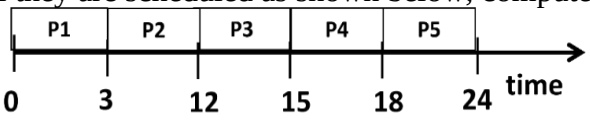
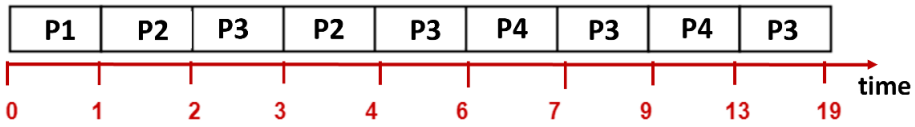
RV UNIVERSITY Go, change the world an initiative of RV EDUCATIONAL INSTITUTIONS **School of Computer Science & Engineering** **B.Tech(H) Program**	**MID-TERM: ANSWER SCHEME – Model Paper** ✅ **CIE** **Academic Year: 2023-24** **Term: II** **Semester: Sem 3** **Section: A, B and C** **Date: 18 Oct 23 (9:15 am to 11:15 am)** **Course Code: CS2100** **Course Name: Operating Systems and Systems Software** **Max Marks: 30 (Weightage: 20 Marks)**

Instructions to the students: 1. Answer all the questions in Part A. **2.** Part-B any 10 out of 12 questions can be answered. The best 10 answers will be considered for evaluation. **3.** No further clarifications will be provided during the examination. You can write all your assumptions in your answers, if any.

Q. No	Short descriptive answers: Part A (10 Questions * 1 mark) – 10 Marks	Marks
1	Whether the given statement below is true or false, justify your answer. Context switch between the threads of the same process is faster and easier.	**1**
2	Give one possible reason for a process which is currently in the Blocked Queue to get moved into the Ready Queue.	**1**
3	Arrival time of P1 and P2 = 0. Arrival time of P3, P4 and P5 = 10. If they are scheduled as shown below, compute the average waiting time. 	**1**
4	From the above Gantt chart, can you give how many processes would have been in the Ready Queue at time unit 16? Assuming there were no other processes added to the system apart from the above five processes, give the range of time units during which maximum number processes were in the Ready Queue.	**1**
5	Assume that you have a preemptive scheduler which was running with a quantum time of 4 units, was increased to 6 time units. If the system has processes which are of much longer execution times than 6 time units. Then, number of context switches would reduce because of the above change. Is the above statement true or false? Justify your answer.	**1**

6	Assuming all the processes have completed their execution at time unit 19. Compute the average waiting time of these processes if they all came in at t = 0. 	**1**
7	What is the significance of a thread calling **pthread_exit()** system call?	**1**

8	Give the messages printed by the parent and child processes when the below code executes. You can assume that it works correctly.
	printf("Message0\n");
	if(fork() == 0)
	  printf("Message1\n");
	else
	  printf("Message2\n");
		1

9	Briefly explain about the pthread library call: **pthread_join(id, &result);** What is the purpose of the two arguments passed to the function above?	**1**
10	Explain in words what does this **datatype** declaration mean. **int *(*(*arr[5])())());** **Note**: Bonus 2 marks will be given if you can write a code which uses the above declaration in a program, that compiles correctly and runs.	**1**

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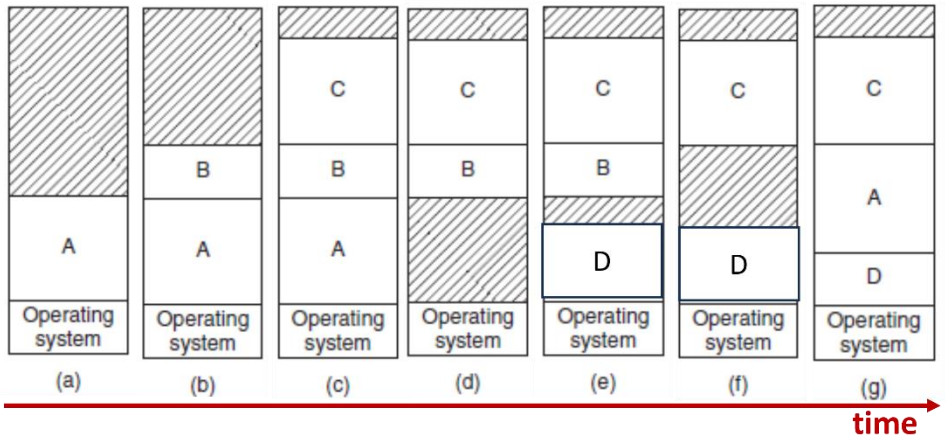
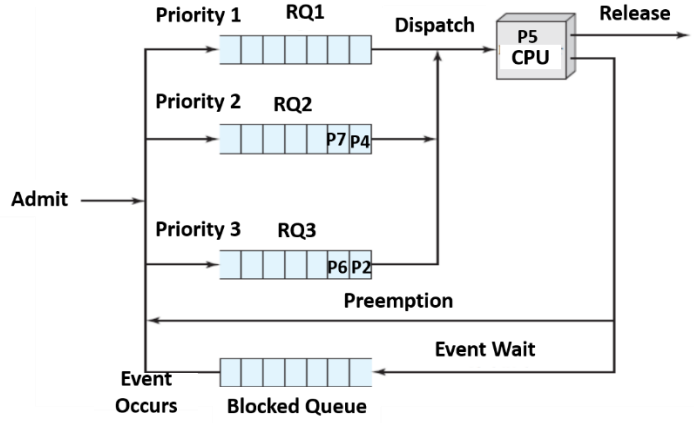
Q. No.	Problems and long descriptive answers: Part B Answer any 10 out of 12 (10 Questions * 2 marks) – 20 Marks	Marks
11	Draw the Gantt chart if the SRTF scheduler is running in the system. Process Id | Arrival time | Burst time P1 | 0 | 20 P2 | 15 | 25 P3 | 30 | 10 P4 | 45 | 15	2
12	In a memory hierarchy, why is the size of the memory which is closer to the CPU happens to be lower than the size of the memory which is farther away from the CPU?	2
13	If the below snapshots have not missed out any movements of processes in and out of main memory, answer the following questions: a) What might be the state of Process A during the interval (d) to (f)? b) Is it possible that all these processes in the MM are in a Running state? 	2
14	Give any two responsibilities of memory management system.	2

15	Explain address translation done by the MMU using Relocation register with an example.	**2**
16	The ready queues of three priority levels with the processes in them are shown below. Within the same priority level LIFO is the scheduling used. Assume that the currently running process P5 creates two new processes P8 followed by P9 with Priorities 2 and 3 respectively. Assume Priority 1 is the highest, with Priority 1 > Priority 2 > Priority 3 Which is the next process that would run on the CPU after P5 terminates? Assume a non-preemptive OS is running. 	**2**
17	If the following command was executed on the file **Q17.sh**, give the access permissions set for the owner, group and others. **chmod +754 Q17.sh**	**2**
18	Explain briefly about stdin, stdout and stderr. What are their file descriptor values?	**2**
19	Explain **pthread_create()** by calling it with sample parameters and explain the role of each parameter passed to it.	**2**

20	When the following code executes, what will be printed?
	Note: You can assume that always the parent process gets a chance to run before the child processes, after any **fork()** call.
	printf("Start of model Q20\n");
	fork();
	fork();
	fork();
	fork();
	printf("At the end of all fork() calls.\n");
		2

21	Explain what happens when the below code is executed.
	Note: Apart from giving the output being printed, explain what happens in the program. Just printing the output messages is not enough.
	
	//All essential include files are assumed to be here.
	void *threadFn(void *arg);
	int main(){
	  void *thread_result;
	  pthread_t id1;
	  pthread_t id2;
	
	  pthread_create(&id1, NULL, threadFn, NULL);
	  pthread_create(&id2, NULL, threadFn, NULL);
	
	  pthread_join(id1, &thread_result);
	  pthread_join(id2, &thread_result);
	
	  printf("I am here ...\n");
	  while(1);
	}
	
	void * threadFn(void *arg){
	  printf("Thread is created.\n");
	  sleep(2);
	  printf("I am going to exit.\n");
	  pthread_exit(NULL);
	}
		2

22	Explain what happens when the below Q22.sh is executed.
	#!/bin/bash
	
	echo "This shell scripts prints param2 numbers starting from param1"
	startingnum=$1
	numseq=$2
	echo "Starting number passed is $startingnum"
	echo "Number sequence passed is $numseq"
	while [$numseq -gt 0]
	do
	  echo "$startingnum"
	  startingnum=$(($startingnum + 1))
	  numseq=$(($numseq - 1))
	done
		2

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