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53 (CS 303) OPSY

2019

OPERATING SYSTEM

Paper : CS 303

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

Answer **any five** questions.

1. (a) Fill in the blanks : $1 \times 10 = 10$

- (i) In paging, PMT stands for _____ .
- (ii) Physical memory is broken into fixed-sized blocks called _____ .
- (iii) A _____ is program in execution.
- (iv) A _____ occurs when a page is not available in the main memory.
- (v) To execute the shortest job first, _____ scheduling algorithm is used.

Contd.



(vi) Number of jobs executed per unit time is known as the _____.

(vii) _____ scheduling is one where the execution of a job is stopped before its completion.

(viii) Job scheduling is the process of _____ system resources to many different tasks by an operating system.

(ix) Race condition between two processes can be avoided by _____.

(x) When the execution of a process is stopped due to I/O operation, the process is placed in the _____ queue.

(b) Briefly define the following terms :
2x5=10

- (i) Thread
- (ii) Race condition
- (iii) Batch processing
- (iv) Segmentation
- (v) Reference string.

2. (a) Differentiate between : 2x5=10

(i) Short-term scheduler and Medium-term scheduler

(ii) Kernel-level thread and User-level thread

(iii) LRU and Optimal page replacement algorithm

(iv) Preemptive scheduling and Non-preemptive scheduling

(v) Virtual memory and Physical memory.

(b) What is Data synchronization? How would you ensure that data synchronization is essential between two processes? 2+3=5

(c) How pages are mapped into physical memory? Explain with a suitable diagram. 5

3. (a) What is priority scheduling? Find out the average waiting time of the following problem using (i) FCFS scheduling and (ii) priority scheduling. $2+4 \times 2 = 10$

Process	Arrival time	Execution time	Priority number
P ₁	0	11	3
P ₂	1	8	2
P ₃	2	7	4
P ₄	3	12	1

Note : Lowest priority number represents the highest priority.

- (b) What is deadlock? What are the necessary conditions for a deadlock to occur? $2+4=6$
- (c) What is inter-process communication? Explain clearly. 4

4. (a) What is FIFO in terms of page replacement? Apply (i) FIFO (ii) LRU and (iii) Optimal algorithms to the following reference string and compute the number of page faults for each. Reference string is : 1, 3, 4, 2, 5, 3, 6, 1, 4, 7, 5, 2, 9, 1, 3, 2.

Note : Maximum number of pages can be stored in the memory is 4 (four). $2+3 \times 3 = 11$

(b) Give four differences between a process and a thread. 4

(c) What is a Process Control Block? Why is it important? $2+3=5$

5. (a) Mention five functions performed by an operating system. 5

(b) What do you mean by distributed operating system? Mention its three important advantages. $3+3=6$

(c) What is External memory fragmentation? How can it be avoided? $2+2=4$

(d) Briefly describe about garbage collection. 5

6. Write short notes on : (any four) $5 \times 4 = 20$

- (a) Banker's algorithm
- (b) Round Robin Scheduling
- (c) Process Life Cycle
- (d) Real-time operating system
- (e) Memory compaction
- (f) Network Operating System.

