United College of Engineering and Research, Allahabad
Department of Computer Science & Information Technology
IIIrd Sessional Examination, 2018-19
B.Tech. -IVTH Sem(CS & IT)
OPERATING SYSTEMS

Subject Code: RCS-401
Time: 2.00 hours **Max. Marks: 30**

Note: There are three sections in this paper. All sections are compulsory.

Section-A

Note: All questions are **compulsory**. Each question has equal marks. **10*1=10**

1. Differentiate between Process and Thread.
2. Draw the labeled process state transition diagram.
3. A system contains 5 processes and ***n*** instances of a resource. Each process requires 5 instances of a resource. What is the minimum value of ***n*** for that the system will never enter into deadlock state?
4. There are various page replacement algorithms (FIFO, LRU, Optimal), which of these page replacement algorithm is best? Given reason to support your answer.
5. List any two difference between Paging and Segmentation.
6. What is aging?
7. What is multiprocessor operating system?
8. If a process is in running state, what are the conditions in which process returns back to ready queue?
9. What is meant by context switching?
10. Why page size always power of 2?

Section-B

Note: Attempt any **six** questions. Each question has equal marks. **6*2=12**

1. Write short notes on any two of the following:
   a. Process Control Block
   b. Multilevel feedback queue scheduling
   c. Thrashing
2. Explain the resource allocation graph algorithm to deal with deadlock problem. What are the limitations of this approach?
3. What are the necessary conditions to hold a deadlock in a system?
4. Explain the various performance criteria for CPU scheduling algorithm.
5. Give the solution of Dinning Philospher Problem by using the concept of semaphores?
6. Given memory partitions of 200K, 400K, 100K, 600K, and 300K (in order). How would each of the first-fit, Best-fit and worst-fit algorithms place processes of 312K, 217K, 412K and 226K (in order)? Which algorithm makes the most efficient use of memory?
7. Consider a logical address space of eight pages of 1024 words, each mapped onto a physical memory of 32 frames then:
   a. How many bits are in logical address?
   b. How many bits are in Physical address?
8. How many page faults will occur for the following reference string
   7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1
   using the following algorithms:
   a. FCFS
   b. LRU

Section-C

Note: Attempt any **two** questions. Each question has equal marks. **2*4=8**

1. Suppose that a disk drive has 5,000 cylinders, numbered 0 to 4999. The drive is currently serving a request at cylinder 143, and the previous request was at cylinder 125. The queue of pending requests, in FIFO order, is

   86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130

   Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests for each of the following disk-scheduling algorithms?
   a. SCAN
   b. C-SCAN
   c. LOOK
   d. C-LOOK

2. Consider the following set of processes, with the length of the CPU-burst time given in milliseconds:

Process	Burst Time	Priority
P1	10	3
P2	1	1
P3	2	3
P4	1	4
P5	5	2

   The processes are assumed to have arrived in the order P1, P2, P3, P4 and P5 all at time 0.
   a) Draw Gantt charts illustrating the execution of these processes using FCFS, SJF, non-preemptive priority (a smaller priority number implies a higher priority), and RR (quantum = 1) scheduling.
   b) What is the turnaround time of each process for each of the scheduling algorithms in part a?
   c) What is the waiting time of each process for each of the scheduling algorithms in part a?
   d) Which of the schedules in part a results in the minimal average waiting time (over all processes)?

3. Describe the Banker's algorithm for safe allocation. Consider a system with five processes and three resource types and at time 'T_0' the following snapshot of the system has been taken:

	Allocated			**Maximum**			**Available**		
Process Id	**R1**	**R2**	**R3**	**R1**	**R2**	**R3**	**R1**	**R2**	**R3**
P1	1	1	2	4	3	3	3	1	0
P2	2	1	2	3	2	2			
P3	4	0	1	9	0	2			
P4	0	2	0	7	5	3			
P5	1	1	2	11	2	3			

   I. Determine the total amount of resources of each type.
   II. Compute the Need matrix
   III. Determine if the state is safe or not using Banker's algorithm
   IV. Would the following request be granted in the current state?
   - P1 <3, 3, 1>
   - P2<2, 1, 0>