MANIPAL UNIVERSITY
SCHOOL OF INFORMATION SCIENCES

FIRST SEMESTER MASTER OF ENGINEERING – ME (EMBEDDED SYSTEMS)
DEGREE EXAMINATION – APRIL / MAY 2016

SUBJECT: ESD 603 – REAL TIME OPERATING SYSTEMS

Saturday, May 7, 2016

Time: 10.00 – 13.00 Hrs.   Max. Marks: 100

1. Describe the ·evolution of Operating systems for a uniprogramming system to multiprogramming and multitasking systems. Relate the evolution to the developments in hardware.

(10 marks)

2. Why Process Control Blocks are required? What information process control block contains?

(4+6=10 marks)

3. With neat diagrams explain the   a) Round Robin Scheduling
                                      b) Multilevel Feedback Queue Scheduling.

(5+5=10 marks)

4. Explain the various hardware solutions to achieve mutual exclusion between processes.

(10 marks)

5. What is a semaphore? What are the drawbacks of using semaphore? With diagram explain the concept of queueing implementation of semaphore.

(2+2+6=10 marks)

6. Let P1, P2, P3, P4 and P5 be 5 processes and 3 resource types A, B and C. A has 10 instances, B has 5 and C has 7 instances. Max needs of P1 is <7,5,3> (7 A type, 5 B type and 3 C type), P2 is <3,2,2> P3 is <9, 0, 2> P4 is < 2,2,2> and P5 is <4,3,3> Current allocations are P1<0,1,0> P2 <3,0,2> P3<3,0,2> P4<2,1,1> and P5 <0,0,2> . Determine whether the system is in a safe state. Whether a request of <3,3,0> of process P5 can be granted? Justify your answer.

(8+2=10 marks)

7. Describe paging as a memory management approach. Draw a diagram which indicates how logical address is converted to a physical address in this scheme. Also mention the benefits and drawbacks of this approach

(3+5+2=10 marks)

8. Consider a page size of 100 bytes and the following memory address reference string: 120, 220,312, 423, 211, 115, 543, 653, 234, 167, 278, 190, 225, 321, 765, 666, 333, 222, 111, 249. How many page faults would occur for the following replacement algorithms, assuming 4 page frames?   .

   a) FIFO replacement
   b) LRU replacement
   c) Optimal replacement

(2+4+4=10 marks)

9. Explain the concept of virtual memory and demand paging.

(10 marks)

10. Consider three processes P1, P2 and P3. The periods for P1, P2 and P3 are 80, 40 and 20 respectively. And their processing times are 40, 10 and 5 respectively.
    a) Is it possible to schedule these tasks based on CPU utilization test?
    b) Draw the **Time line diagram** for the above processes. Do the processes meet their deadlines in this case?

(4+6=10 marks)

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