NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI-620015
B.TECH. DEGREE FOURTH SEMESTER
END SEMESTER EXAMINATION
SPECIALIZATION: COMPUTER SCIENCE & ENGINEERING
SUB.CODE & TITLE: CSPC43 *OPERATING SYSTEMS*

TIME: 9.30 AM TO 12.30 PM DATE: 20.05.2024 MAX. MARKS: 100

ANSWER ALL QUESTIONS

1a. What are the uses of the following programs:

i) Bootstrap Program ii) Driver Programs (3)

b. Using diagrams, explain the following OS implementations:

i) Layered Approach ii) Microkernel (5)

c. Draw the life cycle of a process and discuss the design issues of each state transition. (12)

2a. i) Assume there are four jobs (P1 – P4). Their estimated execution times are 6, 4, 7, 3 and their arrival times are 0, 1, 3, 5 respectively. Calculate the average turnaround time and waiting time using Round Robin scheduling policy with a time quantum of 2 time units.

ii) Briefly explain the working of round robin variants. (6)

b. What is the need for hardware solutions in Process synchronization? Using a pseudo code explain how mutual exclusion problem is solved with Test- and –Set instruction. What is the drawback of Test-and-Set instruction? (8)

c. What are the various methods available for detecting deadlocks in uniprocessor systems? When should the deadlock detection algorithm be invoked? What are the deadlock recovery mechanisms available? (6)

3a. What are the problems associated with static partitioned memory management scheme? What *is swapping? Explain* the various issues related to swapping. (8)

b. How many physical memory references are needed for mapping virtual addresses in segmentation memory management scheme? How can it be reduced? (4)

c. What is a page fault? Write the steps involved in handling page faults including page replacement. Explain using an example. (8)

4a. Using a diagram, explain the flow of control for a write operation in file systems. (10)

b. The request queue consists of track numbers varying between 0 and 199. The head pointer points to the track number 100 and the disk I/O requests are in the following order:

44, 23, 78, 34, 123, 186, 147, 95, 110, 28

Schedule the servicing of disk I/O requests using i) FCFS ii) SSTF iii) SCAN and iv) LOOK scheduling algorithms. (10)

5a. What are the salient features of a distributed OS? What is the role of middleware in distributed systems? (8)

b. Explain the permission based mutual exclusion algorithm. (7)

c. What are the design issues of directory service in distributed systems? (5)

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