



Name :
Roll No. :
Invigilator's Signature :

CS/M.Tech (IT)/SEM-1/PGIT-105/2012-13

2012

REAL TIME OPERATING SYSTEMS

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

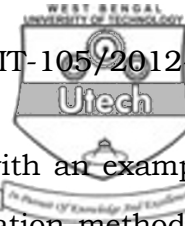
*Candidates are required to give their answers in their own words
as far as practicable.*

Answer Question No. 1 and any *five* from the rest.

1.
 - a) Define an RTOS. What are the components of an RTOS ?
 - b) Discuss Pre-emptive Priority-based Scheduling with an example.
 - c) What are the key characteristics of an RTOS ?
 - d) What is a message queue ? Discuss the message queue control block.
 - e) Define a task in the context of an RTOS. What are the components of a TCB ?
 - f) What are the different types of semaphores used in an RTOS ? Mention the uses of each of them.



- g) What are synchronous and asynchronous exceptions ?
Mention the differences between them.
- h) What do you mean by resource synchronization and activity synchronization ?
- i) What is the function of the programmable interval timer ?
- j) Mention the names of few RTOS in existence. 10×2
2. Explain the task states with an example. In this connection what do you mean by Run-to-Completion tasks and Endless-Loop tasks ? $5 + 5$
3. What is a semaphore ? Describe the semaphore control block. What is recursive locking ? How can priority inversion be avoided using a semaphore ? $2 + 3 + 2 + 3$
4. Describe the message queue states. Discuss about message queue storage. What are the common uses of message queue in an embedded system ? Explain each of them. $3 + 2 + 2 + 3$
5. Discuss the select operation on pipes. What are event registers ? Discuss the event register control block. Describe the catch operation of a signal. $2 + 2 + 4 + 2$
6. What are nested exceptions ? How does it cause stack overflow ? What is the remedy of the problem ? What are spurious interrupts ? What is the common cause of such interrupts ? $2 + 2 + 1 + 3 + 2$



7. What is barrier synchronization ? Discuss with an example.
What are the different Resource Synchronization methods ?
Explain. 5 + 5
8. What are timing wheels ? How are they implemented in
practice ? What are Hierarchical Timing Wheels ? What
advantages are gained in using these wheels over the
conventional timing wheels ? 3 + 2 + 3 + 2
9. Write short notes on any *two* : 5 + 5
- a) Rate Monotonic Scheduling
 - b) Earliest deadline first scheduling
 - c) Signals
 - d) Condition variables.
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