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 defore 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 benifits 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 : T1 = (10, 20), T2 = (15, 60), T3 = (20, 120) to be run on a uniprocersor. 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.