Mid Semester Test (Regular)	**31-10-2022**	**Max. Marks 50**
Suggester time :45 min	**Closed Book**	**Closed Book part Max Marks-25**

**Note: notations have their usual meaning unless stated**
Answer all the parts of question together. Parts not answered together will not be considered.
Answer the question in a concise way (to the point).

Q1. If the release time of the second job of task T1 is 7.5 and the release time of its 4th job is 19.5 and the absolute deadline of its 7th job is 44.5. Then what are the initial phase, period and the relative deadline of Task T1. Give your answer showing the relevant calculations/ justifications. **[3M]**

Q2. In what condition(s) does a periodic task T_i does not remain a periodic task anymore. Please note that T_i does not depend on any other task for its execution and is independent of other tasks in the system. Also there are no abnormalities in the system. **[2M]**

Q3. A task graph for a system having two processors for job execution is shown below: **[12M]**
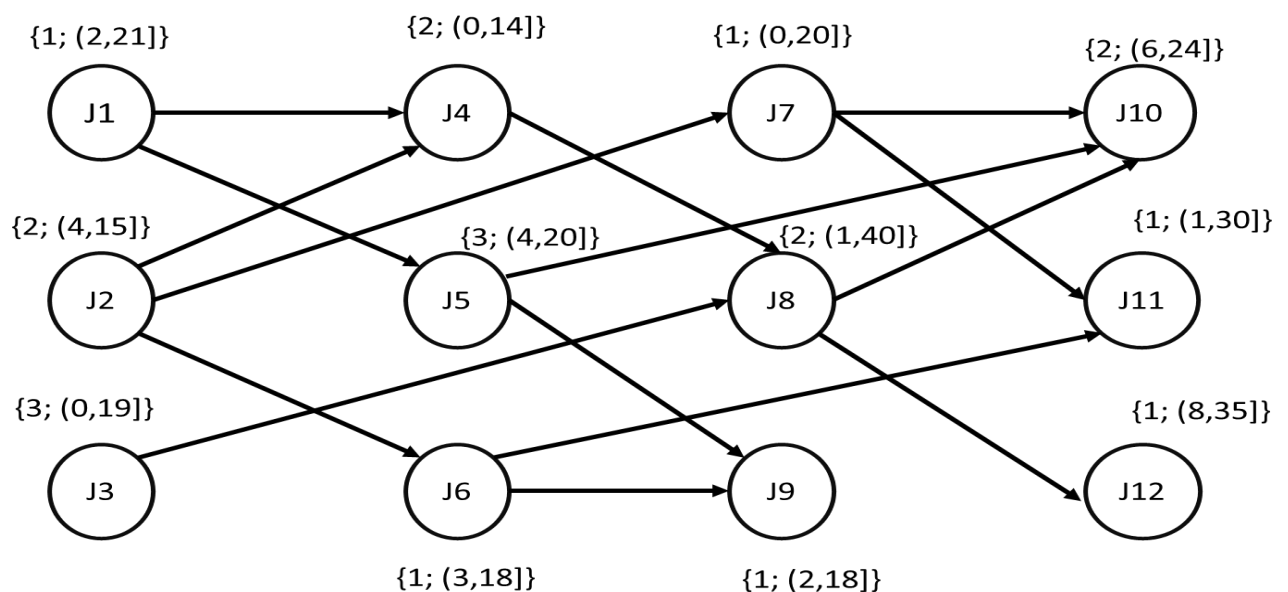
For each of the job, their execution time and the feasible interval is mentioned against it in the format $\{e_i;(r_i,d_i]\}$. Now calculate the effective release times and effective deadlines of all the jobs showing the relevant calculations and tabulate them in the following way:

Job	Effective release time	Effective deadline
J1		
J2		
...		

Q4. What are the different parameters that characterize a job and what information do they convey? **[2M]**

Q5. What is the difference between lateness and tardiness? **[1M]**

Q6. A set of tasks are scheduled using EDF. Can we perform time demand analysis (TDA) to judge their schedulability? If yes, do we have to make any changes in the usual TDA approach? **[1M]**

Q7. If schedulable utilization method and TDA at the critical instant fails, how can we comment about the schedulability of a given set of tasks without performing a complete simulation of the tasks? **[1M]**

Q8. Why do we perform TDA at the critical instant? **[1M]**

Q9. What is in-phase busy interval? In what scenarios do we perform TDA in an in-phase busy interval? **[1M]**

Q10. How is clock-driven scheduling different from tick-scheduling-based priority driven scheduling? **[1M]**

BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE
I SEMESTER 2022-23 BITS G553 REAL TIME SYSTEMS

Mid Semester Test (Regular)   **31-10-2022**   **Max. Marks 50**
Suggester time :45 min   **Open Book**   **Open Book part Max Marks-25**

Q1. A system of four tasks T_i (P_i, e_i) = {(7,1.5), (14,1), (21, 2) (42,5) } is scheduled with clock driven Cyclic-executive scheduling algorithm. A stream of aperiodic jobs arrives as follows, Ai (r_i,e_i) = {(8,1.5);(12,2.5); (20,2)}

a) Draw a neat timing diagram choosing the proper frame size and find the average response time of the aperiodic jobs.
b) Now use the slack stealing algorithm and determine how much the percentage reduction in average response time is compared to the cyclic scheduling and cyclic executive.
c) Consider three sporadic jobs S_i (r_i,e_i,d_i)=S_1(2,1,12), S2 (10,2.5,20) S3 (20,0.5,28). Specify whether these sporadic jobs will be accepted or not. Justify your answer with proper reasoning and methodology.

[12M]

Q2. Consider the following three fixed-priority tasks: T1 (7, 1), T2 (11, 1), T3 (16, 4)
(a)   Use iterative method of Time Demand Analysis (TDA) to check whether the task set is schedulable or not...
(b) Now if T2 self suspends twice for 1 time unit each time and if the context switching time is 0.1-time units for every context switch, determine whether the given task set is schedulable. Use analytical method of TDA to conclude. **[8 M]**

Q3. Consider the following three fixed-priority tasks: T_i(P_i,e_i,D_i)= {(9, 1, 27), (10, 2,30), (11, 3, 33)}
   (a) Without performing actual simulation, determine whether these tasks are scheduled using RMA.

   (b) Now, if the tasks are scheduled using EDF, determine whether the tasks are schedulable or not.

[5M]