Course Code : CST 219   KOLP/RW – 19 / 9507

Fourth Semester B. E. (Computer Science and Engineering) Examination

OPERATING SYSTEMS

Time : 3 Hours]   [Max. Marks : 60

Instructions to Candidates :—
   (1)   All questions are compulsory.
   (2)   Internal choices in questions 1, 3, and 5.
   (3)   Due credit will be given to neatness.

1. Solve any **Two** :

   (a)   What are clustered systems ? Illustrate how are these different than multiprocessor systems.   5(CO1)

   (b)   Explain the goals of modern systems. Illustrate different components of modern operating system which are supported by almost all operating systems.
                                                                          5(CO1)

   (c)   Illustrate memory protection and CPU protection.   5(CO1)

2.   (a)   Consider the following set of processes, with the length of the CPU–burst time given in milliseconds. Assume context switch time = 0.5 ms
Using Preemptive priority and Round Robin scheduling algorithms

      (i)   Draw Gantt chart illustrating the execution of these processes.

      (ii)   Calculate Average waiting time for both the scheduling algorithms.

Process	Burst	Arrival Time	Priority
P1	7	0	3
P2	3	1	4
P3	2	4	2
P4	4	3	1

                                                                          5(CO2)

   (b)   Differentiate between process and threads.   3(CO2)

   (c)   Operating system use PCB for maintaining information about processes. Explain.
                                                                          2(CO2)

3. Solve any **Two** :

   (a)   Can multiple processes be synchronized when they are connected in a distributed environment ? If yes, write the algorithm.   5(CO3)

   (b)   Illustrate hardware synchronization. Provide the pseudo code with explanation.   5(CO3)

   (c)   There is a barber shop which has one barber, one barber chair, and n chairs for waiting for customers if there are any to sit on the chair.

      •   If there is no customer, then the barber sleeps in his own chair.

      •   When a customer arrives, he has to wake up the barber.

      •   If there are many customers and the barber is cutting a customer's hair, then the remaining customers either wait if there are empty chairs in the waiting room or they leave if no chairs are empty.

      Write pseudo code to synchronize barber and customers.   5(CO3)

4.   (a)   What are the different ways to handle a deadlock ?   3(CO3)

   (b)   What are the goals of protection and security ?   3(CO3)

   (c)   Determine whether the system is in safe state using Banker's algorithm:

Total_Resources in system :

	R1	R2	R3	R4
	<9>	<4>	<8>	<6>

Process	Max				Allocation			
	R1	R2	R3	R4	R1	R2	R3	R4
P1	3	2	0	2	3	2	0	2
P2	1	1	0	1	1	1	0	0
P3	3	1	2	1	0	1	1	1
P4	1	0	2	0	0	0	0	0
P5	0	1	1	3	0	0	1	0

4(CO3)

5. (a) Illustrate mapping of logical address to physical address with respect to paging architecture. 5(CO4)

   (b) Using the page reference sequence given

   2, 4, 6, 2, 1, 6, 5, 2, 7, 3, 4, 2, 6, 3, 4, 2, 1, 5, 7, 3

   Construct page fault and page hit sequence for the following page replacement algorithms for FOUR and FIVE ? Also find total page faults.

   (i) FIFO.

   (ii) LRU.

   (iii) Optimal. 5(CO4)

6. (a) Consider a disk queue with I/O requests on the following cylinders in their arriving order :

   73, 66, 82, 12, 158, 78, 44, 78, 67, 69, 196

   The disk head is assumed to be at cylinder 63 and moving in the direction of increasing number of cylinders. Disk consists of total 200 cylinders.

   Calculate and show with diagram the movement of disk head, till all pending requests are satisfied for SSTF and C–LOOK disk–scheduling algorithms. 4(CO4)

   (b) Illustrate different directory structures with their advantages and disadvantages. 6(CO4)