

IV B. Tech I Semester Regular Examinations, November – 2022**EMBEDDED SYSTEMS****(Common to Electronics and Communication Engineering and Electronics and Instrumentation Engineering)****Time: 3 hours****Max. Marks: 75**

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

UNIT - I

- 1 a) Discuss the concept of load store architecture and instruction pipelining? [7]
- b) What is operational quality attributes? Explain the important operational quality attributes to be considered in any embedded system design. [8]

(OR)

- 2 a) What are the different types of memories used in Embedded System design? Explain the role of each. [7]
- b) Give an overview of the different market players of the automotive Embedded application domain. [8]

UNIT - II

- 3 a) Explain the role of decoders in embedded hardware development. Draw the circuit diagram for interfacing a 3-bit binary decoder with 8051. [7]
- b) What is an integrated circuit? Explain the different types of integrations for ICs. Give an example for each. [8]

(OR)

- 4 a) What is a sequential circuit? Draw a 3-bit binary counter using T flip flop and explain its functioning. [7]
- b) Explain the role of watchdog timer in Embedded System with suitable diagram. [8]

UNIT - III

- 5 a) Explain library file in assembly language context? What is the benefit of library file? [7]
- b) What is an interrupt service routine? How it is different from normal service routine? [8]

(OR)

- 6 a) What is the difference between super loop based and OS based embedded firmware design? Which one is the better approach? [7]
- b) Explain the different methods of constant data declaration in embedded C? [8]



UNIT - IV

- 7 a) Explain the commonly used thread standards for thread creation and management by different operating systems? [7]
- b) Three processes with process IDs P1, P2, P3 with estimated completion time 12, 10, 2 milliseconds respectively enters the ready queue together in the order P2, P3, P1. Process P4 with estimated execution completion time 4 milliseconds enters the Ready queue after 8 milliseconds. Calculate the waiting time and Turn Around Time (TAT) for each process and the average waiting time and Turn Around Time (Assuming there is no I/O waiting for the processes) in the FIFO scheduling.

(OR)

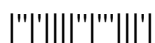
- 8 a) What is task control block (TCB)? Explain the structure of TCB. [7]
- b) Explain Round Robin process scheduling with interrupts? [8]

UNIT - V

- 9 a) Briefly discuss about In Circuit Emulator based firmware debugging? [7]
- b) What is cross-compilation? Explain various files generated during the cross-compilation process? [8]

(OR)

- 10 a) Briefly discuss about logic analyzer? Mention the uses and drawbacks? [7]
- b) Discuss about various hardware debugging tools used in embedded product development? [8]



Code No: R194104H

R19

Set No. 2

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UNIT-I

- 1 a) Explain the different classifications of Embedded Systems. Give an example for each. [7]
b) What is programmable peripheral Interface Device? Explain the interfacing of 8255 PPI with an 8-bit microprocessor/controller? [8]

(OR)

- 2 a) What is non-operational quality attributes? Explain the important non-operational quality attributes to be considered in any embedded system design. [7]
b) Explain about application specific embedded system with suitable example? [8]

UNIT-II

- 3 a) With suitable diagram briefly discuss about open collector and tri-state output? [7]
b) With neat diagram explain the role of reset circuit in embedded system design? [8]

(OR)

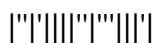
- 4 a) What is a combinational circuit? Draw a combinational circuit for embedded application development? [7]
b) Explain the merits and limitations of parallel ports over serial RS-232 interface? [8]

UNIT-III

- 5 a) What is interrupt vector address and interrupt service routine? How are they related? [7]
b) Explain the limitations of assembly language based embedded firmware development? [8]

(OR)

- 6 a) List out the advantages of high level language based embedded firmware development? [7]
b) Explain the different techniques for delay generation in embedded C programming? [8]



UNIT-IV

- 7 a) Explain starvation in the process scheduling context. Explain how starvation can be effectively tackled? [7]
b) What is semaphore? Explain the different types of semaphores? [8]
(OR)
- 8 a) Explain the dining philosopher's problem in the process synchronization? [7]
b) What is multi threading? Explain how multi threading can improve the performance of an application with an illustrative example? [8]

UNIT-V

- 9 a) List and describe four real-world examples of each type of debugging tools? [7]
b) What is the difference between host and a target? Explain about IDE with neat diagram? [8]
(OR)
- 10 a) Briefly discuss about integrated development environment for embedded software development? [7]
b) What is ROM Emulator? Explain the uses and drawbacks of ROM Emulator? [8]



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UNIT-I

- 1 a) Categorize the core of embedded system depending on its applications and domain. Explain [7]
b) Explain the quality attributes Reliability, Maintainability, Information security and safety in the embedded system design context? [8]
(OR)
- 2 a) With neat diagrams distinguish between Harvard and Von-Neumann processor/controller architecture? [7]
b) Explain the different communication buses used in automotive application? [8]

UNIT-II

- 3 a) What is the role of logic gates in embedded hardware design? Draw a circuit using the AND and OR gate IC's in embedded applications? [7]
b) With neat diagram explain the role of RTC in embedded system design? [8]
(OR)
- 4 a) List out the differences between digital combinational and sequential circuits? [7]
b) Explain the role of real time clock in embedded systems with suitable diagram? [8]

UNIT-III

- 5 a) State the differences between compiler and cross-compiler? Explain the Concepts of C versus Embedded C? [7]
b) What is assembly language programming? List out the advantages of assembly language based embedded firmware development? [8]
(OR)
- 6 a) What are pseudo-ops? What is the use of it in assembly language programming? [7]
b) Explain the difference between super loop based and OS based embedded firmware design? [8]



UNIT-IV

- 7 a) Explain *Thread context switch* and the various activities performed in thread context switching for user level and kernel level threads. [7]
b) Explain the critical section object for process synchronization? Why is critical section object based synchronization fast? [8]

(OR)

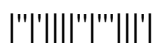
- 8 a) What is kernel? What are the different functions handled by a general purpose kernel? [7]
b) Explain the different types of preemptive scheduling algorithms. State the merits and demerits of each? [8]

UNIT-V

- 9 a) Explain the various elements of an embedded system development environment? [7]
b) What is the difference between an assembler and a disassemble? State their use in embedded application development? [8]

(OR)

- 10 a) What is Debugging? Briefly discuss about various debugging tools used in an embedded system? [7]
b) Write short notes on quality assurance and testing of the embedded system design? [8]



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UNIT-I

- 1 a) Briefly explain the various purposes of embedded systems with [7]
illustrative examples.
b) Explain the product life cycle curve of an embedded product [8]
development?

(OR)

- 2 a) What is a relay? What are the different types of relays available? [7]
Explain its role in embedded applications.
b) Define an embedded system? Explain the different applications of [8]
embedded systems?

UNIT-II

- 3 a) Briefly discuss about the sequence of operation for communicating with [7]
a 1-wire slave device?
b) What is open collector? State its significance in embedded hardware [8]
development?

(OR)

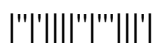
- 4 a) Explain the role of the analog electronic components resistors, [7]
transistors, diode and capacitor in embedded hardware design. Draw a
circuit used in embedded application using these components?
b) Explain the sequence of operation for communicating with an I2C slave [8]
devices?

UNIT-III

- 5 a) What is an interrupt? Explain its properties? What is its role in [7]
embedded application development?
b) Explain function in the embedded C programming context. Explain the [8]
generic syntax of function declaration and implementation?

(OR)

- 6 a) What are the different types of pre-processor directives available in [7]
embedded C? Explain them in detail?
b) Explain context switching, context saving and context retrieval in [8]
relation to interrupts and interrupt service routine?



UNIT-IV

- 7 a) What is kernel space and user space? How is kernel space and user space interfaced? [7]
b) Explain the different task communication synchronization issues encountered in interprocess communication? [8]
- (OR)
- 8 a) Explain the various activities involved in the creation of process and threads. [7]
b) What is IDLEPROCESS? What is the significance of IDLEPROCESS in the process scheduling context? [8]

UNIT-V

- 9 a) What are the different techniques available for embedded firmware debugging? Explain them in detail. [7]
b) Explain about Laboratory instruments for testing the embedded system. [8]
- (OR)
- 10 a) with suitable example briefly discuss about i) Linker ii) Compiler iii) Interpreters [7]
b) What is ROM emulator? Explain ICE based debugging in detail. [8]

