

1. At the machine level, provide step-wise explanation of the activities that takes place before, during, and after an "interrupt"
2. Define "OS", "Memory Mapped I/O", and "BIOS"
3. How
 - a. The parameters needed for execution of a system call are communicated with an OS
 - b. The messages between two processes are communicated with each other
4. Compare (itemize only the differences)
 - a. "interrupt" and "trap"
 - b. "User mode" and "System mode"
 - c. "Loosely coupled" and "Tightly coupled" multi-processor systems
 - d. "Linker" and "loader"
5. Under what circumstances will a process be eliminated
6. Define OS, and compiler
7. What are the components of Java virtual machine and tasks they perform
8. Itemize the advantages(s) and disadvantage(s) of:
 - a. Queueing model approach for evaluating CPU scheduling algorithms
 - b. One-to-one multi-threading model
 - c. *Simple, layered, and virtual machine* operating system structures
9. A set of jobs along with their arrival and CPU burst times are given below

Job	CPU Burst Time	Arrival Time
J1	7	0
J2	4	0
J3	1	2
J4	3	2
J5	2	4
J6	3	4
J7	1	5

Calculate the average waiting time for the following algorithms using the above set of jobs:

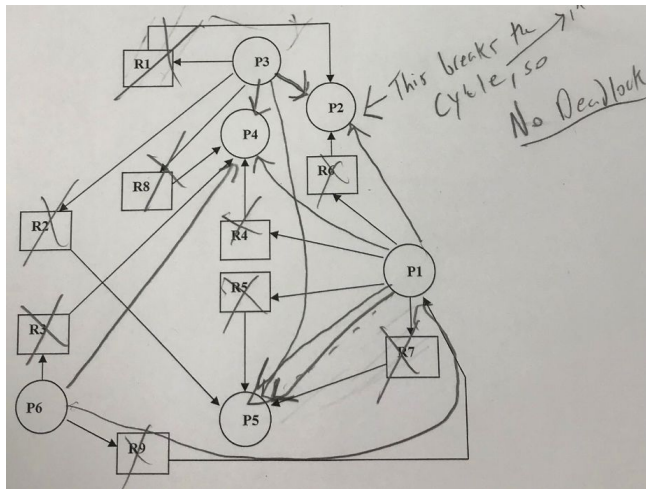
- a. Preemptive SJF
- b. Round Robin (time slice = 3)
- c. Preemptive Round Robin (time slice = 5)

Show **all** of your work **neatly**; otherwise, you receive score of zero

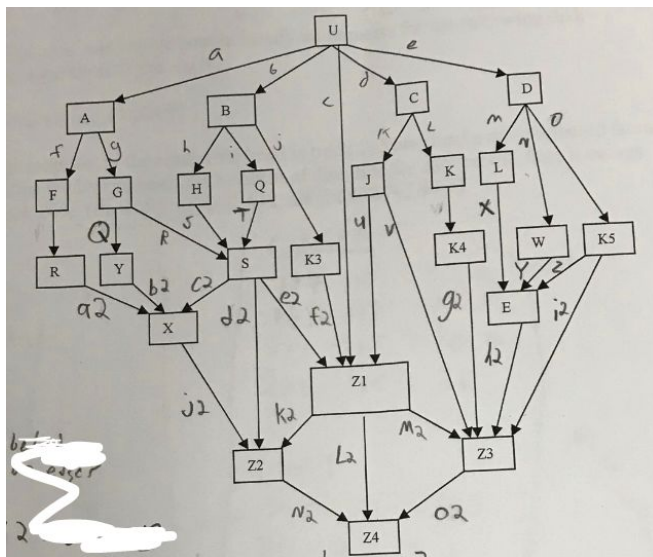
10. Compare and itemize the difference(s) between: (Just point out the differences between any given two concepts. If you only provide the definitions of the concepts and no clearly pointed out differences you receive score of zero regardless of your answer)
 - a. Long term scheduler and short-term scheduler
 - b. Thread and process
 - c. Hard and soft real time Operating systems
 - d. Relocatable and absolute modules

11. Define file directory and thrashing

12. Show whether the following resource-allocation graph has a deadlock? (Assumption: every resource has only one instance) Show all of your work



13. Use semaphores to complete the parallel execution of the following precedence graph



14. A disk queue is made of the I/O operation requests that acquire the following tracks:

72 147 85 96 175 165 200 94 73

Calculate the total head movement to satisfy all requests for the following disk scheduling algorithms:

C-SCAN and C-LOOK

The current position of the read/write head is track 115 and tracks are numbered from 0 to 249. If the read/write head has a choice of direction for movement, then it moves toward track 249.

15. How many page faults do happen to accommodate the following memory references using MFU page replacement algorithm. Four pages are allocated to the process.

Reference String:

3, 5, 8, 4, 3, 5, 7, 7, 5, 7, 3, 5, 6, 3, 2, 8, 2, 6, 6, 8, 2, 5, 6, 8, 5, 6, 2, 2, 7, 7, 5, 2, 6, 3, 3, 2, 5, 8

