

Code No: 156AV**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****B. Tech III Year II Semester Examinations, August/September - 2024****EMBEDDED SYSTEM DESIGN****(Electronics and Communication Engineering)****Time: 3 Hours****Max. Marks: 75**

- Note:** i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A**(25 Marks)**

- 1.a) What is a real-time embedded system? Provide an example. [2]
- b) Classify embedded systems based on their performance requirements and provide an example for each category. [3]
- c) How do Application-Specific Integrated Circuits (ASICs) differ from General Purpose Processors (GPPs)? [2]
- d) Define Commercial Off-The-Shelf (COTS) components. What is one advantage of using COTS components in an embedded system? [3]
- e) Describe a basic mechanism by which a watchdog timer operates. [2]
- f) Give the differences between a monolithic firmware design and a modular firmware design. [3]
- g) Define process, thread and Task. [2]
- h) What are the task states? Draw the state diagram of task. [3]
- i) Define Remote Procedure Call. [2]
- j) Discuss the differences between TCP and UDP sockets and their impact on communication reliability and performance. [3]

PART – B**(50 Marks)**

- 2.a) Define an embedded system. With a neat block diagram explain its core components and their roles in the functioning of the system.
- b) Compare and contrast embedded systems with general computing systems. [5+5]

OR

- 3.a) Discuss the various classifications of embedded systems. Explain the criteria used for classification and provide examples of systems in each category.
- b) Describe the essential characteristics and quality attributes of embedded systems. [5+5]
- 4.a) What is a programmable logic device? What are different types of PLDs? Explain the role of PLDs in embedded system design.
- b) Explain the different factors that need to be consider in the selection of memory for embedded system. [5+5]

OR

- 5.a) Explain the different onboard communication interface in brief.
- b) What are differences between general purpose processor and application specific instruction set processors with an example. [5+5]

- 6.a) Describe the purpose and operation of a reset circuit in an embedded system. Discuss different types of reset circuits and their applications.
- b) Discuss the role of an oscillator unit in embedded systems. Compare and contrast different types of oscillators. [5+5]

OR

- 7.a) Explain various methods of developing embedded firmware.
- b) Explain how the choice of programming language affects the overall development process and system performance. [5+5]

- 8.a) Describe the core functions of an operating system. Explain how an operating system manages hardware and software resources, and discuss its role in providing a user interface.
- b) Explain the use of Semaphores for a Task or for the Critical Sections of a Task. [5+5]

OR

- 9.a) Explain the cooperative scheduling and round robin scheduling with a suitable diagram.
- b) Explain in detail about shared data problem and its possible solutions. [5+5]

- 10.a) Describe the message passing model of task communication. Compare and contrast synchronous and asynchronous message passing.
- b) Explain common issues related to task communication and synchronization in embedded systems. [5+5]

OR

- 11.a) Describe the role of device drivers in an embedded system. Explain the process of writing a device driver.
- b) Design a communication and synchronization strategy for an embedded system that involves multiple tasks performing concurrent operations. [5+5]

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