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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute Affiliated to AKTU, Lucknow)

M.Tech

SEM: II - THEORY EXAMINATION (2025 - 2026)

Subject: Real Time Operating System

Time: 3 Hours

Max. Marks: 70

General Instructions:

IMP: Verify that you have received the question paper with the correct course, code, branch etc.

1. This Question paper comprises of **three Sections -A, B, & C**. It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.
2. Maximum marks for each question are indicated on right -hand side of each question.
3. Illustrate your answers with neat sketches wherever necessary.
4. Assume suitable data if necessary.
5. Preferably, write the answers in sequential order.
6. No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

SECTION-A

15

1. Attempt all parts:-

- (1.1) Time required to synchronous switch from the context of one thread to the context of another thread is called?(CO1,K1) 1
- (a) threads fly-back time
 - (b) jitter
 - (c) context switch time
 - (d) none of the mentioned
- (1.2) Message passing system allows processes to _____(CO2,K1) 1
- (a) communicate with each other without sharing the same address space
 - (b) communicate with one another by resorting to shared data
 - (c) share data
 - (d) name the recipient or sender of the message
- (1.3) An example of a system that may use a process pipeline is a _____(CO3,K2) 1
- (a) High-speed data acquisition system
 - (b) Failure of a power supply in an embedded system
 - (c) Both High-speed data acquisition system and Failure of a power supply in an embedded system
 - (d) None of the mentioned
- (1.4) The maximum number of items a queue can hold is called its _____.(CO4,K1) 1
- (a) Space
 - (b) Length
 - (c) Both a and b
 - (d) None

- | | | |
|-------|--|---|
| (1.5) | Which activity is concerned with identifying the task at the final embedded systems?(CO5,K1) | 1 |
| (a) | high-level transformation | |
| (b) | compilation | |
| (c) | scheduling | |
| (d) | task-level concurrency management | |

2. Attempt all parts:-

- | | | |
|-------|---|---|
| (2.1) | What is Interprocess communication?(CO1,K2) | 2 |
| (2.2) | What are the problems of semaphore?(CO2,K1) | 2 |
| (2.3) | Define UART. (CO3,K1) | 2 |
| (2.4) | What mutual exclusion means?(CO4,K1) | 2 |
| (2.5) | Define context switch time.(CO5,K1) | 2 |

SECTION-B

20

Answer any one of the following:-

- | | | |
|-------|--|---|
| (3.1) | What are the advantages and disadvantages of RTOS?(CO1,K1) | 4 |
| (3.2) | Describe round robin scheduling with example.(CO1,K2) | 4 |

Answer any one of the following:-

- | | | |
|-------|--|---|
| (3.3) | Describe the application of VxWorks in RTOS.(CO2,K2) | 4 |
| (3.4) | Discuss all queue service calls in detail.(CO2,K2) | 4 |

Answer any one of the following:-

- | | | |
|-------|--|---|
| (3.5) | Write short note on Linker and Locater.(CO3,K2) | 4 |
| (3.6) | What is ISR? What is return type of ISR?(CO3,K2) | 4 |

Answer any one of the following:-

- | | | |
|-------|--|---|
| (3.7) | What is interrupt nesting? What are the constants that control interrupt nesting? (CO4,K2) | 4 |
| (3.8) | Explain Binary Semaphores used for Synchronization.(CO4,K2) | 4 |

Answer any one of the following:-

- | | | |
|--------|---|---|
| (3.9) | Write a short note on Mailboxes & Signals.(CO5,K2) | 4 |
| (3.10) | What are the various kinds of problems presents during peripheral programing in ARM Cortex-core controller?(CO5,K2) | 4 |

SECTION-C

35

4. Answer any one of the following:-

- | | | |
|-------|--|---|
| (4.1) | Difference between General Purpose OS & RTOS. Describe basic architecture of an RTOS. (CO1,K3) | 7 |
| (4.2) | Draw and explain the Architecture of Xenomia RTOS.(CO1,K2) | 7 |

5. Answer any one of the following:-

- | | | |
|-------|---|---|
| (5.1) | Explain the architecture of device driver, with neat sketch and give the applications of device drivers. (CO2,K2) | 7 |
| (5.2) | What are the different task communication synchronization issues encountered in | 7 |

Inter Process communication?(CO2,K2)

6. Answer any one of the following:-

- | | | |
|-------|---|---|
| (6.1) | Describe Emulators and logic analyzer in detail. (CO3,K2) | 7 |
| (6.2) | Write different phases of IDEs for Embedded System Development in detail.(CO3,K2) | 7 |

7. Answer any one of the following:-

- | | | |
|-------|---|---|
| (7.1) | Explain xQueueSendToFrontFromISR() and xQueueSendToBackFromISR() API Functions. Also describe their parameters and return values.(CO4,K3) | 7 |
| (7.2) | Explain memory management with Linked List and Bit maps with example. (CO4,K2) | 7 |

8. Answer any one of the following:-

- | | | |
|-------|---|---|
| (8.1) | Briefly describe the features of the Cortex M3 based microcontrollers memory organization. (CO5,K2) | 7 |
| (8.2) | Describe the structure and goals of the CMSIS (Cortex Microcontroller Software Interface Standard) version 1.3.(CO5,K2) | 7 |

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