

# Question Paper

Exam Date & Time: 18-Apr-2018 (09:30 AM - 12:30 PM)



## MANIPAL ACADEMY OF HIGHER EDUCATION

### INTERNATIONAL CENTRE FOR APPLIED SCIENCES

#### FOURTH SEMESTER B.S (ENGG)

#### END-SEMESTER THEORY EXAMINATIONS APRIL - 2018

DATE : 18 APRIL 2018

TIME : 9:30AM TO 12:30PM

#### Operating Systems [CS 245A]

Marks: 100

Duration: 180 mins.

### Answer 5 out of 8 questions.

- 1) Multiprogramming (5)
  - A)
  - B) Timesharing (multitasking) (5)
  - C) Dual Mode of OS operation (5)
  - D) Services provided by Operating Systems (5)
- 2) What is Micro Kernal System Structure of OS (5)
  - A)
  - B) Why do we need Virtual Machines. Explain in detail with help of Diagrams (10)
  - C) What do you mean by Booting and what is a Bootstrap Loader (5)
- 3) What are two differences between user-level threads and kernel-level threads? Under what circumstances is one type better than the other? (5)
  - A)
  - B) Assume that an operating system maps user-level threads to the kernel using the many-to-many model and that the mapping is done through LWP s. Furthermore, the system allows developers to create real-time threads for use in real-time systems. Is it necessary to bind a real-time thread to an LWP ? Explain (5)
  - C) What advantage is there in having different time-quantum sizes at different levels of a multilevel queueing system? (5)
  - D) Can a system detect that some of its processes are starving? If you answer "yes," explain how it can. If you answer "no," explain how the system can deal with the

starvation problem.

- 4) What is the effect of allowing two entries in a page table to point to the same page frame in memory? Explain how this effect could be used to decrease the amount of time needed to copy a large amount of memory from one place to another. What effect would updating some byte on the one page have on the other page? (5)
- A)
- B) Consider the following page-replacement algorithms. Rank these algorithms on a five-point scale from "bad" to "perfect" according to their page-fault rate. Separate those algorithms that suffer from Belady's anomaly from those that do not. Explain with reasons(5 Marks) (5)
- a.LRU replacement
- b.FIFO replacement
- c. Optimal replacement
- d. Second-chance replacement
- C) What are the four scenarios of Scheduling. Explain in detail. (10)
- 5) Why do some systems keep track of the type of a file, while others leave it to the user and others simply do not implement multiple file types? Which system is "better?" (5)
- A)
- B) Explain the various process scheduling performance criteria (10)
- C) What do you mean by resource Allocation Graph? How is it useful for determining Safe State? Explain with help of an example. (5)
- 6) Explain the advantages and disadvantages of FCFS, Preemptive SJF, Priority(Preemptive and nonpreemptive Scheduling) and Round-Robin Scheduling with help of examples. (20)
- 7) Write Psedo-Code for Banker's Algorithm (10)
- A)
- B) Explain the concept of of Threads and explain the Threading Models in details (10)
- 8) Name two differences between logical and physical addresses (5)
- A)
- B) Consider the following page reference string: (15)
- 1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6.
- How many page faults would occur for the following replacement algorithms, assuming one, two, three, four,

five, six, or seven frames? Show all the steps in detail and explain in brief each of the replacement algorithms  
Remember all frames are initially empty, so your first unique pages will all cost one fault each.

• LRU replacement

• FIFO replacement

• Optimal replacement

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