Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E –Ist SEMESTER–EXAMINATION – JULY- 2012

Subject code: 710105N **Date: 11/07/2012**

Subject Name: Real Time Computing

Time: 2:30 pm – 05:00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Define the folloing terms. **07**

(i) Phase (ii) Release time (iii) Aperiodic task
(iv) Sporadic task (v) Clock driven scheduling
(vi) priority driven scheduling (vii) absolute deadline

(b) What are common properties of valid schedule? What is feasible & optimal schedule? **07**

Q.2 **(a)** Consider the real-time program described by the pseudo code below. Names of jobs are in italic. **07**

At 9AM.*start*:have breakfast and go to office:
At 10AM.
  If there is class,
    t*each*;
  Else, *help* students;
When *teach* or *help* is done, *eat_lunch*;
Until 2PM, *sleep*;
If there is a seminar,
  If topic is interesting,
    l*isten*;
  Else, *read*;
Else
  w*rite* in office;
When seminar is over, *attend* social hour;
discuss;
jog;
eat_dinner;
work a little more;
end_the_day;

(i) Draw a task graph to capture the dependencies among jobs.

(b) Discuss some applications of real time systems in multimedia. **07**

OR

(b) Each of the following systems of periodic tasks is scheduled and executed according to a cyclic schedule. For each system, choose an appropriate frame size. Preemptions are allowed, but the number of preemptions should be kept small. **07**

i) (6,1),(10,2) and (18,2)
(ii) (8,1),(15,3),(20,4) and (22,6)

Q.3 **(a)** Justify given statements. **07**

(i)Non-preemptive EDF algorithm is not optimal.

(ii)EDF is not optimal on multiple processors.

(b) A system consists of two periodic tasks **07**

T1(3,1), T2(3,2)

(i) What is total utilization?

(ii) Construct RM schedule in interval [0, 12]. Label any missed deadline.

OR

Q.3 **(a)** A system consists of three periodic tasks. **07**

T1(3,1),T2(5,2),T3(8,3)

(i) What is total utilization?

(ii) Construct DM schedule in interval [0, 16]. Label any missed deadline.

(b) What do you mean by blocking time of jobs? Which parameters affect blocking time? **07**

Q.4 **(a)** A system consists of five jobs. Their release time, execution time, priority & resource requirements are given below. **07**

Job	Release Time	Execution Time	Priority	Resource from time	Resource total time
J1	0	6	4	R1 from 1	2
J2	2	9	3	R2 from 3 R1 from 9	1 3
J3	5	3	2	R1 from 6	1
J4	7	5	1	R2 from 8	2

Use priority inheritance protocol to fulfill resource requirements of all jobs.

(b) Consider a fixed priority system in which there are five tasks Ti , for i=1,2,3,4 and 5 with decreasing priorities. There are two resources x and y. The critical sections of T1, T2,T4 and T5 are [Y:3],[Y:5[X;2]] and [X;10], respectively (Note that T3 does not require any resource)find the blocking times bi(rc) of the tasks. **07**

OR

Q.4 **(a)** Explain general structure of microkernel from RTOS point of view. **07**

(b) What should be common capabilities of any RTOS? **07**

Q.5 **(a)** Explain real time extension of linux OS. **07**

(b) Explain some code optimization techniques in real time environment. **07**

OR

Q.5 **(a)** Explain real time code testing methods. **07**

(b) With suitable example explain how average response time of aperiodic jobs is improved in clock driven schedule. **07**

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