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Reg. No._____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FOURTH SEMESTER B.TECH DEGREE EXAMINATION, JUNE 2017

Course Code: **CS 204**
Course Name: **OPERATING SYSTEMS (CS)**

Max. Marks: 100   Duration: 3 Hours

PART A

Answer all Questions. 3 Marks for each question.

1. How do clustered systems differ from multiprocessor systems?

2. What is the main advantage of the microkernel approach to system design?

3. What are the components of a process which are not shared across threads in a multithreaded process?

4. What is the use of pipe system call?

PART B

Answer any two full questions. 9 Marks for each question.

5. a. How does the distinction between kernel mode and user mode function as a basic form of protection system?   (6)

   b. What is the role of timer in operating system?   (3)

6. a. Differentiate between a standard C library and a system call.   (3)

   b. Explain how a new process can be created in Unix using fork system call.   (6)

7. a. What are the fields in a Process Control Block (PCB)?   (3)

   b. With the help of a diagram, describe the actions taken by a kernel to context-switch between processes.   (6)

PART C

Answer all Questions. 3 Marks for each question.

8. What is the use of conditional variables in a monitor ?

9. What are the conditions to be satisfied to ensure solution to critical section problem?

10. What are the disadvantages of shortest job first algorithm? What is the strategy to overcome it?

11. Who is the 'banker' in banker's algorithm? Justify your answer.

PART D

Answer any two full questions. 9 Marks for each question.

12. a. A semaphore ensures mutual exclusion even if it is built of sequence of instructions. Justify. (3)

   b. Consider a banking system that maintains an account balance with two functions: deposit (amount) and withdraw (amount). These two functions are passed the amount that is to be deposited or withdrawn from the bank account balance. Assume that a husband and wife share a bank account. Concurrently, the husband calls the withdraw() function and the wife calls deposit(). Describe how a race condition is possible and whatmight be done to prevent the race condition from occurring. (6)

13. Draw the Gantt chart and find the average waiting time for the following algorithms:
   i) FCFS ii) Shortest Remaining Time First iii) Priority Scheduling (9)

Process No.	Arrival Time (msec)	Burst Time (msec)	Priority
P0	0	8	5
P1	1	4	2
P2	2	1	1
P3	3	5	3
P4	4	2	4

14. a. What are the conditions which may lead to deadlock? (4)

   b. What are the strategies to recover from deadlock? (5)

PART E

Answer any four full questions. 10 Marks for each question.

15. a. What is the function of a translation look-aside buffer (TLB). (5)

   b. What is the structure and purpose of an inverted page table? (5)

16. a. Why are page sizes always powers of 2? (4)

   b. With the help of a diagram explain the steps involved in handling a page fault. (6)

17. a. Differentiate between internal and external fragmentation. (4)

b. Compare the memory organization schemes of contiguous memory allocation, pure segmentation, and pure paging with respect to thefollowing issues:

    i.   External fragmentation

    ii. Internal fragmentation   (6)

    iii. Ability to share code across processes

18. a. What is the advantage of indexed allocation of disk space?   (5)

    b. What is an inode in UNIX? Consider a file system that uses inodes to represent files. Disk blocks are 8 KB in size, and a pointer to a disk block requires 4 bytes. This file system has 12 direct disk blocks, as well as single, double, and triple indirect disk blocks. What is the maximum size of a file that can be stored in this file system?   (5)

19. a. The disk-scheduling algorithm should be written as a separate module of the operating system. Why?   (4)

    b. Suppose that a disk drive has 5,000 cylinders, numbered 0 to 4,999. The drive is currently serving arequest at cylinder 2,150, and the previous request was at cylinder 1,805. The queue of pendingrequests, in FIFO order, is:2,069, 1,212, 2,296, 2,800, 544, 1,618, 356, 1,523, 4,965, 3,681

      Starting from the current head position, what is the total distance (in cylinders) that the disk arm movesto satisfy all the pending requests for each of the following disk-scheduling algorithms?   (6)

      i)   FCFS   ii)   SSTF iii)   SCAN

20. a.   Define the terms i) Seek time ii) Rotational delay iii) Disk bandwidth.   (3)

    b.   Explain how access matrix is used as a protection mechanism.   (7)

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