**First Semester 2022-2023**  
**COMPREHENSIVE EXAMINATION**

**Course No.** : EE ZG523/ ME XR510/ EC WF576  
**Course Title** : Embedded Systems  
**Nature of Exam** : Closed Book  
**Weightage** : 40%  
**Duration** : 2½ Hours  
**Date of Exam** : Sunday, 27/11/2022 (FN)  
**No. of Pages** = 1  
**No. of Questions** = 3

**Q.1 Answer the following questions related to Embedded System Architecture:**  
(a) Explain the role of RTOS in embedded systems. Provide examples.  
(b) What is the difference between microcontrollers and microprocessors?  
(c) Discuss the significance of power optimization techniques in embedded devices.  
(d) Why is memory management crucial in embedded systems? Explain with case studies.  
(e) How does an interrupt-driven system enhance real-time performance?  
[15]

**Q.2 Answer the following questions related to Communication Protocols:**  
(a) Compare UART, SPI, and I2C protocols in embedded systems.  
(b) How does CAN bus improve communication in automotive systems?  
(c) What are the advantages of using wireless protocols like Zigbee in IoT?  
(d) Explain the role of edge computing in embedded devices.  
(e) Discuss the limitations of Bluetooth Low Energy (BLE) in industrial applications.  
[15]

**Q.3 State True or False providing due justification for your answers:**  
(a) An embedded system always requires an operating system.  
(b) ARM processors are used only in mobile devices.  
(c) High-speed embedded systems do not require power management techniques.  
(d) Embedded systems cannot support multitasking.  
(e) IoT devices always use cloud computing for data processing.  
[10]