Candidate Seat no……

CHAROTAR UNIVERSITY OF SCIENCE & TECHNOLOGY

Fifth Semester of B. Tech (CE) Examination

November 2021

CE354 Operating System

Date: 23.11.2021, Tuesday **Time: 10.00 a.m. To 01.00 p.m.** **Maximum Marks: 70**

Instructions:

1. The question paper comprises two sections.
2. Make suitable assumptions and draw neat figures wherever required.

SECTION – I

Q – 1 Answer the following questions. **[1]**

1. Several processes access and manipulate the same data concurrently, the outcome depends on which order each access takes place. This situation is called as

   a. Race Condition

   b. Mutual Exclusion

   c. Critical Section

   d. Semaphore

2. The_____module gives control of the CPU to the process selected by the short-term scheduler.

   a. Dispatcher

   b. Processor

   c. Memory

   d. Timer

3. Which of the following is not a solution to the dynamic storage allocation problem?

   a. Best Fit
   b. First Fit
   c. Worst Fit
   d. Roll out,Roll in

4. ----------is maintained to keep track of which frames can be allocated.

   a. Free-frame list
   b. Page Table
   c. Page Offset
   d. Frame Table

5. Which of the following file systems is supported by the windows OS?

   a. NTFS
   b. FAT32
   c. exFAT
   d. All of the these

6. Which of the following "semaphore" can take the non-negative integer values?

   a. Binary Semaphore
   b. Counting Semaphore
   c. Real Semaphore

d. All of the these

7. Which one of the following Scheduling algorithm allocates the CPU first to the process that requests the CPU first?
   a. Priority scheduling
   b. Shortest job scheduling
   c. First-come, first-served scheduling
   d. None of above

8. Which of the following is/are not shared by all the threads in a process?

   I. Program Counter

   II. Stack

   III. Registers

   IV. Address space

   a. I and II only
   b. II and III only
   c. I, II and III only
   d. IV only

9. CD-ROM is a non-Preemptable device. A process P1 has started to burn a CD-ROM.An interuupt occurs and the CD recorder is taken away from the process P1 and given to process P2.What are the consequences of above action?
   a. P1 successfully completes its burning operation
   b. P2 successfully completes its operation
   c. There is a computation failure of P1
   d. There is a computation failure of P2

10. You are a professional Gamer or Videographer. Your work needs Speed and efficiency and you are not worried about fault tolerance. Which of the following RAID levels would you choose for your work?
    a. RAID 0
    b. RAID 1
    c. RAID 01
    d. RAID 10

11. Which of the following linux data structures is responsible for mapping file names with inodes
    a. Superblock
    b. Dentries
    c. VFS file
    d. Buffer Cache

12. Which of the following statement is true with respect to deadlock prevention
    1. Use Spool everything to attack the mutual exclusion condition
    2. Use resource request algorithm to attack hold and wait condition

3. Request all the resources in advance to attack hold and wait condition
4. Take resources away to attack No preemption condition
5. Order resources numerically to attack circular wait condition
6. Use safety algorithm to attack circular wait condition

a. 1, 2 & 3 only
b. 2,4,5 & 6 only
c. 1,3,4 & 5 only
d. 1,3,4 & 6 only
e. 1,2,3,4,5 & 6

13. Which of the following page replacement algorithms suffers from Belady's anomaly?

a. FIFO
b. LRU
c. Optimal Page Replacement
d. Both LRU and FIFO

14. A state is safe, if the system
    a. does not crash due to deadlock occurrence
    b. can allocate resources to each process in some order and still avoid a deadlock
    c. is protected and safe by the state
    d. (d) All of these
15. Which command is used to sort the lines in a file in reverse order
    a. Sort
    b. Sort -r
    c. Sort-rev
    d. rsort

16. Which command is used to display characteristics of a process
    a. Ps
    b. Pid
    c. Pu
    d. au
17. If a page number is not found in the translation lookaside buffer, then it is known as a?
    a. Translation Lookaside Buffer miss
    b. Buffer miss
    c. Translation Lookaside Buffer hit
    d. All of the mentioned
18. What type of memory stores data in a swap file on a hard drive?
    a. Secondary memory
    b. Virtual memory
    c. Low memory
    d. RAM

19. SSTF stands for _____.
    a. Shortest Signal Time First
    b. Shortest Seek Time First
    c. System Seek Time First
    d. System Shortest Time First
20. The PCB is identified by _____.
    a. Real-Number
    b. Binary Number
    c. Store block
    d. Integer Process ID

Q – 2 (A) Answer the following questions. (ANY FIVE) **[07]**

1. Discuss about Logical & Physical address and explain single level paging with suitable examples.
2. What is a file? Give details about any two file allocation methods. Discuss the performance in terms of Internal fragmentation, External fragmentation and file size
3. Consider the following set of processes, with the length of the CPU burst time given in milliseconds:

Process	Arrival Time	Priority	CPU Burst	I/O Burst	CPU Burst
P1	0	2	1	5	3
P2	3	1	3	3	1
P3	4	4	2	3	1
P4	5	3	2	4	1

   a. Draw the Gantt chart to illustrate the execution of these processes using the, preemption based priority scheduling algorithms (a low priority number implies a higher priority)
   b. What is the Completion time, Waiting time and Turnaround time of P1, P2, P3, P4 processes?
   c. Calculate the idle time of CPU and the CPU utilization when the above mentioned processes are scheduled.

4. . What is semaphore? For what purpose semaphore can be used? Give a deadlock free solution to solve Dining Philosophers problem using semaphores.
5. Consider the following snapshot of a system:

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

   Answer the following questions using the banker's algorithm:
   a. Illustrate that the system is in a safe state by demonstrating an order in which the processes may complete.

b. If a request from process P1 arrives for (1, 1, 0, 0), can the request be granted immediately?
c. If a request from process P4 arrives for (0, 0, 2, 0), can the request be granted immediately?

6. Consider the following page reference string:1 3 5 4 8 4 1 2 3 2 1 6 1 4 2 3 4 5 1 6 8. How many page faults would occur for the FIFO, LRU and Optimal page replacement algorithms? The frames allotted are three and consider pure demand paging.

(B) Answer the following questions. (ANY THREE) **[05]**

1. What is meant by RAID? Explain various levels of RAID with its major functionality.
2. Suppose a disk has 200 cylinders, numbered from 0 to 199. The disk arm is at cylinder 110 after servicing the cylinder 55, and there is a queue of disk access requests for cylinders 33, 80, 91, 54, 20, 187, 64, 48, 2, 165 105, 110, 135 and 146. What will be the seek time (in terms of number of cylinder) if SSTF and C-Look algorithm is used. (Note: Draw the neat diagram to show the movement of read/write head)
3. What is system protection in an operating system? How does the OS achieve it using an access matrix?
4. Define Buffer cache. Explain the buffer header with a suitable diagram.

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