Name:

Enrolment No:

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

Online End Semester Examination, June 2021

Course: Operating System **Semester: II**
Program: BCA – IoT **Time: 03 hrs.**
Course Code: CSBC 1009 **Max. Marks: 100**

SECTION A

1. **Each Question will carry 5 Marks**
2. **Instruction: Select the correct answer(s)**

S. No.	**Question**	**CO**
Q 1	(i) To access the services of operating system, the interface is provided by the: (a) System Calls (b) API (c) Library (d) Assembly Instruction (ii) The main function of the command interpreter is: (a) To get and execute the next user-specified command (b) To provide the interface between the API and application program (c) To handle the files in operating system (d) None of the mentioned	**CO1**

Q2	(i) How many times does the program below print Hello?
	include <stdio.h>
	int main()
	{
	fork();
	fork();
	fork();
	printf("Hello\n");
	}
	(ii) Interprocess communication
	a. is required for all processes. b. is usually done via disk drives
	c. is never necessary d. allows processes to synchronize memory
		CO2

Q3	(i) I have just invented a new scheduling algorithm that I claim gives the highest priority to processes that have just entered the system, but is fair to all processes. The algorithm works like this: There are two queues, one for new processes and one for old processes. When a process enters the system, it is put at the end of the new queue. After 2 milliseconds on the new queue, whether a process has been scheduled or not, it is moved to the end of the old queue. When it is time to schedule a process, the system schedules the process at the head of one of the queues, alternating between the two queues. Each process runs to completion before the next process is scheduled. Assume that processes enter the system at random times and that most processes take much longer than 2 milliseconds to execute. Now consider following conclusions statements: a. This algorithm gives the highest priority to new processes.	**CO2**

	b. This algorithm is starvation free. Which of the above statement is true? (ii) The context of a process in the PCB of a process does not contain : (a) the value of the CPU registers (b) the process state (c) memory-management information (d) context switch time	
Q4	(i) If the size of logical address space is 2 to the power of m, and a page size is 2 to the power of n addressing units, then the high order _____ bits of a logical address designate the page number, and the ____ low order bits designate the page offset. a) m, n b) n, m c) m – n, m d) m – n, n (ii) A swapper manipulates ___________ whereas the pager is concerned with individual _______ of a process. (a) the entire process, parts (b) all the pages of a process, segments (c) the entire process, pages (d) none of the mentioned	**CO3**
Q5	(i) If a disk fails in RAID level ___________ rebuilding lost data is easiest. a) 1 b) 2 c) 3 d) 4 (ii) In the _______ algorithm, the disk head moves from one end to the other, servicing requests along the way. When the head reaches the other end, it immediately returns to the beginning of the disk without servicing any requests on the return trip. a) LOOK b) SCAN c) C-SCAN d) C-LOOK	**CO4**

Q6	(i) All processes share a semaphore variable mutex, initialized to 1. Each process executes in the following manner:
	signal(mutex);
	…..
	critical section
	…..
	wait(mutex);
	In this situation :
	a. a deadlock will occur
	b. processes will starve to enter critical section
	c. several processes may be executing in their critical section
	d. All of these
	(ii) Banker's algorithm for resource allocation deals with __________?
	a. Deadlock Prevention b. Deadlock Avoidance
	c. Deadlock Detection d. Deadlock Recovery
		CO5

SECTION B

1. **Each question will carry 10 marks**
2. **Instruction: Write short / brief notes**

S. No.	**Question**	**CO**
Q 7	(a) Differentiate between multi-programming, multiprocessing and multitasking systems (b) Differentiate between long term, mid term and short term scheduler. .	**CO1**
Q 8	(a) We wish to schedule three processes P1, P2 and P3 on a uniprocessor system. The priorities, CPU time requirements and arrival times of the processes are as shown below: **Process** **Priority** **CPU Time Required** **Arrival time** (hh:mm:ss) P1 10(highest) 20 sec 00:00:05 P2 9 10 sec 00:00:03 P3 8 (lowest) 15 sec 00:00:00 We have a choice of preemptive or non-preemptive scheduling. In preemptive scheduling, a late-arriving higher priority process can preempt a currently running process with lower priority. In non-preemptive scheduling, a late-arriving higher priority process must wait for the currently executing process to complete before it can be scheduled on the processor. What are the turnaround times of P2 using preemptive and non-preemptive scheduling respectively? (b) What is a process and how it is represented in operating system? Explain with the help of suitable diagram, how transitions occur between the various states of a process. (i) Ready to Running (ii) Running to Ready (iii)Waiting to Running	**CO2**
Q 9	(a) Describe the difference between deadlock and starvation. (b) Explain the various conditions for the occurrence of the deadlock in detail.	**CO5**
Q 10	Describe the banker's algorithm. For the following snapshot, find is the system is in the safe state? If yes, show safe sequence using Banker's algorithm.	**CO5**
Q 11	Consider the following page reference string -1, 2, 3, 4, 5, 5, 3, 4, 1, 6, 7, 8, 7, 8, 9, 7, 8, 9, 5, 4, 5, 4, 2. How many page faults would occur for the following replacement algorithm, assuming three frames? (all frames are initially empty) I) FIFO Replacement II) LRU Replacement III) Optimal Replacement **OR**	**CO3**

Q 10 snapshot:

	Allocation			**Max**			**Available**		
	A	B	C	A	B	C	A	B	C
P_0	0	0	2	0	0	4	1	0	2
P_1	1	0	0	2	0	1			
P_2	1	3	5	1	3	7			
P_3	6	3	2	8	4	2			
P_4	1	4	3	1	5	7			

	Given memory partitions of 100 KB, 500 KB, 200 KB, 300 KB and 600 KB (in order), how would each of the first-fit, best-fit and worst-fit algorithms place processes of 212 KB, 417 KB, 112 KB and 426 KB (in that order) ? Which algorithm makes the most efficient use of memory?	
Section C **1. Each Question carries 20 Marks.** **2. Instruction: Write long answer.**		
Q12	Consider the disk queue with I/O requests on the following cylinders in their arriving order: 67, 12, 15, 45, 48, 50, 109, 89, 56, 59, 34, 88, 130, 24. The disk head is assumed be at cylinder 80 and moving in the direction of increasing number of cylinders. The disk consists of total 150 cylinders. (i) Show the disk head movement with diagram using FCFS, SSTF, LOOK and C-SCAN scheduling algorithms. Calculate the total head movements. (ii) Requests cylinders 60, 85, and 90 arrive while processing at 50. What will happen to these new requests on according to all the above scheduling algorithms? **OR** Consider a disk has 200 cylinders, numbered from 0 to 199. At some time the disk arm is at cylinder 100, and moving towards right direction. There is a queue of disk access requests for cylinders 30, 85, 110, 100, 105, 126, 135,55 and 195. Show the disk head movement with diagram using FCFS, SSTF, C-LOOK and C-SCAN scheduling algorithms. Calculate the total head movements.	**CO4**