2018
CSIT
CSIT: 1.3
OPERATING SYSTEMS
Full Marks: 80.
Time: 3 hours.

The figures in the margin indicates full marks for the questions

1. Answer all questions from the following (question carries ONE mark each.): 1X5=5

   i. Define External Fragmentation?
   ii. What is Kernel?
   iii. What is the objective of Multiprogramming?
   iv. What is Multitasking?
   v. What does Dispatcher do?

2. Answer any 7 (SEVEN) questions from the following (question carries FIVE marks each.): 5X7=35

   i. Define Deadlock. Explain the necessary conditions for deadlock to arise? 1+4
   ii. Deadlocks can be described more precisely in terms of directed graph called system resource allocation graph. So, describe Resource Allocation Graph. 5
   iii. Describe Multilevel Queue Scheduling and Multilevel Feedback-Queue Scheduling. 3+2
   iv. Explain Critical Section Problem. A solution to Critical Section Problem must satisfy three requirements, what are the requirements? 2+3
   v. Explain Process and their States. 2+3

P.T.O.

vi. How Deadlock can be Recovered using Process Termination and Resource pre-emption method. 2+3

vii. Explain, what is a Safe State in Deadlock Avoidance? 5

viii. What are Logical and Physical Address Space, explain. 2.5+2.5

ix. Explain Dynamic Loading and its advantages. 3+2

x. Define the following:
   a. CPU Utilization.
   b. Throughput.
   c. Turnaround Time.
   d. Waiting Time.
   e. Response Time.

Answer any FOUR questions from the following (question carries TEN marks each.):

3. Describe Demand Paging with its Basic method. 4+6

4. Explain Least Page Replacement and Optimal Page Replacement Algorithm and find the number of Page Faults for the reference string 0, 1, 2, 3, 0, 1, 4, 0, 1, 2, 3, 4, using 3 number of page frames for each of these Algorithms. 2+8

5. Consider the following set of processes, with the length of the CPU burst given in milliseconds.

Processes	Burst Time	Arrival Time
P1	8	0
P2	3	1
P3	2	2
P4	5	3
P5	1	4

Where P1, P2, P3, P4 and P5 are processes. 3+3+3+1

i. Draw three Gantt charts that illustrates the execution of these processes using First Come First Serve, Shortest Job First and Round Robin Scheduling Algorithms (time quantum=1).

ii. What is the waiting time of each process for each of the scheduling algorithms in part i?

iii. What is the turnaround time of each process for each of the scheduling algorithms in part i?

iv. Which of the algorithms in part i results in minimum average waiting time?

6. How can a Deadlock be Prevented, explain with details.

7. Suppose that a Disk drive has 2000 cylinders, numbered 0 to 1999, the drive is currently serving a request at 145. The queue of pending requests in FIFO order is:
96, 1430, 913, 1784, 948, 1509, 1022, 1950, 130
Starting from the current head position, draw the graph and find out the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests for each of the following disk scheduling algorithms?
i. FCFS
ii. SSTF
iii. SCAN
iv. C-SCAN

8. Consider the following snapshot of a system:

	ALLOCATION				MAX				AVAILABLE		
	A	B	C		A	B	C		A	B	C
P_1	0	0	1		0	0	1				
P_2	1	0	0		1	7	5				
P_3	1	3	5		2	3	5				
P_4	0	6	3		0	6	5				
									1	5	2

Where P_1 to P_4 are processes and A, B, C are different resource types such that there are 3 instances of resources type A, 14 instances of resource type B and 11 instances of resource type C.

P.T.O.

Answer the following questions using Banker's algorithm. 2+4+4

a) What is the content of the matrix Need?

b) Is the system in a safe state? If yes then find the Safe Sequence.

c) If a request from process P_2 arrives for (0, 5, 2) for the resource types A, B and C respectively then, can the request be granted immediately, if yes, find the Safe Sequence?

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