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KATHMANDU UNIVERSITY
End Semester Examination
August/September, 2017

AUG 31 2017

Level : B. Sc.
Year : III

Course : COMP 307
Semester : I

Exam Roll No. :

Time: 30 min

F. M. : 10

Registration No.:

Date :

SECTION "A"
[20 Q × 0.5 = 10 marks]

Circle the most appropriate answer.

1. What two events may take a process into *ready* state?
   a. termination and blocked
   b. new and running
   c. new and termination
   d. running and termination

2. A computer installation has 1000 K of main memory. The jobs arrive and finish in the following sequence.
   Job 1 requiring 200 K arrives
   Job 2 requiring 350 K arrives
   Job 3 requiring 300 K arrives
   Job 1 finishes
   Job 4 requiring 120 K arrives
   Job 5 requiring 150 K arrives
   Job 6 requiring 10 K arrives
   Among first-fit, best-fit and worst-fit, which performs better for this sequence?
   a. worst-fit
   b. best-fit
   c. first-fit
   d. all of them perform same

3. Assuming Optimal Page Replacement implementation, determine the number of page faults when references to page occur in the order 1, 2, 4, 5, 2, 1, 2, 4. Assume that the main memory can accommodate 3 pages and the main memory already has the pages 1 and 2, with page 1 having been brought earlier than page 2.
   a. 3
   b. 4
   c. 5
   d. 6

4. Which is the disadvantage of invoking the detection algorithm for every request?
   _____.
   a. overhead of the detection algorithm due to consumption of memory
   b. excessive time consumed in the request to be allocated memory
   c. considerable overhead in computation time
   d. all of the above

5. A state is safe, if _____.
   a. the system does not crash due to deadlock occurrence
   b. the system can allocate resources to each process in some order and still avoid a deadlock
   c. the state keeps the system protected and safe
   d. All of these

6. Disk scheduling involves deciding _____
   a. which disk should be accessed next
   b. the order in which disk access requests must be serviced
   c. the physical location where files should be accessed in the disk
   d. none of the above

7. With Direct Memory Access, _____.
   a. the processor can read or write directly to a device
   b. the kernel can read or write directly to a process' memory without intermediate buffers
   c. a process can read or write to kernel memory without intermediate buffers
   d. the device can read or write directly to the system's memory

8. The first-fit, best-fit and the worst-fit algorithm can be used for _____.
   a. contiguous allocation
   b. linked allocation
   c. indexed allocation
   d. all of the above

9. When does preemption take place?
   a. when a quantum expires
   b. when a process issues an I/O request
   c. when a process exits
   d. all of the above

10. CPU fetches the instruction from memory according to the value of _____.
   a. program counter
   b. status register
   c. instruction register
   d. program status word

11. Disk requests come to a disk driver for cylinders in the order 10, 22, 20, 2, 40, 6 and 38 at a time when the disk drive is reading from cylinder 20. The seek time is 6 ms per cylinder. The total seek time, if the disk arm scheduling algorithm is first-come-first-served is _____.
   a. 360 ms b. 850 ms c. 900 ms d. none of the above

12. What is the drawback of banker's algorithm?
   a. In advance processes rarely know that how much resources they will need
   b. The number of processes changes as time progresses
   c. Resource once available can disappear
   d. All of the above

13. A system has 12 magnetic tape drives and 3 processes : P0, P1, and P2. Process P0 requires 10 tape drives, P1 requires 4 and P2 requires 9 tape drives.
   Process = {P0, P1, P2}
   Maximum = {10, 4, 9}
   Allocation = {5, 3, 3}
   Which of the following is the safe sequence?
   a. P0, P1, P2 b. P1, P2, P0 c. P2, P0, P1 d. There is no safe sequence

14. When an interrupt occurs, an operating system _____.
   a. ignores the interrupt
   b. always changes the state of the interrupted process after processing the interrupt
   c. always resumes execution of the interrupted process after processing the interrupt
   d. may change the state of the interrupted process to "blocked" and schedule another process

15. Which of the following algorithms supports direct access to file; without suffering from external fragmentation?
    a. Contiguous allocation
    b. Linked allocation
    c. Indexed allocation
    d. None of the above

16. What is a quantum?
    a. the absolute minimum time that a process can run
    b. the maximum time that a process can run before being preempted
    c. the amount of time that a process runs before it blocks on I/O
    d. the fraction of a time slice during which the process is running

17. What is the main function of shared memory?
    a. use primary memory efficiently
    b. do intra process communication
    c. do inter process communication
    d. none of the above

18. Thrashing _____.
    a. reduces page I/O
    b. decreases the degree of multiprogramming
    c. implies excessive page I/O
    d. improves the system performance

19. Which of the following algorithms can be implemented as preemptive algorithm?
    a. Round robin and First in first out
    b. First in first out and Priority scheduling
    c. Priority Scheduling and round robin
    d. Priority scheduling

20. When a process is created using the classical `fork()` system call, which of the following is not inherited by the child process?
    a. Process address space
    b. process ID
    c. user ID
    d. open files

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SECTION "B"
[6 Q. × 4 = 24 marks]

Attempt *ANY SIX* questions.

1. What is critical region? What are the three requirements of any solution to the critical section problem? [1+3]

2. With regard to process synchronization describe what is meant by race conditions?

3. Describe the general strategy behind deadlock prevention, and give an example of a practical deadlock prevention method. [2+2]

4. What is internal fragmentation and external fragmentation? Give a brief example of each. [2+2]

5. What is Page Fault? How does Operating System handle Page Fault? [1+3]

6. Discuss the overall strategy of Indexed allocation method.

7. What is the main purpose of having Direct Memory Access (DMA) controller? How does it work? [1+3]

SECTION "C"
[2 Q. × 8 = 16 marks]

Attempt *ANY TWO* questions.

8. Given the following processes and burst times: [2+2+4]

Processes	Burst Time
P1	13
P2	5
P3	23
P4	3
P5	31
P6	3
P7	14

Calculate the average waiting time when following algorithms are are used:
a) First Come First Served
b) Shortest Job First
c) Round Robin (quantum = 6)

9. Consider the following snapshot of a system with five processes (P1, P2, P3, P4, P5) and four resources (R1, R2, R3, R4). The instances of resources R1, R2, R3, and R4 are 6, 7, 14, and 12 respectively.

	Allocation				Max				Available			
	R1	R2	R3	R4	R1	R2	R3	R4	R1	R2	R3	R4
P1	0	0	1	2	0	0	3	2	2	1	2	0
P2	2	0	0	0	2	7	5	0				
P3	0	0	3	4	6	6	5	6				
P4	2	3	5	4	4	3	5	6				
P5	0	3	3	2	0	6	5	2				

Is this system currently deadlocked, or can any process become deadlocked? Why or why not? If not deadlocked, give an execution order. [8]

10. Disk requests are received by a disk drive for cylinders 5, 25, 18, 3, 39, 8, and 35 in that order. A seek takes 5 ms per cylinder moved. How much seek time is needed to serve these requests if serviced in the order that they are received (FCFS)? Assume that the arm is at cylinder 20 when the last o these requests is made with none of these requests yet served. What if SSTF, SCAN, and LOOK algorithms are used? [2+2+2+2]