MANIPAL INSTITUTE OF TECHNOLOGY

(A constituent unit of MAHE, Manipal)

SEVENTH SEMESTER BTECH. (E & C) DEGREE END SEMESTER EXAMINATION JANUARY/FEBRUARY 2021 SUBJECT: ADVANCED EMBEDDED SYSTEM DESIGN (ECE - 4001)

TIME: 3 HOURS

Instructions to candidates

- Answer ALL questions.
- Missing data may be suitably assumed.
- 1A. Discuss the characteristics of modern operating systems. Make a clear distinction of process and thread.
- 1B. What common events lead to the creation of a process? Explain.
- 1C. What is the process image? Explain the process control structure.

(4+3+3)

MAX. MARKS: 50

- 2A. Briefly explain RTX kernel. What are the advantages of using RTX kernel.
- 2B. Discuss the role of process control block? Draw the process list structure.
- 2C. Explain the uses of threads in a single user multiprocessing system.

(4+3+3)

- 3A. Write a RTX code for LPC1768, having two tasks by setting an event for each tasks. Display the message for each task as "Task X created", where X=1, 2 respectively. The first task continuously repeat 30ms after the second task completes and the second task must repeat 20ms after first task completes.
- 3B. Define an interrupt mask register of ARM cortexM3. Give the differences between Thumb and Thumb-2 modes.
- 3C. What is the role of DLAB bit in ARM Cortex UART configuration? Write an UARTO initialization code for LPC1768 by obtaining the values to be loaded into various registers. Given that the PCLK=12 MHz, baud rate of 9600, 8 bit data , 1 stop bit and no parity.

(4+3+3)

- 4A. Complete the **Table 4A** using data given for 5 processes. Draw the timing diagram with comparative analysis for all the scheduling. Discuss the problem due to simple Feedback scheduling and how to overcome that? Calculate the mean turnaround time and normalized TAT for Feedback scheduling with $q=2^i$.
- 4B. Demonstrate how MUTEX function can be used in RTX code for LPC1768 to print the value of a global variable which gets updated in each task. Assume that there are 2 tasks.

(7+3)

5A. What are the differences between system wait function and os_tsk_pass function. Write a RTX code for LPC1768 using cooperative scheduling to operate "RELAY" and "LED" simultaneously.

- 5B. Explain the following using an example : i. Reusable resources ii. Consumable resources
- 5C. Justify the need of AMBA system in high end processors. Define the following with respect to AMBA based system: i. bus cycle ii. bus transfer iii. burst operation.

(4+3+3)

I able 4A						
Process	Α	В	С	D	Е	Mean
Arrival time	0	2	3	5	7	
Service time (Ts)	3	2	4	4	3	
SRT						
Finish Time						Mean
TAT (Tt)						
Tt/ Ts						
HRRN						
Finish Time						Mean
TAT (Tt)						
Tt/ Ts						
FB q=1						
Finish Time						Mean
TAT (Tt)						
Tt/ Ts						

Table 4A