

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

Theory Exam-III, December 2021

B. Tech in Computer Science & Engineering, Semester V

Roll No.....

COURSE CODE: CS1108

Time: 2 Hours

Max. Marks: 30

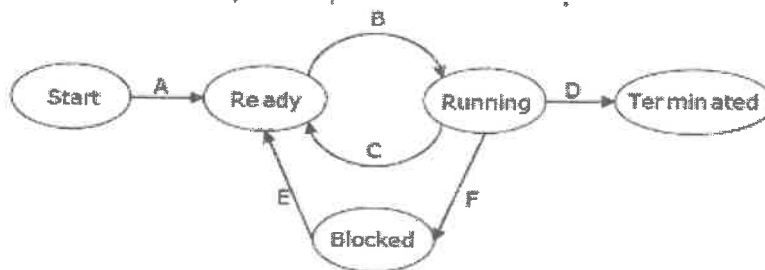
COURSE TITLE: Operating Systems

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

- Q.1 In the following process state transition diagram for a uniprocessor system, assume that there are always some processes in the ready state: Now consider the following statements:

2.5



I. If a process makes a transition D, it would result in another process making transition A immediately.

II. A process P2 in blocked state can make transition E while another process P1 is in running state.

III. The OS uses preemptive scheduling.

IV. The OS uses non-preemptive scheduling.

Which of the above statements are TRUE? Give justification also.

- (A) I and II
(B) I and III
(C) II and III
(D) II and IV

- Q.2 Assume that the following jobs are to be executed on a single processor system

2.5

Job ID	CPU Burst Time
p	4
q	1
r	8
s	1
t	2

The jobs are assumed to have arrived at time 0^+ and in the order p, q, r, s, t. Calculate the departure time (completion time) for job p if scheduling is round robin with time slice 1.

Q.3	What is the producer-consumer problem in operating system? Write solution for it using Semaphores.	05																																		
Q.4	An operating system uses the <i>Banker's algorithm</i> for deadlock avoidance when managing the allocation of three resource types X, Y, and Z to three processes P0, P1, and P2. The table given below presents the current system state. Here, the allocation matrix shows the current number of resources of each type allocated to each process and the Max matrix shows the maximum number of resources of each type required by each process during its execution. <table border="1"><thead><tr><th rowspan="2">Process</th><th colspan="3">Allocation</th><th colspan="3">Max</th></tr><tr><th>X</th><th>Y</th><th>Z</th><th>X</th><th>Y</th><th>Z</th></tr></thead><tbody><tr><td>P0</td><td>0</td><td>0</td><td>1</td><td>8</td><td>4</td><td>3</td></tr><tr><td>P1</td><td>3</td><td>2</td><td>0</td><td>6</td><td>2</td><td>0</td></tr><tr><td>P2</td><td>2</td><td>1</td><td>1</td><td>3</td><td>3</td><td>3</td></tr></tbody></table> There are 3 units of type X, 2 units of type Y and 2 units of type Z still available. Find out the following: (a) What will be the content of need matrix? (b) Is the system currently safe? If it is safe state write the safe sequence. (c) What will happen if the following independent requests for additional resources in the current state. • REQ1: P0 requests 0 units of X, 0 units of Y and 2 units of Z • REQ2: P1 requests 2 units of X, 0 units of Y and 0 units of Z	Process	Allocation			Max			X	Y	Z	X	Y	Z	P0	0	0	1	8	4	3	P1	3	2	0	6	2	0	P2	2	1	1	3	3	3	05
Process	Allocation			Max																																
	X	Y	Z	X	Y	Z																														
P0	0	0	1	8	4	3																														
P1	3	2	0	6	2	0																														
P2	2	1	1	3	3	3																														
Q.5	A process has been allocated 3 page frames. It uses the Optimal page replacement and Least Recently Used (LRU) page replacement policies. Assume that none of the pages of the process are available in the memory initially. The process makes the following sequence of page reference (reference string): 1, 2, 1, 3, 7, 4, 5, 6, 3, 1 How many page faults occur for the above reference string?	05																																		
Q.6	Consider the six memory partitions of fix size 300KB, 400KB, 450KB, 500KB, 200KB, 250KB, where KB refer to kilo byte. The partitioned are required to be allotted to four processes of size 200KB, 420KB, 220KB, and 230KB in the given order. If the First fit, best fit, and worst fit algorithm is used, which partitions are not allotted to any process?	05																																		
Q.7	Consider a disk system with 100 cylinders. The requests to access the cylinders occur in the following sequence: 4, 34, 10, 7, 19, 73, 2, 15, 6, 20 Assuming that the head is currently at cylinder 50, what is the time taken to satisfy all requests if it takes 1ms to move from one cylinder to adjacent one and shortest seek time first (SSTF) and First come first served (FCFS) policy is used?	05																																		