7236

BOARD DIPLOMA EXAMINATION, (C-20)

FEBRUARY/MARCH — 2022

DCME - THIRD SEMESTER EXAMINATION

OPERATING SYSTEMS

Time : 3 hours] [*Total Marks* : 80

PART—A 3×10=30

Instructions : (1) Answer **all** questions.

(2) Each question carries **three** marks.

(3) Answers should be brief and straight to the point and shall not exceed five simple sentences.

1. Define the terms spooling and buffering.

2. List any three applications which does not need OS.

3. Draw the process state diagram.

4. State the need of process scheduler.

5. List two operations that can be performed on a semaphore.

6. Define the term deadlock.

7. Write any two differences between logical and physical address space.

8. Define the term swapping.

9. Define the terms capacity, latency time, seek time and reliability with respect to disks.

10. List any three file access methods.

PART—B

8×5=40

Instructions : (1) Answer **all** questions.

(2) Each question carries **eight** marks.

(3) Answers should be comprehensive and criterion for valuation is the content but not the length of the answer.

11. *(a)* Compare distributed system with real time system with respect to online gaming.

(OR)

(b) Identify the challenges of designing operating systems for mobile devices compared with designing operating systems for traditional PCs.

12. *(a)* Apply SJF scheduling algorithm to calculate the average waiting time for processes given below :

Process	**Burst Time**	**Arrival Time**
P1	6	0
P2	4	4
P3	8	2
P4	2	3

(OR)

(b) Compare preemptive and non-preemptive scheduling algorithms with respect to round robin scheduling algorithm.

13. *(a)* A counting semaphore was initialized to 12, then the following sequences of operations were performed on this semaphore : 10P (wait), 4V (signal), 2P (wait) and 5V (signal). Calculate the final value of counting semaphore.

(OR)

(b) Apply the bankers algorithm to check the system is in safe state or not for the following snapshot of a system :

Process	Allocation A B C D	Max A B C D	Available A B C D
P0	0 0 1 2	0 0 1 2	1 5 2 0
P1	1 0 0 0	1 7 5 0	
P2	1 3 5 4	2 3 5 6	
P3	0 6 3 2	0 6 5 2	
P4	0 0 1 4	0 6 5 6	

14. (a) Initially usage of memory is allocated as specified in figure below. After receiving additional requests : 10K, 25K and 15K, at what starting address will each of the additional requests be allocated by applying first-fit allocation method?

Used	Hole	Used	Hole	Used	Hole	Used	Hole	Used	Hole
10K	5K	20K	20K	10K	30k	30K	20K	10K	15K

(OR)

(b) Consider the following page reference string :

2,1,3,0,4,1,2,3,0,1,2,4,3,0,3,2,1,4,3,1.

How many page faults would occur when make use of the LRU replacement algorithm, assume frame size is four?

15. (a) Calculate the average access time for transferring 512 bytes of data with the data rate 40 kB per second. The average seek time is 5 msec, the disk rotation is 6000 RPH, and the controller overhead is 0.1 msec.

(OR)

(b) A disk queue with requests for I/O to blocks on cylinders 88, 18, 44, 50, 45, 24, 65, 96. The head is initially at cylinder number 53. The cylinders are numbered from 0 to 100. Starting from the current head position, calculate the total distance (in number of cylinders) that the disk arm moves to satisfy all the pending requests by applying SCAN disk scheduling policy.

PART—C

10×1=10

Instructions : (1) Answer the following question.

(2) The question carries **ten** marks.

(3) Answers should be comprehensive and criterion for valuation is the content but not the length of the answer.

16. *A* shared variable x, initialized to zero, is operated on by four concurrent processes W, X, Y, Z as follows. Each of the processes W and X reads x from memory, increments by one, stores it to memory and then terminates. Each of the processes Y and Z reads x from memory, decrements by two, stores it to memory, and then terminates. Each process before reading x invokes the P operation (i.e. wait) on a counting semaphore S and invokes the V operation (i.e. signal) on the semaphore S after storing x to memory. Semaphore S is initialized to two. What is the maximum possible value of x after all the processes complete execution?

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