₂] |
| 2. Differentiate drum brakes and disc brakes in automotive braking systems. | CO1 | [K ₂] |
| 3. Why is electronic control crucial for improving performance aspects such as speed, power, and torque in modern automotive systems? | CO2 | [K ₂] |
| 4. What role do environmental legislation and safety norms play in driving the adoption of electronic systems in automotive design? | CO2 | [K ₁] |
| 5. Why is booting reconfiguration in the context of IDEs necessary, and what benefits does it offer during the development process? | CO3 | [K ₂] |
| 6. Define what an Integrated Development Environment (IDE) is and mention its primary purpose in software development. | CO3 | [K ₁] |
| 7. Name two types of engine management systems commonly used in automotive vehicles and give their differences. | CO4 | [K ₁] |
| 8. Recall the role of electronic control in modern braking and traction systems, highlighting their | CO4 | [K ₁] |

importance in enhancing vehicle safety

9. List the purpose of SPI (Serial Peripheral Interface) and I2C (Inter-Integrated Circuit) protocols in embedded systems, and how do they differ in terms of communication speed and complexity? CO5 [K2]
10. What is the role of USB (Universal Serial Bus) in embedded systems and highlight its advantages. CO5 [K1]

Answer any FIVE Questions:-

PART B (5 x 16 = 80 Marks)

(Answer not more than 400 words)

11. a) Explain the function and importance of the transmission system in automotive vehicles, focusing on the differences between manual and automatic transmissions. 8 CO1 [K2]
- b) Outline the working principles and advantages of diesel fuel injection systems over carburetors in automotive engines. Compare their efficiency, emission levels, and adaptability to varying operating conditions. 8 CO1 [K2]
12. Analyze the operation and benefits of advanced safety subsystems such as Anti-lock Braking System (ABS), Traction Control System (TCS), and Electronic Stability Program (ESP) in enhancing vehicle control and accident prevention. 16 CO2 [K3]
13. a) Compare and contrast the features and capabilities of PC-based debuggers commonly integrated into IDEs. Utilize their effectiveness in diagnosing and resolving software defects, and discuss the importance of robust debugging tools in the software development lifecycle. 8 CO3 [K3]
- b) Identify the process of setting up and configuring a host-target interaction environment within an IDE with the challenges associated in ensuring compatibility between the development host and target hardware, and propose strategies for mitigating potential issues during configuration 8 CO3 [K3]
14. a) Interpret the significance of software calibration using engine and vehicle dynamometers in optimizing engine performance and ensuring compliance with 8 CO4 [K2]

emission standards.

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|--------|---|---|-----|-------------------|
| b) | Infer the functions and operation of various sensors employed in automotive systems and their importance in providing real-time data for engine management, transmission control, and vehicle safety systems. | 8 | CO4 | [K ₂] |
| 15. a) | Compare and contrast the characteristics of various vehicle communication protocols, including Local Interconnect Network (LIN), FLEXRAY, Media Oriented Systems Transport (MOST), and Keyword Protocol 2000 (KWP2000). | 8 | CO5 | [K ₂] |
| b) | Explain the architecture of the Controller Area Network (CAN) protocol used in vehicle communication systems along with its message format, error handling mechanisms, and applications in automotive electronics. | 8 | CO5 | [K ₂] |
| 16. a) | Assess the impact of technological advancements in vehicle electronics on the automotive industry and consumer preferences. | 8 | CO2 | [K ₃] |
| b) | Explore the role of electronic systems in improving comfort and safety features in automobiles and potential challenges in real-world driving scenarios. | 8 | CO2 | [K ₃] |
