



B.E/B.TECH DEGREE EXAMINATIONS: NOV/DEC 2023

(Regulation 2018)

Seventh Semester

COMMON TO ECE,EIE,MCE

U18ECE0058: Advanced HMI

COURSE OUTCOMES

CO1: Summarize HMI architecture and its subcomponents.

CO2: Develop real time automotive applications using tools such as Unity and Qt.

CO3: Develop simple HMI using Android and Web app development tools.

CO4: Perform HMI testing and validation for the developed system.

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 the advantages of HMI. | CO1 | [K ₂] |
| 2. What is a widget? | CO1 | [K ₂] |
| 3. Infer the relationship between controller and state machine. | CO1 | [K ₂] |
| 4. Explain the concept of colliders in Unity. | CO2 | [K ₂] |
| 5. Differentiate between a Prefab and an Instance in Unity. | CO2 | [K ₂] |
| 6. Explain the difference between HTML and CSS in web development. | CO3 | [K ₂] |
| 7. Illustrate how CSS can be used to style a webpage's text and explain the key properties involved. | CO3 | [K ₂] |
| 8. Outline the key benefits of using service workers in Progressive Web Apps (PWAs). | CO3 | [K ₂] |
| 9. Interpret the significance of usability testing in the validation and verification of automotive HMI systems. | CO4 | [K ₂] |
| 10. Relate the role of human factors engineering to the validation and verification of automotive HMI designs. | CO4 | [K ₃] |

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

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| 11. Explain the architecture, platform, and essential tools required for designing and implementing an effective HMI system. Discuss how these components are interconnected and their significance in achieving user-friendly and efficient human-machine interaction. Provide examples where appropriate to support your explanation. | 16 | CO1 | [K ₂] |
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| 12. | a) | Explain the steps involved in importing and organizing assets in Unity. Discuss the importance of asset optimization and how it contributes to a more efficient game development process. Provide practical examples to support your explanation. | 12 | CO2 | [K ₂] |
| | b) | Explain the fundamental concept of signals and slots in Qt. Provide a brief example to demonstrate how signals and slots facilitate communication between objects in a Qt application. | 4 | CO2 | [K ₂] |
| 13. | a) | Explain the Android architecture in detail, covering the key components, layers, and their interactions. Discuss how each component contributes to the overall functionality and performance of Android devices. Provide examples and real-world scenarios where applicable. | 16 | CO3 | [K ₂] |
| 14. | a) | Discuss the key challenges encountered in the testing of automotive Human-Machine Interface (HMI) systems. Explore the complexities associated with ensuring HMI functionality, usability, and safety in the automotive context. Provide examples of specific testing challenges and potential strategies to overcome them. | 8 | CO4 | [K ₃] |
| | b) | Explain the key features and applications of Bosch's Graphical Test System (GTS) for automotive testing. How does GTS streamline the testing process and improve efficiency in automotive development and validation? | 8 | CO4 | [K ₂] |
| 15. | | Describe the Model-View-Controller (MVC) architecture and illustrate how it can be effectively applied in the design of an automotive infotainment system to enhance user experience and system functionality. | 16 | CO1 | [K ₂] |
| 16. | | Discuss the Android Activity Lifecycle and the transitions between different states as a user interacts with your mobile app. Explain how these state changes impact app behavior, memory management, and user experience. Share insights into best practices for managing the Activity Lifecycle effectively to ensure optimal performance and responsiveness. | 16 | CO3 | [K ₂] |
