

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2025

Sixth Semester

Electrical and Electronics Engineering

20EEPW601 - EMBEDDED SYSTEMS AND IoT WITH LABORATORY

Regulations - 2020

Duration: 3 Hours

Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

	<i>Marks</i>	<i>K-Level</i>	<i>CO</i>
1. Which of the following is used to prevent a system from hanging due to software errors? (a) Real Time Clock (b) Watchdog Timer (c) DMA Controller (d) In-Circuit Emulator	1	K1	CO1
2. Direct Memory Access improves system performance by: (a) Reducing processor clock frequency (b) Allowing peripherals to access memory directly (c) Increasing the size of memory (d) Using multiple processors	1	K2	CO1
3. In an IoT architecture, the function of sensors is to: (a) Process cloud data (b) Sense and collect environmental parameters (c) Provide internet connectivity (d) Store data permanently	1	K1	CO2
4. Which of the following best describes Industrial IoT? (a) IoT for personal gadgets (b) IoT applications in industrial and manufacturing sectors (c) IoT used only in healthcare (d) IoT limited to smart homes	1	K2	CO2
5. Which serial communication standard is commonly used for long-distance communication in industrial systems? (a) RS-232 (b) RS-485 (c) SPI (d) I ² C	1	K2	CO3
6. Which of the following is a synchronous serial communication protocol? (a) RS-232 (b) CAN (c) SPI (d) UART	1	K1	CO3
7. In a preemptive scheduling RTOS, the CPU: (a) Executes tasks until completion (b) Switches tasks based on priority (c) Runs only one task at a time (d) Does not support multitasking	1	K2	CO4
8. Which RTOS mechanism allows tasks to synchronize their execution using signals? (a) Semaphore (b) Interrupt (c) Task Queue (d) Stack	1	K1	CO4
9. Smart meters are used to: (a) Measure only voltage (b) Monitor and communicate energy consumption data (c) Control industrial robots (d) Perform medical diagnosis	1	K1	CO5
10. An example of an embedded system application in agriculture is: (a) Soil moisture monitoring system (b) Video conferencing tool (c) Web browser (d) Cloud gaming device	1	K1	CO5

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

11. Define an embedded system and give one example.	2	K1	CO1
12. List any two memory management methods used in embedded systems.	2	K1	CO1
13. What is the importance of sensing and actuation in IoT?	2	K1	CO2
14. State two key features of Industrial IoT.	2	K1	CO2
15. Differentiate between RS232 and RS485 communication standards.	2	K2	CO3
16. What is the purpose of the CAN bus in embedded networking?	2	K1	CO3
17. Define task and thread in the context of an RTOS.	2	K1	CO4
18. What is priority inversion, and why is it a problem?	2	K2	CO4
19. Name two applications of embedded systems in healthcare.	2	K1	CO5

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| 20. How is an embedded system used in smart grids? | 2 | K2 | CO5 |
| 21. Write any two differences between SPI and I ² C communication. | 2 | K2 | CO3 |
| 22. Give two examples of home automation systems using embedded technology. | 2 | K1 | CO5 |

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

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| 23. a) | Explain the role of various structural units in an embedded processor. How does each unit contribute to system performance and functionality? | 11 | K2 | CO1 |
| OR | | | | |
| b) | Discuss the working and significance of timer and counting devices, watchdog timer, and real-time clock in ensuring reliable embedded system operation. | 11 | K2 | CO1 |
| 24. a) | Describe the role of sensors in IoT. Explain different types of sensors and their applications. | 11 | K2 | CO2 |
| OR | | | | |
| b) | Describe the role of cloud computing in IoT. Explain various cloud computing models and their advantages. | 11 | K2 | CO2 |
| 25. a) | Compare and contrast various serial communication standards RS232, RS422, RS485 based on speed, distance, and application suitability. | 11 | K2 | CO3 |
| OR | | | | |
| b) | Explain the CAN protocol bringing out the architecture, message formats and error detection on detail. | 11 | K2 | CO3 |
| 26. a) | Explain the concepts of task scheduling in RTOS. Compare preemptive and non-preemptive scheduling with examples and discuss their impact on real-time performance. | 11 | K3 | CO4 |
| OR | | | | |
| b) | Illustrate how inter-task communication is achieved using shared memory, message passing, semaphores, and mailboxes. Evaluate their advantages and limitations. | 11 | K3 | CO4 |
| 27. a) | Examine the design and operation of an embedded system used in Smart Meter applications. Discuss how IoT integration improves energy monitoring, data analytics, and bidirectional communication in Smart Grid systems. | 11 | K4 | CO5 |
| OR | | | | |
| b) | Analyze the IoT-based embedded system architecture for smart agriculture applications. Explain how sensors, wireless communication, and cloud analytics enhance precision farming, irrigation control, and crop health monitoring. | 11 | K4 | CO5 |
| 28. a) | Explain the working of an embedded IoT system for healthcare monitoring. Explain how biosensors, wearable devices, and cloud-based data processing enable real-time patient monitoring and telemedicine. | 11 | K2 | CO5 |
| OR | | | | |
| b) | Explain the working and advantages of an IoT-enabled embedded system for home automation. Explain how microcontrollers, sensors, actuators, and wireless protocols (like ZigBee, Wi-Fi, or Bluetooth) are used for intelligent control of lighting, temperature, and security. | 11 | K2 | CO5 |