

Faculty of Engineering & Technology
Fourth Semester B.E. (Comp. Sci. Engg.) (C.B.S.)
Examination

OPERATING SYSTEM

Paper—3

Time : Three Hours]

[Maximum Marks : 80

INSTRUCTIONS TO CANDIDATES

- (1) All questions carry marks as indicated.
- (2) Solve **SIX** questions as follows :—
Question No. 1 **OR** Question No. 2
Question No. 3 **OR** Question No. 4
Question No. 5 **OR** Question No. 6
Question No. 7 **OR** Question No. 8
Question No. 9 **OR** Question No. 10
Question No. 11 **OR** Question No. 12
- (3) Due credit will be given to neatness and adequate dimensions.
- (4) Illustrate your answers wherever necessary with the help of neat sketches.

1. (a) Define operating system. Explain Batch, Time sharing and real time operating system. 7
- (b) What is system call ? Explain different system calls. 7

OR

2. (a) Explain the services provided by operating system. 8
- (b) Differentiate between : 6
- (i) Multitasking and multiprogramming.
- (ii) Loosely coupled and tightly coupled multiprocessing.
3. (a) Describe the various directory structures. 7
- (b) Explain the different access methods for file. 6

OR

4. (a) Suppose that a disk drive has 5000 cylinders. The drive is currently serving at cylinder 143 and previous request was at cylinder 125. The queue of pending request in FIFO is ordered as 86, 1470, 913, 1777, 948, 1022, 1750, 130. What is the total distance that the disk arm moves for the following algorithm FCFS, SSTF, SCAN ? 6
- (b) Explain different Disk space allocation methods. 7
5. (a) Define a thread. What are the benefits of using thread ? Define its various models in multithreaded system. 8

- (b) State and explain in brief the various scheduling criteria used for comparing CPU scheduling algorithm. 5

OR

6. (a) Consider the following set of processes : 9

Process	Arrival Time	Burst Time
P_1	0	3
P_2	1	5
P_3	2	2
P_4	3	5
P_5	4	5

Calculate average waiting time and turn around time for :

- (i) FCFS
- (ii) SJF
- (iii) RR (Time Slice = 2)

- (b) Explain process control block. 4

7. (a) Under what circumstances do page faults occur ? Describe the action taken by operating system when a page fault occurs. 7

- (b) Consider the following page reference string :—

7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1. How many page faults would occur for the

following page replacement algorithm assuming 3 frames :

- (i) FIFO
- (ii) Optional
- (iii) LRU.

6

OR

8. (a) On a system using segmentation, compute physical address for each of the following logical addresses, if address generates a segment fault, then indicate so :

Segment	Base	Length
0	330	124
1	876	125
2	111	99
3	498	302

- (i) 0,99
- (ii) 2,78
- (iii) 1,268
- (iv) 3,222
- (v) 0,111.

8

- (b) What are the causes of thrashing ? How the effect of thrashing can be minimized ?

5

9. (a) Explain producer–Consumer problem with solution using semaphore. 7
- (b) What is semaphore ? What is the difference between a binary and counting semaphore ? Explain how improper implementation of a semaphore can lead to a deadlock. 6

OR

10. (a) What do you mean by monitor ? How does it give better solution than semaphores ? 7
- (b) Explain reader —writer problem. 6
11. (a) What are the necessary conditions for a deadlock situation to arise ? 7
- (b) Explain resource allocation graph algorithm. 7

OR

12. (a) Consider a system with five processes P_0 to P_4 and resource type A, B, C. Resource type A has 7 instances, B has 2 and C has 6 instances. Suppose at time t_0 we have following snapshot :—

	Allocation			Request			Available		
	A	B	C	A	B	C	A	B	C
P_0	0	1	0	0	0	0	0	0	0
P_1	2	0	0	2	0	2			
P_2	3	0	3	0	0	0			
P_3	2	1	1	1	0	0			
P_4	0	0	2	0	0	2			

Find the safe state if any. At time t_1 , P_2 makes one additional request for instance type C ; check whether system is in deadlock or not at time t_1 . 7

(b) Write and explain Bankers algorithm. 7