



UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESSION 2021/2022**

- COURSE NAME : REAL TIME SYSTEM APPLICATIONS
- COURSE CODE : BIE 33303
- PROGRAMME CODE : BIP
- EXAMINATION DATE : JULY 2022
- DURATION : 3 HOURS
- INSTRUCTION :
1. ANSWER ALL QUESTIONS
 2. THIS FINAL EXAMINATION IS AN **ONLINE ASSESSMENT AND CONDUCTED VIA CLOSED BOOK.**
 3. STUDENTS ARE **PROHIBITED** TO CONSULT THEIR OWN MATERIAL OR ANY EXTERNAL RESOURCES DURING THE EXAMINATION CONDUCTED VIA CLOSED BOOK.

THIS QUESTION PAPER CONSISTS OF **THREE (3) PAGES**

CONFIDENTIAL



- Q1** (a) Provide a proper definition for the following Real Time Systems (RTS) related terms:
- (i) Aperiodic task. (1 mark)
 - (ii) Multi-rate control systems. (1 mark)
 - (iii) Release time of a job. (1 mark)
 - (iv) Hard deadline. (1 mark)
- (b) Discuss if the payroll processing system is considered an RTS. Support your answer with the RTS concepts and characteristics. (6 marks)
- Q2** (a) Discuss how redundancy plays an important role in improving the RTS reliability and fault tolerance. (10 marks)
- (b) State the differences between failure, error, and fault. (6 marks)
- (c) Illustrate the reasons behind the occurrence of damages and propose solutions to mitigate the damages in RTS. (10 marks)

Q3 (a) Trace the execution flow of Jobs J_i and J_k , based on the flow graph of Figure Q3(a).

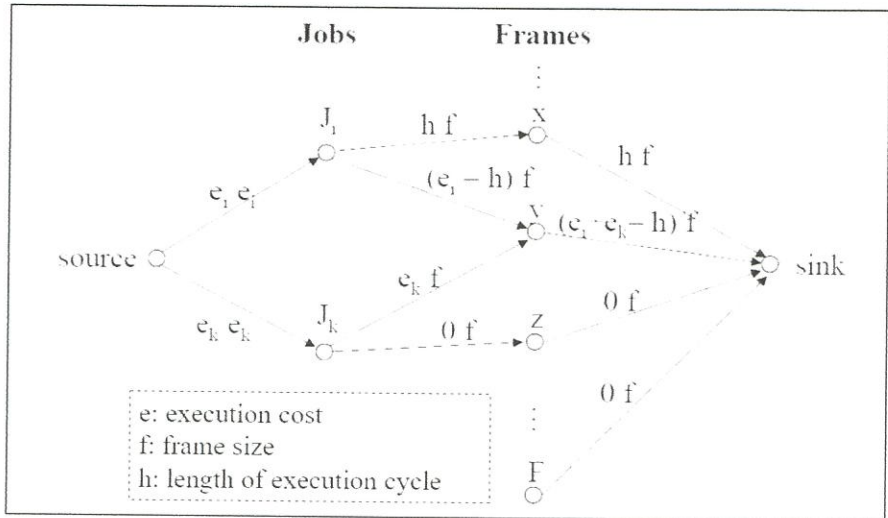


Figure Q3(a)

(5 marks)

(b) Based on Figure Q3(b), draw a job scheduling of a multiprocessor P that executes four jobs in the following order: J_1, J_2, J_3, J_4 . Where r_i is the release time, d_i is the deadline, and e_i is the execution time.

	r_i	d_i	e_i
J_1	0	10	5
J_2	0	10	6
J_3	4	15	8
J_4	0	20	10

Figure Q3(b)

(5 marks)

(c) Explain the meaning of synchronous communication in RTS.

(4 marks)

(d) Illustrate how the semaphores approach is used to implement synchronization in RTS.

(10 marks)

-END OF QUESTIONS -

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