Register Number: ……………………..

B.E /B.TECH DEGREE EXAMINATIONS: NOV/DEC 2014

(Regulation 2009)

Fifth Semester

CSE112: OPERATING SYSTEMS

(Common to CSE/IT)

Time: Three Hours   **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. In multithreading, each thread will have _____

    a) Its own data and code but shares stack and registers
    b) Its own stack but shares code, data and registers
    c) Its own stack and registers but shares code and data
    d) Its own data, code and registers.

2. In memory systems, boundary registers _____

    a) are used for temporary program variable storage
    b) are only necessary with fixed partitions
    c) track page boundaries
    d) track the beginning and ending of programs

3. Let the time taken to switch between user and kernel modes of execution be 't1', while the time taken to switch between two processes be 't2'. Which of the following is TRUE?
    a) t1<t2
    b) t1>t2
    c) t1=t1
    d) Nothing can be said about the relation between t1 and t2

4. A process executes the code fork(); fork(); fork(); The total number of child processes created is_____

    a) 3
    b) 4
    c) 7
    d) 8

5. If a resource-allocation graph has a cycle (having more than one instance of each resource type), then _____
    a) The system will be in a deadlock state
    b) The system will not be in a deadlock state
    c) The system may (or) may not be in deadlock state
    d) None of the above

6. If the logical address space contains 20 pages of 2048 words each, mapped onto a physical

memory of 40 frames, minimum number of bits in the logical address must be

a) 16   b) 15

c) 17   d) 18

7. Translation look-aside (TLB) is _____

    a) Distributive, high speed memory   b) Commutative, high speed memory

    c) Associative, high speed memory   d) Transitive, high speed memory

8. Which of the following manages file metadata information?

    a) logical file system   b) file-organization module

    c) Basic-file system   d) I/O control

9. Which policy replaces a page if it is not in the favored subset of a process's pages?

    a) FIFO   b) LRU

    c) LFU   d) Working set

10. In which disk scheduling algorithm, the disk arm does not process the requests in the reverse direction?

    a) FCFS   b) SSTF

    c) SCAN   d) C-SCAN

PART B (10 x 2 = 20 Marks)

11. Distinguish between a system call and a system program.

12. What are privileged instructions? Give any two examples.

13. Distinguish between user threads and kernel threads.

14. Compare multilevel queue and multilevel feedback queue scheduling.

15. What is the difference between resource allocation graph and wait-for graph?

16. Compare global and local frame replacement.

17. Distinguish between paging and demand paging techniques.

18. If process P1 has 240 pages and process P2 has 540 pages and if there are 200 free blocks of equal size in the physical memory, using proportional allocation how many blocks will be allocated to process P1 and P2.?

19. If it takes 50 nano seconds to access main memory and 10 nano seconds to access TLB, how long it takes to access an information in memory using paging if there is a (i) TLB hit and (ii) TLB miss?

20. Compare seek time and rotational latency time.

PART C (5 x 14 = 70 Marks)

21. a) (i) Illustrate how operating system acts as a resource manager.   (8)

       (ii) Identify the services provided by the operating system for users.   (6)

(OR)

    b) Explain about Inter-process communication.

22. a) (i)

Process	Burst time (ns)	Arrival time	Priority	(8)
P1	2	2	3	
P2	4	1	2	
P3	6	0	5	
P4	1	4	4	

Calculate ATAT & AWT using
(a) SRTF scheduling
(b) Non-Preemptive priority scheduling (lower number for priority means high priority)

(ii) Describe the Peterson's solution to critical section problem. What is its limitation? (6)

(OR)

b) (i) Explain how synchronization is implemented in the Bounded-Buffer problem using semaphores. (8)

(ii) Describe about the various multithreading models. State their advantages and disadvantages. (6)

23. a) (i) Explain about paging with necessary hardware (8)

(ii) An operating system uses the Banker's algorithm for deadlock avoidance when managing the allocation of three resource types X, Y, and Z to three processes P0, P1, and P2. The table given below presents the current system state. Here, the Allocation matrix shows the current number of resources of each type allocated to each process and the Max matrix shows the maximum number of resources of each type required by each process during its execution. (6)

	Allocation	Max
	X Y Z	X Y Z
P0	0 0 1	8 4 3
P1	3 2 0	6 2 0
P2	2 1 1	3 3 3

There are 3 units of type X, 2 units of type Y and 2 units of type Z still available. The system is currently in a safe state. Consider the following independent requests for additional resources in the current state:
REQ1: P0 requests 0 units of X, 0 units of Y and 2 units of Z
REQ2: P1 requests 2 units of X, 0 units of Y and 0 units of Z.

Which one of the following is TRUE?
(A) Only REQ1 can be permitted.
(B) Only REQ2 can be permitted.
(C) Both REQ1 and REQ2 can be permitted.
(D) Neither REQ1 nor REQ2 can be permitted. Give explanation for your answer.

(OR)

b) (i) How to detect deadlocks. (10)

(ii) Explain about inverted page table. (4)

24. a) (i) Consider the virtual page reference string (6)

1,2,3,1,2,4,1,3,2,4

On a demand paged virtual memory system running on a computer system that has main memory size of 3 page frames which are initially empty. If LRU, FIFO and Optimal page replacement policies are used which policy gives more page faults for this scenario?

(ii) Explain the basic steps involved in demand paging (8)

(OR)

b) Describe about

(i)Acyclic-graph directory. (5)

(ii)Thrashing (4)

(iii)Clock page replacement algorithm. (5)

25. a) (i) Suppose that a disk drive has 6000 cylinders numbered 0 to 5999, the drive is currently serving a request at cylinder 140 and the previous request was at cylinder 170, the queue of pending requests in FIFO order, is 150, 2785, 999, 3412, 450, 1811, 2460, 70. Starting from the current head position, what is the total distance that the disk arm moves to satisfy all the pending requests, for each of the following disk-scheduling algorithms? (8)
      (i) FCFS   (ii) SSTF   (iii) C-SCAN (iv) LOOK

(ii) Explain about linked allocation of disk space (6)

(OR)

b) (i) Explain about the I/O system in Linux. (8)

(ii) Explain any two methods for keeping track of free space in disk (6)

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