Birla Institute of Technology & Science, Pilani
Work Integrated Learning Programmes Division
First Semester 2022-2023

Mid-Semester Test
(EC-2 Regular)

Course No.	:	BITS ZG553
Course Title	:	Real Time Systems
Nature of Exam	:	Open Book
Weightage	:	35%
Duration	:	2 Hours
Date of Exam	:	23/09/2022 (FN)

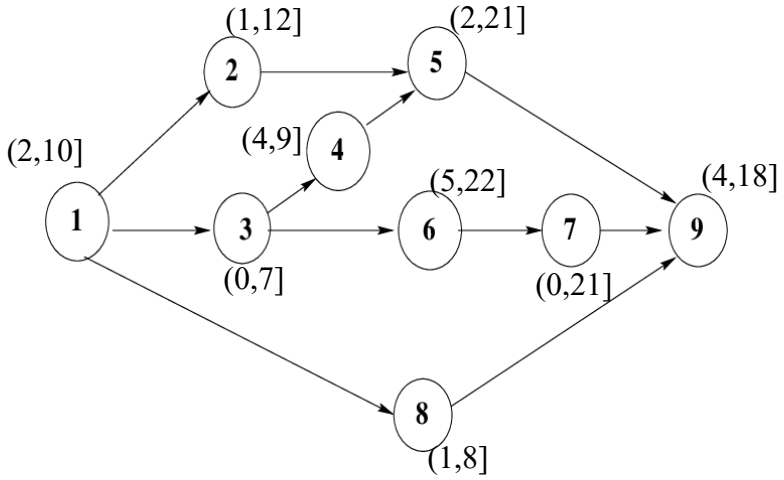
No. of Pages = 2
No. of Questions = 6

Note to Students:
1. Please follow all the *Instructions to Candidates* given on the cover page of the answer book.
2. All parts of a question should be answered consecutively. Each answer should start from a fresh page.
3. Assumptions made if any, should be stated clearly at the beginning of your answer.

Q.1 Below is the set of periodic real time tasks. Determine whether the following set of tasks is schedulable using Rate monotonic algorithm on a uniprocessor. [8 Marks]

Task	Execution time	Period
T1	40	100
T2	40	150
T3	100	350

Q.2 For the precedence graph given below, find the effective release time and effective deadline. The feasible interval is given beside in the graph. Find the EDF schedule for the jobs. Assume that the execution time of each job is 1 . [10 Marks]



Q.3 State whether the following statements are TRUE or FALSE. Justify your answer.

(a) Unlike table driven schedulers, storing of precomputed schedule is not required by cyclic schedulers.

(b) While scheduling a set of hard real-time periodic tasks using a cyclic scheduler, if more than one frame satisfies all the constraints on frame size then the largest of these frame sizes should be chosen. [3 Marks]

Q.4 Answer the following questions? [3 Marks]

(a) Between two soft real time systems A and B, as the tardiness increases, usefulness of the system decreases at faster rate for the system A compared to system B. Which system has softer time constraints? Why?

(b) A periodic task in a real time system is characterized by (2, 10,3,10). What will be the feasible interval of the 2nd job of this task.

(c) When do the RM and DM algorithms produce the same schedule for a system of periodic tasks?

Q.5 (a) What is slack of a job? Explain? [2 Marks]

Q.5 (b) Is MLF a dynamic priority or Static priority algorithm? Schedule below task set using MLF algorithm. Draw the Gantt chart for the same. [6 marks]

	Arrival time	Execution time	Relative deadline
T1	0	10	33
T2	4	3	24
T3	5	10	24

Q.6 A real-time system consists of three tasks T1, T2, and T3. Their characteristics have been shown in the following table. [3 Marks]

Task	Phase (ms)	Execution Time (ms)	Relative Deadline (ms)	Period (ms)
T_1	20	10	20	20
T_2	40	10	50	50
T_3	70	20	80	80

Suppose the tasks are to be scheduled using an offline scheduling. Compute the length of time for which the schedules have to be stored in the pre-computed schedule table of the scheduler.

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