

M.Sc. 3rd Semester Examination, 2022

COMPUTER SCIENCE

(Advanced Operating System)

PAPER — COS-301

Full Marks : 50

Time : 2 hours

The figures in the right hand margin indicate marks

Candidates are required to give their answers in their own words as far as practicable

GROUP — A

Answer any four questions : 2 × 4

1. What is web-based computing ?
2. In paging, the page size is always power of 2. Why ?
3. What is thrashing ?

4. What is the function of memory management unit ?
5. What is clustered system ?
6. Distinguish between buffering and spooling.

GROUP – B

Answer any **four** questions : 4 × 4

7. What is the limitation of simple implementation of Wait() and Signal() operations and how it can be solved ? 1 + 3
8. Consider a logical address space of eight pages 1024 words each, mapped onto a physical memory of 32 frames. What are the lengths of logical and physical address ? 4
9. Implement Dining-Philosophers problem using monitor. 4
10. How many page faults would occur for the following reference string for four page frames using FIFO and LRU algorithm-1, 2, 3, 4, 5, 3, 4, 1, 6, 7, 8, 9, 7, 8, 9, 5, 4, 5, 4, 2. 2 + 2

11. Suppose that a disk has 5000 cylinders, numbered 0 to 4999. The drive is currently serving a request at cylinder 143 and the previous request was at cylinder 125. The queue of pending requests, in FIFO order is - (86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130). Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all pending requests for LOOK and C-SCAN disk scheduling algorithms. 2 + 2
12. For a paged system, TLB hit ratio is 0.9. Let the RAM access time, t be 20 ns and the TLB access time, T be 100ns. Find out effective access time with TLB. 4

GROUP – C

Answer any two questions : 8 × 2

13. Consider the set of 6 processes whose arrival time and burst time are given below

Process	Arrival time	Burst time
P ₁	5	5
P ₂	4	6
P ₃	3	7
P ₄	1	9
P ₅	2	2
P ₆	6	3

If the CPU scheduling policy is Round Robin with quantum = 3, calculate the average waiting time and average turnaround time.

4 + 4

14. Consider the following snapshot of a system :

Process	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P ₀	0	0	1	2	0	0	1	2	1	5	2	0
P ₁	1	0	0	0	1	7	5	0				
P ₂	1	3	5	4	2	3	5	6				
P ₃	0	6	3	2	0	6	5	2				
P ₄	0	0	1	4	0	6	5	6				

Answer the following using Banker's algorithm :

- (a) What is the content of matrix Need ?
- (b) Is the system in a safe state ?
- (c) If a request from process P1 arrives for (0, 4, 2, 0), can it be granted ? 2 + 2 + 4

15. (a) What is virtual memory ?

(b) What are the advantages of it ?

(c) What is Demand paging ? What hardware supports is needed to implement it ? 2 + 2 + 4

16. (a) What is segmentation ?

(b) Explain segmentation hardware with diagram.

(c) Distinguish between paging and segmentation scheme. 1 + 5 + 2

[*Internal Assessment* – 10 Marks]
