Question Paper

Exam Date & Time: 22-Nov-2018 (10:00 AM - 01:00 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

SCHOOL OF INFORMATION SCIENCES
FIRST SEMESTER MASTER OF ENGINEERING - ME (EMBEDDED SYSTEMS)
Real Time Operating Systems [ESD 603]

Marks: 100 **Duration: 180 mins.**

END SEMESTER DEGREE EXAMINATION NOVEMBER 2018

Answer all the questions.

1) Write short notes on (10)
a) Dual mode operation of operating systems

b) Real time systems

2) Explain process states and state transitions with the help of a neat diagram, mentioning the role of corresponding schedulers for the state transitions. (10)

3) Four jobs arrive at a computer at times 0,1,2,3 respectively. They have the estimated running times of 8,10,6 and 5 seconds. Their priorities are 3, 4, 5, and 2 respectively, with 5 being the highest priority. Draw Gantt charts and determine the turnaround-time and waiting time for each process in the following cases: (10)
a. Round robin with time slice = 3 time units, switching overhead =1unit
b. Shortest job first with preemption.
c. Priority scheduling with preemption.

4) Explain the two models of Inter Process Communication and the benefits of IPC. (10)

5) What is a semaphore? What are the 2 operations associated with it, Explain them. Also explain how they could be used to achieve synchronization with the help of an example (10)

6) a. What is the difference between deadlock prevention and deadlock avoidance? Explain. (10)
b. What is meant by deadlock recovery? Explain the 2 ways of recovering from a deadlock.

7) Consider the following snapshot of a system (10)

				MAX			Available		
	A	B	C	A	B	C	A	B	C
P0	0	1	0	0	1	1	1	5	2
P1	1	0	0	1	7	5			
P2	1	1	5	2	3	5			
P3	0	5	3	0	6	5			
P4	0	1	1	1	4	5			

A, B and C are the resource types. P0, P1, P2, P3 and P4 are the 5 processes.
The current allocation, the maximum resources required by each process and the available resources have been given. Answer the following questions using Bankers algorithm.
(i) Determine the maximum number of resources of each type in the system.
(ii) Determine the Need matrix.
(iii) List the steps in determining whether the system is safe or not. Give the safe sequence if present.

8) What is meant by a page fault? Explain briefly. Consider the following page reference string: (10)
1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 6
How many page faults would occur for the following replacement algorithms, assuming 4 page frames?
A. FIFO replacement
B. LRU replacement
C. Optimal replacement

9) Given memory partitions of 215K, 600K, 300K, 400K, 250K and 700K (in order), how would each of the First-fit, Best-fit and worst fit algorithms place the memory segments of processes of 256K,526K, 220K 312K, 212K and 517K (in order)? In this case which algorithm makes most efficient use of memory? (10)

10) Consider three processes P1 and P2. The periods for P1 and P2 are 50 and 80 respectively. And their processing times are 25 and 35 respectively. (10)

i) Is it possible to schedule these tasks based on CPU utilization test?
ii) Draw the Gantt chart which depicts the Rate Monotonic

scheduling for the above processes. Do the processes meet their deadlines in this case?

-----End-----