

B.E./B.TECH. Degree Examination, December 2020

Third Semester

CS16302 – OPERATING SYSTEMS

(Regulation 2016)

Time: Three hours

Maximum : 80 Marks

Answer **ALL** questions**PART A - (8 X 2 = 16 marks)**

1. Main memory is byte addressable and cache is word addressable of size 32 bits. Then how many memory read operation will be performed for satisfying a CPU request upon a cache miss.
A) 1
B) 2
C) 3
D) 4
2. A situation where a process is ready to execute but is continuously denied access to a processor in deference to other processes is
A) Synchronization
B) Mutual Exclusion
C) Deadlock
D) Starvation
3. A system has 6 identical resources and N processes competing for them. Each process can request atmost 2 resources. Which one of the following values of N could lead to a deadlock?
A) 1
B) 2
C) 3
D) 4
4. The effective strategy to replace a block that has been used less than others is
A) LRU
B) LFU
C) FIFO
D) None of the mentioned
5. The time sharing system minimizes the response time of the processor. Identify whether the given statement is true or false and justify your answer.
6. Discuss the advantages and disadvantages of pre-emptive and non-pre-emptive scheduling.
7. Examine the solution of the producer consumer problem that does not satisfy the requirements of the critical section problem.
8. A CPU generates 32-bit virtual addresses. The page size is 4 KB. The processor has a translation look-aside buffer (TLB) which can hold a total of 128-page table entries and is 4-way set associative. Calculate the minimum size of the TLB tag?

PART B - (4 X16 = 64 marks)

9. (a) Illustrate the mechanism to establish communication between processes. (16)

(OR)

- (b) A network mail delivery system schedules and delivers the packets in the ready queue. (16)
Apply FCFS, SJF, SRTF, Priority (Pre-emptive and Non Pre-emptive) and Round Robin (No. of Packets=1) CPU scheduling algorithms to schedule the systems. Calculate finishing time, waiting time, turnaround time, average waiting time and average turnaround time of the systems. Identify which scheduling is best to increase the throughput.

System Name	No. of Packets	Time of arrival	Priority
A	5	0	1
B	2	1	2
C	10	2	4
D	3	3	3

10. (a) Design a monitor solution for dining philosopher's problem and implement a monitor using semaphores. (16)

(OR)

- (b) Consider the following snapshot of a system: (16)

	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P0	0	0	1	2	0	0	1	2	1	5	2	0
P1	1	0	0	0	1	7	5	0				
P2	1	3	5	4	2	3	5	6				
P3	0	6	3	2	0	6	5	2				
P4	0	0	1	4	0	6	5	6				

Perform the following using the banker's algorithm:

- Compute the Need matrix and check whether the system is in safe state.
 - If a request from process P1 arrives for (0,4,2,0), can the request be granted immediately?
11. (a) (i) Given six memory partitions of 400 KB, 700 KB, 650 KB, 300 KB, 850 KB and 225 KB (in order). Compare how the first-fit, best-fit, and worst-fit algorithms place the processes of size 215 KB, 600 KB, 458 KB, 300 KB, and 475 KB (in order)? (6)
- (ii) Consider the following segment table: (6)

Segment	Base	Length
0	419	500
1	4300	15
2	2327	780
3	3952	56

Calculate the physical addresses for the following logical addresses.

- a) 0, 285
- b) 2, 800
- c) 1, 10
- d) 3, 46
- e) 2, 656

- (iii) Consider a logical address space of 8 pages of 1024 words each, mapped onto a physical memory of 64 frames. How many bits are there in the logical address and in the physical address? **(4)**

(OR)

- (b) Analyze the performance of the FIFO, LRU and Optimal page replacement algorithms for the given page reference string: 1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6. The number of frames to be considered is 3 and 4. **(16)**

12. (a) Apply the listed disk scheduling mechanisms to process the following requests {10, 130, 100, 40, 70, 180, 90, 160}. The disk arm is initially at 50. Calculate the total distance (in cylinders) that the disk arm moves to satisfy all pending requests. **(16)**

- a. FCFS
- b. SSTF
- c. SCAN
- d. LOOK
- e. C-SCAN
- f. C-LOOK

(OR)

- (b) Discuss the various file allocation methods and analyze the performance of each method. **(16)**