

 SIES Graduate School of Technology RISE WITH EDUCATION (Affiliated to University of Mumbai)		End Semester Examination (R-24) FH 2026 Answer Key with marking scheme																																																																																																																																																																																																																																																													
Branch: IT		Course: Operating System																																																																																																																																																																																																																																																													
Year/ Semester: SE/ IV		Course code: ITC403																																																																																																																																																																																																																																																													
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Q. 1	Attempt any FOUR. (All questions carry equal marks)		20																																																																																																																																																																																																																																																												
A.	Function of Operating system – 1 Mark for each question		5																																																																																																																																																																																																																																																												
B.	Race condition explanation – 3 Marks Example – 2 Marks		5																																																																																																																																																																																																																																																												
C.	Process and Thread Difference - 1 Mark for each point		5																																																																																																																																																																																																																																																												
D.	Fragmentation – 1Mark Type of Fragmentation – Internal Fragmentation with example – 2 Marks External Fragmentation with example – 2 Marks		5																																																																																																																																																																																																																																																												
E.	RAID Levels Explanation – 4 Marks Diagram - 1 Mark		5																																																																																																																																																																																																																																																												
F.	Features of Cloud OS – 1 Mark for each feature		5																																																																																																																																																																																																																																																												
Q.2	Attempt any FOUR. (All questions carry equal marks)		40																																																																																																																																																																																																																																																												
A.	Producer Consumer Problem Explanation – 3 Marks Stating Semaphors Used for solving Producer Consumer Problem and the data types used – 2 Marks Solution to the Problem (Including Producer and Consumer Code) – 5 Marks		10																																																																																																																																																																																																																																																												
B.	LRU – 4 Marks Solving and 1 Mark for Correct Page Faults. <table border="1"><tr><td>Ref →</td><td>1</td><td>2</td><td>4</td><td>7</td><td>3</td><td>0</td><td>1</td><td>2</td><td>0</td><td>3</td><td>0</td><td>4</td><td>2</td><td>3</td><td>0</td><td>2</td><td>0</td><td>1</td><td>7</td><td>0</td></tr><tr><td>F1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>7</td><td>7</td></tr><tr><td>F2</td><td>-</td><td>2</td><td>2</td><td>2</td><td>2</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>F3</td><td>-</td><td>-</td><td>4</td><td>4</td><td>4</td><td>4</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>4</td><td>4</td><td>4</td><td>4</td><td>4</td><td>4</td><td>1</td><td>1</td><td>1</td></tr><tr><td>F4</td><td>-</td><td>-</td><td>-</td><td>7</td><td>7</td><td>7</td><td>7</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td></tr><tr><td>Fault</td><td>F</td><td>F</td><td>F</td><td>F</td><td>F</td><td>F</td><td>F</td><td>F</td><td></td><td></td><td></td><td>F</td><td></td><td></td><td></td><td></td><td></td><td>F</td><td>F</td><td></td></tr></table> Total Page Faults (LRU) = 11 Optimal – 4 Marks Solving and 1 Mark for Correct Page Faults. <table border="1"><tr><td>Ref →</td><td>1</td><td>2</td><td>4</td><td>7</td><td>3</td><td>0</td><td>1</td><td>2</td><td>0</td><td>3</td><td>0</td><td>4</td><td>2</td><td>3</td><td>0</td><td>2</td><td>0</td><td>1</td><td>7</td><td>0</td></tr><tr><td>F1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>4</td><td>4</td><td>4</td><td>4</td><td>4</td><td>4</td><td>1</td><td>7</td><td>7</td></tr><tr><td>F2</td><td>-</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td></tr><tr><td>F3</td><td>-</td><td>-</td><td>4</td><td>4</td><td>4</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>F4</td><td>-</td><td>-</td><td>-</td><td>7</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td></tr><tr><td>Fault</td><td>F</td><td>F</td><td>F</td><td>F</td><td>F</td><td>F</td><td></td><td></td><td></td><td></td><td></td><td>F</td><td></td><td></td><td></td><td></td><td></td><td>F</td><td>F</td><td></td></tr></table> Total Page Faults (Optimal) = 9		Ref →	1	2	4	7	3	0	1	2	0	3	0	4	2	3	0	2	0	1	7	0	F1	1	1	1	1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	7	7	F2	-	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	F3	-	-	4	4	4	4	1	1	1	1	1	4	4	4	4	4	4	1	1	1	F4	-	-	-	7	7	7	7	2	2	2	2	2	2	2	2	2	2	2	2	2	Fault	F	F	F	F	F	F	F	F				F						F	F		Ref →	1	2	4	7	3	0	1	2	0	3	0	4	2	3	0	2	0	1	7	0	F1	1	1	1	1	1	1	1	1	1	1	1	4	4	4	4	4	4	1	7	7	F2	-	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	F3	-	-	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	F4	-	-	-	7	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Fault	F	F	F	F	F	F						F						F	F		10
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C.	Conditions for deadlock – 4 Marks (1 Mark for each deadlock condition) Resource allocation Graph – 2 Marks Detection of Deadlock using RAG – 4 Marks	10
D.	SJF – 3Marks Priority – 3Marks Round Robin – 4 Marks	
E.	Paging Description – 5 Marks Conversion of Logical to Physical Address – 5 Marks	10
F.	Extended Process State diagram – 3 Marks State and Transition Description – 7 Marks	
Q.3	Attempt any FOUR. (All questions carry equal marks)	20
A.	Direct Memory Access with diagram – 5 Marks	5
B.	Role of PCB – 2 Marks Structure of PCB with Diagram – 3 Marks	5
C.	Monolithic and Microkernel Difference - 1 Mark for each point (4 Marks) and 1 Mark for diagram	5
D.	File Access Methods – 3 Marks Compare and state beneficial one – 2 Marks	5
E.	Open Source and Proprietary OS – 1 Mark for each point	5
F.	Description of SCAN disk Scheduling Algorithm – 2 Marks Example – 3 Marks	5