



## SPRING END SEMESTER EXAMINATION-2019

6<sup>th</sup> Semester B.Tech (Open Elective-I)

### INTRODUCTION TO OPERATING SYSTEM

CS3048

(For 2017(L.E), 2016 & 2015 Admitted Batches)

Time: 3 Hours

Full Marks: 60

*Answer any SIX questions.*

*Question paper consists of four sections-A, B, C, D.*

*Section A is compulsory.*

*Attempt minimum one question each from Sections B, C, D.*

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words as far as practicable and all parts of a question should be answered at one place only.*

#### SECTION-A

1. Answer all the questions. [2 × 10]

- (a) In which condition Round Robin (RR) and FCFS scheduling algorithm gives identical results?
- (b) Write and explain about different CPU scheduling criteria.
- (c) How starvation is different from Deadlock? Explain.
- (d) Operating system is a software infrastructure added on bare hardware “ --- Yes or No – Justify your answer.
- (e) How many maximum bits are required to specify page address if main memory size is 2GB and page size is of 2KB?
- (f) What are the specific parameters need to be changed in PCB during the context switching between processes?
- (g) Write the advantages of threads over process.
- (h) With respect to CPU scheduling criteria, which two criteria is equal for non-preemptive scheduling algorithms. Why?



- (i) Consider a logical address space of 32 pages of 4096 words in each mapped on to a physical memory of 32 frames. How many numbers of bits are needed for logical address?
- (j) Why context switching is considered as an overhead?

### SECTION-B

- 2. (a) Draw process state diagram to explain the life cycle of a process. How do we differentiate preemptive & non-preemptive scheduling from process state diagram? [4]
- (b) Explain the difference between batch, time-sharing, multiprogramming and real time operating system. [4]
- 3. (a) Explain different types of file allocation methods with their advantages. [4]
- (b) What is a process? Draw and Explain, how a process can be scheduled through different scheduling queues? [4]

### SECTION-C

- 4. (a) Implement a multiprogramming system with variable partition scheme, where it uses a free memory list to track available memory. The current list contains entries of 160KB, 390KB, 300KB, 450KB, and 200KB as free. The system receives requests for multiple processes as like 155KB, 271KB, 446KB, 190kb and 81KB in order. Draw and explain the final allocation of the process by using following dynamic memory allocation strategies like first fit and best fit. [4]
- (b) Using shortest remaining time first (SRTF) & round robin (RR) algorithm to Calculate average wait time and turnaround time of the processes given below : - [4]



Process	Arrival	CPU Burst
P <sub>1</sub>	01	10
P <sub>2</sub>	02	02
P <sub>3</sub>	03	05
P <sub>4</sub>	01	06
P <sub>5</sub>	04	03
P <sub>6</sub>	00	05

Note: For round robin scheduling algorithm the given time slice is 02 Unit of time.

5. (a) Compare internal fragmentation with respect to external fragmentation memory management scheme with a suitable example. Explain the advantages & disadvantages of both the memory management schemes. [4]

- (b) Draw and explain the required paging hardware with TLB to map logical address to physical address in a paging scheme. [4]

Consider a paging system with the page table in memory. Each memory reference access takes 100ns. The TLB has a hit ratio of 85% & the time needed for access is 2ns. What is the effective access time for a page through TLB?

6. (a) Demonstrate the comparison between resource allocation graph (RAG) and wait for graph (WFG) used to identify deadlock in a system with an example. [4]

- (b) Suppose a disk drive has 400 cylinders, numbered from 0 to 399. The disk drive is currently serving a request at cylinder 233 and the previous request was at cylinder 25. The queue of pending requests, in FIFO order is: 128, 247, 91, 274, 348, 209, 22, 190, 130. Calculate the total distance that the disk arm moves to satisfy all the pending requests, using the following disk [4]

scheduling algorithms.

- I. Shortest seek time first (SSTF)
- II. First come first serve (FCFS)

### SECTION-D

7. (a) Consider the logical address space in a computer system 256 segments. Each segment can have up to 16 pages of 4K words per each. Physical memory consist of 4K blocks of 4K words in each. Evaluate the maximum number of bits required for physical and logical address for the above system. [4]
- (b) Justify, how multilevel feedback scheduling algorithm is better than multilevel queue algorithm (Give an example). [4]
8. Explain the steps of design involved in Banker's algorithm. [8]
- If there are five process like (P0, P1, P2, P3, P4) & three resource type like A [10 instances], B [07 instances], C [07 instances]. Suppose at time T0, the following snapshot of the system given bellow: -

Process	Allocation			Max. Need		
	A	B	C	A	B	C
P0	2	1	1	5	2	3
P1	2	1	2	2	2	3
P2	2	2	3	4	2	3
P3	2	1	0	3	1	1
P4	1	1	0	2	2	2

- a) Use the safety algorithm to find weather the above system is in safe state or not.
- b) If a resource of type-A increased its allocation for process P4 by 1 (P4 process allocation becomes < 2, 1, 0 >) then check whether the above system is in safe state or not.

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