MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

SEVENTH SEMESTER B. TECH (ELECTRONICS AND INSTRUMENTATION)
PROCTORED ONLINE END SEMESTER EXAMINATION Dec. 21/Jan. 22

SUBJECT: **REAL TIME OPERATING SYSTEM** (**ICE 4060**)

TIME: 2.20 to 3.45 PM **DATE: 17-12-2021** **MAX MARKS 20**

Note: Answer All questions.

<table>
<tr><td>1</td><td>A</td><td>What are the different type timing constraints available in embedded world. Explain each constraint with a ATM machine. Also draw the state machine diagram for each state.</td><td>3</td></tr>
<tr><td></td><td>B</td><td>Determine whether the following real time task in scheduled on a uniprocessor using RMA. Show the intermediate steps in computation. Is RMS optimal when the task dealline differ from the task period? Note all time in m sec
<table>
<tr><td>Task</td><td>Start time</td><td>Processing time</td><td>period</td><td>deadline</td></tr>
<tr><td>T1</td><td>20</td><td>25</td><td>150</td><td>100</td></tr>
<tr><td>T2</td><td>40</td><td>7</td><td>40</td><td>40</td></tr>
<tr><td>T3</td><td>60</td><td>10</td><td>60</td><td>50</td></tr>
<tr><td>T4</td><td>25</td><td>10</td><td>30</td><td>20</td></tr>
</table></td><td>4</td></tr>
<tr><td></td><td>C</td><td>Illustrate with an example the key techniques that one need to adopt for high reliability in embedded system. Also illustrate with an example different fault tolerance technique available.</td><td>3</td></tr>
<tr><td>2</td><td>A</td><td>A real time system which consists of three tasks T_1 , T_2, T_3 Note all time is m sec
<table>
<tr><td>Task</td><td>Phase</td><td>Execution time</td><td>Relative Deadline</td><td>Period</td></tr>
<tr><td>T1</td><td>20</td><td>10</td><td>20</td><td>20</td></tr>
<tr><td>T2</td><td>40</td><td>10</td><td>50</td><td>50</td></tr>
<tr><td>T3</td><td>70</td><td>20</td><td>80</td><td>80</td></tr>
</table></td><td>3</td></tr>
</table>

		Assume T1 has higher priority then t2 and t3 has higher priority then t2. A back ground task Tb arrives at time 0 and would require 2000msec to complete. Compute the completion time of the background task Tb assuming that context switching time takes not more than 1 msec.	
	B	Consider a real time system whose task characteristics and dependencies are described as follows. The task repeat every 150msec. Determine a feasible schedule which could be used by a table driven scheduler	4
	C	With help of a finite state machine model illustrate famous software fault tolerance techniques also interrupt the technique with any one embedded application.	3

Task	Computation time	deadline	Dependency
T1	10	50	-
T2	10	80	T1
T3	30	60	T1
T4	50	150	T3,t2
T5	35	140	T2