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SEAT No. _____

Total No. of printed pages : 2

SARDAR PATEL UNIVERSITY
Master of Computer Application (M.C.A.) II Semester Examination
PS02CMCA24 Operating System Principles

15th April, 2019

Monday

Time: 10:00 a.m. to 1:00 p.m.

Total Marks: 70

1. **Select most appropriate option for each of the following questions :** 8

- (i) Which scheduler keeps partially executed swapped out processes on a mass storage device for later execution to improve system performance ?
(A) short-term (B) medium-term (C) long-term (D) none of these.
- (ii) A list of processes that are ready to run and kept in main memory is called
(A) a ready queue (B) a device queue (C) an I/O queue (D) none of these.
- (iii) Which of the following is a CPU scheduling algorithm ?
(A) C-SCAN (B) LRU (C) RR (D) none of these.
- (iv) The Peterson's solution to the critical section problem is used for _____ concurrent processes.
(A) 2 (B) 4 (C) 8 (D) none of these.
- (v) Which approach to operating system design is best suited for debugging ?
(A) microkernel (B) modular (C) layered (D) none of these.
- (vi) Which of the following parameters can be used to compare the performance of CPU scheduling algorithms ?
(A) job size (B) average waiting time
(C) amount of time a process spends on a CPU (D) none of these.
- (vii) Which of the following algorithms is also called an elevator algorithm ?
(A) SRTF (B) SJF (C) SCAN (D) none of these.
- (viii) In which multithreading model only one thread can access a kernel at a time, and multiple threads are unable to run in parallel on multiprocessors ?
(A) one-to-one (B) many-to-one (C) many-to-many (D) none of these.

2. **Answer the following questions in brief (ANY SEVEN) :** 14

- (i) Draw the **process state diagram**.
- (ii) What is a **PCB** ? Which information does it contain ?
- (iii) What is a **thread** ? List the **benefits** of multithreaded programming.
- (iv) Which **criteria** can be used to compare CPU scheduling algorithms ?
- (v) Explain the concept of a **virtual machine**.
- (vi) What is a **semaphore** ?
- (vii) Distinguish between a **process** and a **program**.
- (viii) What are the main features of the **layered design** of an operating system ?
- (ix) Distinguish between the **SCAN** and **C-SCAN** disk scheduling algorithms.

(1)

(P.T.O)

(Page 1 of 2)

3.(A) Define the term **operating system**. List and explain various operating system services. 6

(B) Consider the following four processes, with the length of the next CPU burst given in milliseconds : 6

Process	Arrival Time	Burst Time
P1	7	9
P2	0	8
P3	8	12
P4	9	15

Show the resulting **preemptive SJF schedule** using Gantt chart.
Calculate the **average waiting time** for the resulting schedule.

OR

(B) Write a short note on **priority scheduling**. What is the major problem with priority scheduling ? What is its solution ? 6

4.(A) Explain the **queuing-diagram representation** of process scheduling. 6

(B) What is **virtual memory** ? Describe the benefits of a virtual memory system. Explain the concept of **demand paging**. 6

OR

(B) Define the term **deadlock**. List and explain the **necessary conditions** for occurrence of a deadlock. 6

5.(A) Distinguish between the **shared memory** and **message passing** models of interprocess communication. 6

(B) Write a short note on **paging scheme** for memory management. 6

OR

(B) What is a **critical section problem** ? Which **requirements** should be satisfied by a solution to the critical section problem ? 6

6.(A) Distinguish between the **FIFO** and **Optimal page replacement algorithms**. Consider the following reference string : 6

3, 1, 0, 1, 4, 0, 3, 0, 0, 2, 1, 5, 2, 0.

Assuming **three memory frames**, find out the **total number of page faults** using the **FIFO page replacement algorithm**.

(B) Describe the **FCFS** disk scheduling algorithm. Consider an ordered **disk queue** with requests involving the following tracks : 6

26, 67, 36, 128, 62, 83, 72

If the read/write head is initially located on track 43, what is the **total head movement** considering the **FCFS disk scheduling algorithm** ?

OR

(B) What is a **page fault** ? Explain the steps required to handle a page fault with a diagram. 6

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(2)