United College of Engineering and Research, Allahabad
Operating System
B. Tech (4th Semester) CSE & IT
Second Sessional Exam, 2016-17

Time: **2** hours   Max Marks: **30**

Section A

Attempt All Questions in section A   **(10x1=10)**

1. What do you mean by monolithic kernel?
2. What is Thrashing?
3. What is busy waiting?
4. 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?
5. What is dirty bit?
6. There are various page replacement algorithms (FIFO, LRU, Optimal), which of these page replacement algorithm is best? Given reason to support your answer.
7. Differentiate between Deadlock and Starvation.
8. What is Belady's anomaly?
9. What is critical section?
10. List the various services of operating system.

Section B

Attempt Any three Questions from section B   **(4x3=12)**

1. Give the solution of Dinning Philospher Problem by using the concept of semaphores?
2. Write and explain Peterson solution (Algorithm-3) to the critical section problem.
3. Describe in detail the actions taken by the operating system when a page faults occur.
4. Differentiate between paging and segmentation. On a system using paging and segmentation, the virtual address space consists of up to 8 segments where each segment can be up to 2^{29} bytes long. The hardware pages each segment into 256-byte pages. Determine the bits needed in the virtual address to specify the
   - Segment number
   - Page number
   - Offset within page
   - Entire virtual address
5. Explain the resource allocation graph algorithm to deal with deadlock problem. What are the limitations of this approach?

Section C

Attempt Any one Questions from section C   **(8x1=8)**

1. Consider the following reference string 1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6. How many page faults will occur for:
   - Optimal
   - LRU page replacement algorithm?

   Assuming three and four frames (initially empty) in each case.

P. T. O.

2. Explain the difference between internal fragmentation and external fragmentation? Which one occurs in paging system? Which one occurs in system using pure segmentation? Discuss various ways of removing fragmentation.
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:

Process Id	Allocated			Maximum			Available		
	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>