BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI
First Semester 2017-2018
BITS G553 Real-Time Systems
Mid-Semester Exam (Regular)

Time: 90 Min **MM: 50** **Closed Book** **Date: 11-10-2017**

Note: Please answer all parts of a question together at one place.
Clearly specify if any assumptions are made.

1. Three periodic tasks T_i (P_i,e_i)= {(12,2),(13,4),(20.8)} are scheduled using non-strict LST. Show its schedule until t=20 using a neat Gantt chart. Show all the calculations at appropriate time as time proceeds. [6M]

2. A system of periodic tasks T_i (P_i,e_i)= {(4,1),(6,1),(8,3)} are scheduled using a cyclic executive scheduling algorithm.
   i. Comment about its schedulability by stating the reasons.
   ii. Draw the Network flow Graph for a hyperperiod.
   iii. There are two aperiodic jobs A_i (r_i,e_i)= {(2,2),(19,1)}. Calculate the response time of these jobs by drawing the timing diagram of only the relevant frames.
   iv. There are three sporadic jobs $S_i(r_i,e_i,d_i)$={(0,1,5), (7,2,24), (5,1,20)}. Can these sporadic jobs be accepted? Give proper justification.
   v. Now if the above periodic tasks are scheduled using EDF, comment about acceptance/rejection of the above sporadic jobs.

   [24M]

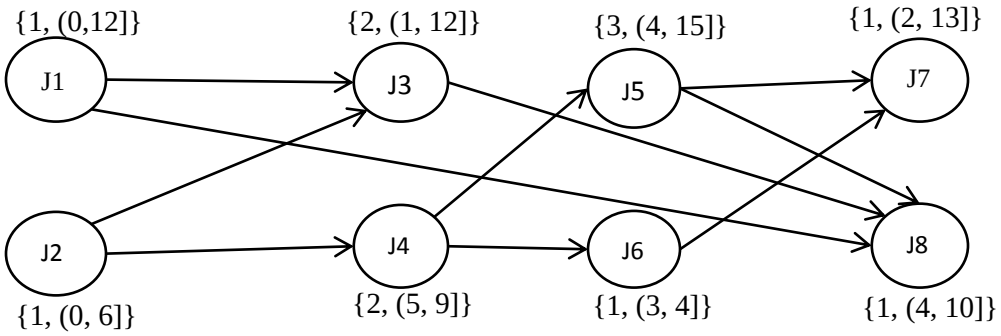
3. (i) Three periodic tasks T_1(3.5,1), T_2(8,1) and T_3(5,2,3) are to be scheduled using DMA. Comment about its schedulability using iterative method of Time Demand Analysis (TDA).

   (ii) Now if T_2 has a non-preemptible portion of 0.75 units of time, comment about its schedulability.

   [7M]

4. Answer the following in brief.
   i. How does deferrable server mitigate the disadvantages of a polling server?
   ii. "Advances in supercomputer hardware will take care of real-time requirements." Comment about the correctness/ validity of this statement.
   iii. What information does functional parameters of the workload convey?

iv. Consider the pre-emptible jobs of the precedence graph below (the execution time and feasible interval is after the name of each job)



Compute the effective release times and deadlines of the jobs.

v. In the case of long response time tasks in a fixed-priority driven scheduling, how do we check the schedulability of periodic tasks without resorting to complete simulation of the tasks?

[2+2+2+4+3=13M]