R20

SET -1

III B. Tech II Semester Regular Examinations, July -2023
EMBEDDED SYSTEMS
(Electronics and Communication Engineering)

Time: 3 hours   Max. Marks: 70

Answer any **FIVE** Questions **ONE** Question from **Each unit**
All Questions Carry Equal Marks
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UNIT-I

1. a) Explain the classification of embedded systems with examples.   [7M]
    b) List out major application areas of embedded systems with examples.   [7M]
                                        (OR)
2. a) What is the role of quality attribute in the embedded system development context? [7M]
        Explain the different Quality attributes to be considered in an embedded system design.
    b) Explain Time-to-market? What is its significance in product development?   [7M]

UNIT-II

3. a) Explain different ways of communication between the serial communication ports. [7M]
    b) Illustrate the watchdog timer for firmware execution supervision.   [7M]
                                        (OR)
4. a) Describe the sequence of operation for communicating with an I2C slave device. [7M]
    b) Explain the merits and limitations of Parallel port over Serial RS-232 interface. [7M]

UNIT-III

5. a) Discuss the different 'embedded firmware design' approaches in detail.   [7M]
    b) Explain the advantages of 'High Level language' based 'Embedded firmware' development. [7M]
                                        (OR)
6. a) What is Interrupt? Explain its properties and What is its role in embedded application development? [7M]
    b) What are the different types of pre-processor directives available in 'Embedded C'? [7M]
        Explain them in detail.

UNIT-IV

7. a) What is kernel? What are the different functions handled by a general purpose kernel. Explain in detail. [7M]
    b) What is the difference between 'Hard' and 'Soft' real-time systems? Give an example for 'Hard' and 'Soft' Real-Time kernels. [7M]
                                        (OR)
8. a) Discuss how Threads and Processes are related. What parameters are common to Process and Threads? Explain in detail. [7M]
    b) Explain the various factors to be considered for the selection of scheduling criteria. [7M]

UNIT-V

9. a) Explain the various elements of an embedded system development environment.   [7M]
    b) Explain the various details held by a Map file generated during the process of cross-compiling an Embedded C project. [7M]
                                        (OR)
10. a) What is ROM emulation? Explain In Circuit Emulator (ICE) based debugging in detail. [7M]
    b) Explain how a digital camera implemented using an embedded operating system.   [7M]

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SET -2

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UNIT-I

1.	a)	Explain the different characteristics of embedded systems in detail.	[7M]
	b)	Discuss the purpose of embedded systems and applications..	[7M]

(OR)

2.	a)	What is the difference between General Purpose Processor (GPP) and Application Specific Instruction Set Processor (ASIP)? Give an example for each.	[7M]
	b)	Describe the quality attributes of embedded systems.	[7M]

UNIT-II

3.	a)	What are the different modes of operations in Serial Interface port? Explain in detail.	[7M]
	b)	Explain the role of Reset circuit in Embedded System.	[7M]

(OR)

4.	a)	Explain the role of Real Time Clock (RTC) in Embedded System.	[7M]
	b)	Write in detail about the merits and limitations of Parallel port over Serial RS-232 interface.	[7M]

UNIT-III

5.	a)	What is the difference between 'Super loop' based and 'OS' based embedded firmware design? Which one is the better approach? Explain it.	[7M]
	b)	Explain the 'High Level language' based 'Embedded firmware' development technique.	[7M]

(OR)

6.	a)	What are Interrupt Vector Address and Interrupt Service Routine (ISR)? How are they related? Explain it.	[7M]
	b)	Explain the different bit manipulation operations supported by 'Embedded C'.	[7M]

UNIT-IV

7.	a)	What is kernel space and user space? How is kernel space and user space interfaced? Explain it.	[7M]
	b)	Explain the different computational models in embedded system design.	[7M]

(OR)

8.	a)	Explain the concept of 'multithreading'. What are the advantages of multithreading.	[7M]
	b)	What all activities are involved in context switching? Explain in detail.	[7M]

UNIT-V

9.	a)	Discuss the role of Integrated Development Environment (IDE) for Embedded Software Development.	[7M]
	b)	Differentiate between Intel Hex and Motorola Hex file format.	[7M]

(OR)

10.	a)	What is the difference between a simulator and an emulator? Explain in detail.	[7M]
	b)	Discuss the case study of embedded system for a smart card.	[7M]

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UNIT-I

1. a) Illustrate an application-specific Embedded system with suitable example. [7M]
    b) Explain in detail about the typical embedded system-core of the embedded system. [7M]

(OR)

2. a) What is Sensor? Explain its role in Embedded System Design? Illustrate with an example. [7M]
    b) Describe what embedded firmware is and its role in embedded systems. [7M]

UNIT-II

3. a) Explain the role of the analog electronic components resistor, transistor, capacitor and diode in embedded hardware design. Draw a circuit used in embedded application using these components. [7M]
    b) What is open collector? State its significance in embedded hardware development. [7M]

(OR)

4. a) Explain serial communication using I2C, CAN and USB bus in detail. [7M]
    b) Discuss the role of Watchdog Timer in Embedded System. [7M]

UNIT-III

5. a) Explain the limitations/drawbacks of 'Assembly language' based Embedded firmware development. [7M]
    b) Describe the various steps involved in the assembling of an assembly language program. [7M]

(OR)

6. a) What is the difference between compiler and cross-compiler? Explain in detail. [7M]
    b) Define task control block (TCB)? Explain the structure of TCB. [7M]

UNIT-IV

7. a) What is the difference between a General Purpose kernel and a Real-Time kernel? Give an example for both. [7M]
    b) What is the difference between Interrupt Service Routine and Normal Service Routine? Explain in detail. [7M]

(OR)

8. a) Explain how multithreading can improve the performance of an application with an illustrative example. [7M]
    b) What is Computational model? Explain its role in hardware software co-design. [7M]

UNIT-V

9. a) What are the different files generated during the cross-compilation of an Embedded C file? Explain them in detail. [7M]
    b) Explain the advantages and limitations of simulator based debugging. [7M]

(OR)

10. a) Explain in detail about the On Chip Debugging (OCD). [7M]
    b) Sketch the block diagram of digital camera and explain digital camera implementation in an embedded operating system. [7M]

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SET -4

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UNIT-I

1. a) Draw and explain the typical Embedded system architecture. [7M]
    b) What is Actuator? Explain its role in Embedded System Design? Illustrate with an example. [7M]

(OR)

2. a) What is Embedded Firmware? What are the different approaches available for Embedded Firmware development? [7M]
    b) Explain the quality attribute Throughput in the embedded system design context. [7M]

UNIT-II

3. a) Explain the different on-board communication interfaces in brief. [7M]
    b) Explain the difference between I2C and SPI communication interface. [7M]

(OR)

4. a) Explain the different external communication interfaces in brief. [7M]
    b) What is Electronic Design Automation (EDA) tool? Explain the role of EDA tools in embedded system design. [7M]

UNIT-III

5. a) Explain the advantages of 'Assembly language' based Embedded firmware development. [7M]
    b) Explain 'library file' in assembly language context. What is the benefit of 'library file'? Explain it. [7M]

(OR)

6. a) What all precautionary measures need to be implemented in an Interrupt Service Routine (ISR)? Explain in detail. [7M]
    b) Explain in detail about the device driver programming. [7M]

UNIT-IV

7. a) Explain the commonly used thread standards for thread creation and management by different operating systems. [7M]
    b) Explain multiprocessing, multitasking and multiprogramming. [7M]

(OR)

8. a) Explain the different types of non-preemptive scheduling algorithms. State the merits and de-merits of each. [7M]
    b) What is hardware software co-design? Explain the fundamental issues in hardware software co-design. [7M]

UNIT-V

9. a) Explain the various details held by a List file generated during the process of cross-compiling an Embedded C project. [7M]
    b) Explain the role of Integrated Development Environment (IDE) for Embedded Software Development. [7M]

(OR)

10. a) What are the different techniques available for embedded firmware debugging? Explain them in detail. [7M]
    b) Discuss mobile phone software for key inputs. [7M]

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