KATHMANDU UNIVERSITY
End Semester Examination
August, 2018

Marks scored:

Level : B.Sc.
Year : III

Course : COMP 307
Semester: I

Exam Roll No.:

Time: 30 mins.

F. M. : 10

Registration No.:

Date : AUG 13 2018

SECTION "A"
[20 Q. ×0.5 = 10 marks]

Circle the most appropriate answer.

1. What is operating system?
   a) collection of programs that manages hardware resources
   b) system service provider to the application programs
   c) link to interface the hardware and application programs
   d) all of the above

2. What is a medium-term scheduler?
   a) It selects which process has to be brought into the ready queue
   b) It selects which process has to be executed next and allocates CPU
   c) It selects which process to remove from memory by swapping
   d) None of the above

3. Consider the following set of processes, the length of the CPU burst time given in milliseconds :

| | |
|---|---|
| p1 | 6 |
| p2 | 8 |
| p3 | 7 |
| p4 | 3 |

   Assuming the above process being scheduled with the SJF scheduling algorithm :
   a) The waiting time for process P1 is 3ms
   b) The waiting time for process P1 is 0ms
   c) The waiting time for process P1 is 16ms
   d) The waiting time for process P1 is 9ms

4. A solution to the problem of indefinite blockage of low – priority processes is :
   a) Starvation b) Wait queue c) Ready queue d) Aging

5. Which one of the following is a synchronization tool?
   a) Pipe b) Thread c) Semaphore d) Socket

6. In UNIX, each process is identified by its :
   a) Process Control Block b) Device queue
   c) Process Identifier d) None of the above

7. Each request requires that the system consider the _____ to decide whether the current request can be satisfied or must wait to avoid a future possible deadlock.
   a) resources currently available
   b) processes that have previously been in the system
   c) resources currently allocated to each process
   d) future requests and releases of each process

8. The solution to starvation is :
   a) the number of rollbacks must be included in the cost factor
   b) the number of resources must be included in resource preemption
   c) resource preemption be done instead
   d) all of the above

9. In fixed size partition, the degree of multiprogramming is bounded by _____
   a) the number of partitions
   b) the CPU utilization
   c) the memory size
   d) all of the above

10. The first fit, best fit and worst fit are strategies to select a _____
   a) process from a queue to put in memory
   b) processor to run the next process
   c) free hole from a set of available holes
   d) all of the above

11. For 3 page frames, the following is the reference string :
   7 0 1 2 0 3 0 4 2 3 0 3 2 1 2 0 1 7 0 1
   How many page faults does the LRU page replacement algorithm produce ?
   a) 10 b) 15 c) 11 d) 12

12. Optimal page – replacement algorithm is difficult to implement, because :
   a) it requires a lot of information
   b) it requires future knowledge of the reference string
   c) it is too complex
   d) it is extremely expensive

13. Thrashing _____ the CPU utilization.
   a) Increases b) keeps constant c) decreases d) memorizes

14. The time taken for the desired sector to rotate to the disk head is called :
   a) positioning time
   b) random access time
   c) seek time
   d) rotational latency

15. SSTF algorithm, like SJF _____ of some requests.
   a) may cause starvation
   b) will cause starvation
   c) does not cause starvation
   d) causes aging

16. In contiguous allocation :
   a) each file must occupy a set of contiguous blocks on the disk
   b) each file is a linked list of disk blocks
   c) all the pointers to scattered blocks are placed together in one location
   d) none of the above

17. Access matrix model for user authentication contains
   a) a list of objects
   b) a list of domains
   c) a function which returns an object's type
   d) all of the above

18. Suppose requests have recently arrived for data on cylinders 25, 46, 12, and 3, in that order, and that the read-write head is currently at cylinder 20. If the disk scheduling policy is SSTF, the outstanding requests will be serviced in the order
    a) 25, 46, 12, 3
    b) 25, 46, 3, 12
    c) 3, 12, 25, 46
    d) 25, 12, 3, 46

19. If the value of a binary semaphore S is 0, and a process executes a WAIT instruction on S, then
    a) S will remain zero and the process will proceed
    b) S will remain zero and the process will be placed on a queue
    c) S will become one and the process will proceed
    d) S will become one and the process will be placed on a queue

20. If we preempt a resource from a process, the process cannot continue with its normal execution and it must be :
    a) aborted
    b) rolled back
    c) terminated
    d) queued

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SECTION "B"
[6 Q. × 4 = 24 marks]

Attempt ***ANY SIX*** questions.

1. Why do we need Process Scheduling algorithms? Describe five different criteria used to evaluate process scheduling algorithm? [1+3]

2. What do you mean by deadlock? Explain the four conditions that need to be satisfied to be a system in deadlock. [1+3]

3. Describe the basic method of segmentation memory management system.

4. What is Belady's Anomaly? Demonstrate that FIFO Page Replacement algorithm suffers from Belady's Anomaly. [1+3]

5. Disk requests are received by a disk drive for cylinders 8, 10, 30, 26, and 15 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.

6. What is Linked allocation method? Discuss the advantages and disadvantages of indexed allocation in comparison with contiguous allocation method. [1+3]

7. What do you mean by protection mechanism? Explain in detail how capability list differ from access control list. [1+3]

SECTION "C"
[2 Q. × 8 = 16 marks]

Attempt ***ANY TWO*** questions.

8. Five batch jobs. A through E, arrive at a computer center at almost the same time. They have estimated running times of 10, 6, 2, 4, and 8 minutes. Their (externally determined) priorities are 3, 5, 2, 1, and 4, respectively, with 5 being the highest priority. For each of the following scheduling algorithms, determine the average waiting time.
   a) FCFS scheduling algorithm
   b) Priority scheduling algorithm
   c) Shortest job first scheduling algorithm

9. Consider a swapping system in which memory consists of the following hole sizes in memory order: 10 MB, 4 MB, 20 MB, 18 MB, 7 MB, 9 MB, 12 MB, and 15 MB. Which hole is taken for successive segment requests of
   a) 12 MB
   b) 10 MB
   c) 9 MB
   For first fit? Now repeat the question for best fit, and worst fit. Explain with neat diagram.

10. Explain what deadlock avoidance is and apply it to the following example. There are five processes (A to E) and four types of resources. Resources are assigned as follows. A: (3,0,1,0), B:(0,1,1,2), C:(3,1,0,0), D:(0,0,1,0), E:(2,1,1,0). The availability vector is (1,0,2,1). Determine whether the request by A for one item of resource type 4 should be granted.