



Name :

Roll No. :

Invigilator's Signature :

CS/B.TECH (CSE)/SEM-8/CS-802B/2011

2011

REAL TIME & EMBEDDED SYSTEM

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.*

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any **ten** of the following :

$$10 \times 1 = 10$$

- i) Which of the following are real time applications scenarios ?
- a) An on-line bus ticketing system
 - b) Printing of annual report of a company's annual report
 - c) Reconciling a day's transactions in an account book of a small company
 - d) An aircrafts' yaw control system.



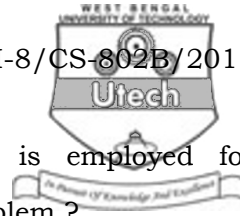
- ii) Identify the category of the following real-time systems as "hard, soft or firm" :
 - a) An on-line celebrity cricket bat auction
 - b) A patient monitoring system in an ICU
 - c) A library book reservation system
 - d) A bank's credit card defaulters notice generation program.
- iii) Which of the following describes the RTOS design philosophy best ?
 - a) Maximize the throughput of the system
 - b) Maximize the processor utilization
 - c) Minimizing the response time
 - d) Response within certain stipulated time period.
- iv) Which of the following are commercially claimed RTOSs ?
 - a) Linux
 - b) Windows CE
 - c) Mindows NT
 - d) Vx works.
- v) Scheduling of tasks is a very important consideration in RTOS. Which of the following is best described the scheduling policy design ?
 - a) The scheduler must follow a pre-emptive policy
 - b) The scheduler must not use pre-emptive policy option
 - c) The scheduler must not only use pre-emptive policy options with the priority considerations.
 - d) The scheduler must not use pre-emptive policy option, but must employ priority consideration.



- vi) Supercomputer typically employ
- a) Real time operating system
 - b) Multiprocessor operating system
 - c) Desktop OS
 - d) None of these
- vii) CPU performance is measured through
- a) Throughput
 - b) MHz
 - c) Flaps
 - d) none of these.
- viii) Which file system does windows 95 typically use ?
- a) FAT 16
 - b) FAT 32
 - c) NTFS
 - d) WNFS.
- ix) Which of the following is contained in Process Control Block (PCB) ?
- a) Process Number
 - b) List of open files
 - c) Memory Limits
 - d) All of these.



- x) Keeping a task's schedulability in mind, which way a task may be scheduled ?
- a) The task has a predetermined time after which it may be scheduled.
 - b) The task has a predetermined time before which it may be scheduled
 - c) The task has a predetermined time interval during which it must be scheduled any time
 - d) The task start has a worst case delay estimate before which it must be scheduled.
- xi) Describe which of the following scheduling policies is most suited for controlling a set of periodic tasks ?
- a) FCFS
 - b) Least laxity first
 - c) Earliest dead line first
 - d) Rate monotonic policy schedule.



xii) Which of the following strategies is employed for overcoming the priority inversion problem ?

- a) Abandon the notion of priorities altogether
- b) Have only two priority levels
- c) Allow for temporarily raising the priority of lower level priority process
- d) Use pre-emptive policies strictly based on priorities.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

- 2. Prove that the Rate Monotonic Algorithm is an optimal static-priority algorithm. 5
- 3. What is priority inversion ? How can this be solved ? 2 + 3
- 4. Explain the difference between clock-driven scheduling and priority-driven scheduling of periodic task. 5
- 5. What is a single purpose processor ? What are the benefits of choosing a single purpose processor over general purpose processor ? 2 + 3
- 6. Explain Inter Task Communication. 5



GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. a) What is NRE cost ? 2
b) What is the design gap ? 5
c) Describe characteristics of real time system. 8
8. a) Explain the shortcomings of EDF. 6
b) Consider the following set of three periodic real-time tasks : $T_1 = (10, 20)$, $T_2 = (15, 60)$, $T_3 = (20, 120)$ to be run on a uniprocessor. Determine whether the task set is schedulable under RMA. 9
9. a) Explain working principal of USB. 5
b) Classify the sockets used in USB with diagram. 3
c) Explain with suitable diagram the working of I^2C . 7
10. Draw a circuit diagram to connect four seven-segment display with 8051 microcontroller.

Explain how multiplex display technique is used to display in four seven-segment display. $10 + 5$



11. Write Short notes on any three of the following 3×5

- a) Deadline Monotonic Algorithm
- b) Self-suspension
- c) Round Robin time scheduling
- d) SOC
- e) Watch-dog timers.

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