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B. Tech.

(SEM IV) THEORY EXAMINATION 2017-18

OPERATING SYSTEM

Time: 3 Hours ***Total Marks: 100***

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 10 = 20

a) What is an operating system?
b) Explain Deadlock Recovery.
c) Describe Resource Request Algorithm.
d) Explain Inter-process Communication.
e) Give the solution to Critical Section Problem using Hardware Instructions.
f) Define Belady's Anomaly.
g) Define Elevator algorithm.
h) Describe Swap-In and Swap-Out in Demand paging.
i) Define Binary Semaphores and Mutex.
j) Describe Multithreading and its various models.

SECTION B

2. Attempt any *three* of the following: 10 x 3 = 30

a. State the producer consumer problem. Give a solution to the problem using semaphore.
b. Critically evaluate the method of massage passing as a means of Inter-process communication.
c. Can a system be in a state that is neither deadlocked nor safe? If so give an example, if not prove that all states are either deadlocked or safe.
d. What is the advantage of having different time quantum size on different levels of a multi queuing system?
e. For the following data find the average Turnaround time and average waiting time for:
   i. Preemptive SJF
   ii. Round-Robin (Time quantum:3)

Job	Arrival Time	Burst Time
1	0	10
2	1	3
3	3	2
4	4	4

SECTION C

3. Attempt any *one* part of the following: 10 x 1 = 10

a. Write the condition for deadlock. Explain the protocol to be used to break the circular wait condition.
b. Consider the following snapshot of a system.

Process	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P_0	0	0	1	2	0	0	1	2	1	5	2	0
P_1	1	0	0	0	1	7	5	0				
P_2	1	3	5	4	2	3	5	6				
P_3	0	6	3	2	0	6	5	2				
P_4	0	0	1	4	0	6	5	6				

Answer the following using Banker's algorithm

i. Find the Need Matrix
ii. Is the system in safe state?
iii. If the request from process P_1 for < 0,4,2,0>, can the request be granted immediately

4. Attempt any *one* part of the following: 10 x 1 = 10

a. Explain implementation of paging technique with respect to address mapping, page table, page size and hardware support for paging.

b. (i) Consider the following segment table

Segment	Base	Length
0	219	600
1	2300	14
2	90	100
3	1327	580
4	1952	96

What are the physical addresses of following logical address?
a. (0,430) b. (1, 12) c. (2,500) d. (3,400) e. (4,110)
(ii)Why page size is kept in power of two.

5. Attempt any *one* part of the following: 10 x 1 = 10

a. Write a short note on
i. Performance criteria for scheduling algorithms
ii. Multiprocessor Scheduling

b. (i) Explain the difference between external and internal fragmentation.
(ii)How many page faults would occur for the following reference string for four frames using LRU page replacement algorithm 1,2,3,4,5,5,3,4,1,6,7,8,7,8,9,7,8,9,5,4,5,4,2

6. Attempt any *one* part of the following: 10 x 1 = 10

a. What Hit ratio is required to reduce the effective memory access time from 300 nanoseconds without using TLB to 250 nanoseconds with TLB. The TLB access time is 60 nanoseconds.

b. i). Write various steps to handle page Fault in Demand Paging.
ii). Explain Thrashing and its solution.

7. Attempt any *one* part of the following: 10 x 1 = 10

a. The head of a moving head disk with 200 tracks numbered 0-199 is currently serving a request at track 143 and the last served request was 135, consider an ordered disk queue with request involving track numbers
86, 147, 91, 177,94,150,102,175,130
Find the total head movement for the following
(i) SSTF (ii) C-scan

b. Explain the following
(i) Interrupt driven I/O (ii) Blocking and Non-blocking I/O

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