Name:

Enrolment No:

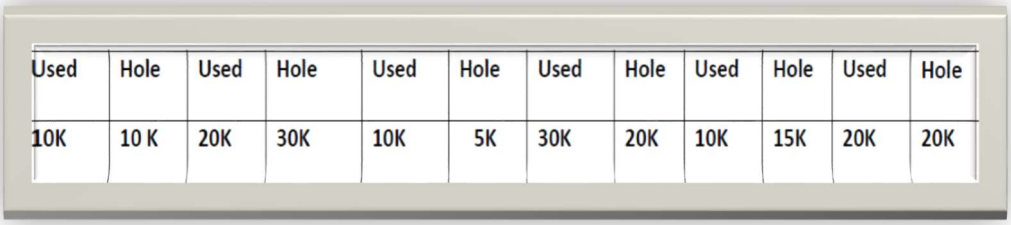
UPES
UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2019

Course: Operating System **Semester: III**
Program: B.Tech. CSE- All IBM + Xebia Branches **Time 03 hrs.**
Course Code: CSEG-2007 **Max. Marks: 100**

Instructions:

SECTION A

S. No.		Marks	CO
Q 1	Extract the main purposes of an operating system?	**4**	**CO1**
Q2	On a system using Best fit, assume memory is allocated as shown in figure. Before additional requests for 20K, 10 K and 5K are  received. At what starting address will each of the additional requests be allocated and mention percentage of fragmentation incur in these allocations?	**4**	**CO5**
Q3	Give the completion time for the following processes when the scheduling algorithm is SRTF and each process first spends some time on I/O, then on CPU and again on I/O. Assume that there are multiple I/O devices.	**4**	**CO2**

Process	**Arrival Time**	**Execution Time**		
		I/O Time	**CPU Time**	**I/O Time**
P1	0	4	14	2
P2	1	8	28	4
P3	3	12	42	6

Q4	Apply Semaphore and its operations to synchronize the working of Producer process in classical producer consumer problem.	**4**	**CO3**
Q5	How many total processes are created if parent is excecuting three fork system calls as fork(); fork(); fork();	**4**	**CO2**
SECTION B (attempt 4 Questions)			
Q 6	Define the essential properties of the following types of operating systems: a. Batch b. Interactive c. Time sharing d. Real time e. Distributed	**10**	**CO1**
Q7	i) Consider a file currently consisting of 100 blocks. Assume that the file control block (and the index block, in the case of indexed allocation) is already in memory. Analyze how many disk I/O operations are required for contiguous, linked, and indexed (single-level) allocation strategies, if, for one block, the following conditions hold. In the contiguous allocation case, assume that there is no room to grow in the beginning, but there is room to grow in the end. Assume that the block information to be added is stored in memory. a. The block is added at the beginning. b. The block is added in the middle. c. The block is added at the end. d. The block is removed from the beginning. e. The block is removed from the middle. ii) How cycle existence is necessary but not sufficient condition for deadlock occurrence?	**10 (6+4)**	**CO5, CO3**
Q8	Analyze process life cycle with suitable diagram. OR How context switching happens? Explain with the help of suitable diagram	**10**	**CO2**
Q9	i)Describe the differences between symmetric and asymmetric multiprocessing and What are three advantages and one disadvantage of multiprocessor systems? ii)For Cooperating process, how remainder section problem is solved in Peterson algorithm?	**10(6+2 +2)**	**CO1, CO2, CO3**
SECTION-C Attempt two questions			
Q 10	Comply with Segmentation Memory Management Technique with Suitable diagram. Consider the following segment table:	**20**	**CO4**

Segment	Base	Length
0	219	600
1	2300	14
2	90	100
3	1327	580
4	1952	96

What are the physical addresses for the following logical addresses?
a. 0,430
b. 1,10
c. 2,500
d. 3,400

OR

a) Comply with Paging Memory Management Technique with Suitable diagram.

b) Consider a paging system with the page table stored in memory.
i) If a memory reference takes 200 nanoseconds, how long does a paged memory reference take?
ii) If we add associative registers, and 75 percent of all page-table references are found in the associative registers, what is the effective memory reference time? (Assume that finding a page-table entry in the associative registers takes zero time, if the entry is there.)

Q11 **i)** Consider the following snapshot of a system:

	Allocation	Max	Available
	A B C D	A B C D	A B C D
P_0	0 0 1 2	0 0 1 2	1 5 2 0
P_1	1 0 0 0	1 7 5 0	
P_2	1 3 5 4	2 3 5 6	
P_3	0 6 3 2	0 6 5 2	
P_4	0 0 1 4	0 6 5 6	

Answer the following questions using the banker's algorithm:

a). Is the system in a safe state?

ii) Suppose a disk has 201 cylinders, numbered from 0 to 200. At some time the disk arm is at cylinder 100, and there is a queue of disk access requests for cylinders 30, 85, 90, 100, 105, 110, 135 and 145. If Shortest-Seek Time First (SSTF) is being used for scheduling the disk access, Calculate the Seek Count.

10+10

CO3, CO5