	King Saud University College of Computer and Information Sciences Computer Science Department	
Course Code	CSC 227	
Course Title	Operating Systems	
Semester	Fall 2022-23 (II)	
Type of Examination	Midterm Exam	**Duration:** 2hrs
Student Name:		
Student ID:		
Student Section No.		
Instructor Name:		

Instructions:

- This exam has 30 marks.
- This exam has 9 pages.
- **Do not use pencil**
- Write clearly and neatly.
- Copy your answers to questions 1-1 to 1-18 in the table below.
- **ONLY THIS TABLE WILL BE GRADED**
- **WHEN FILLING THE TABLE, USE CAPITAL LETTERS**

1.	2.	3.	4.	5.	6.
7.	**8.**	**9.**	**10.**	**11.**	**12.**
13.	**14.**	**15.**	**16.**	**17.**	**18.**

Question 1. Select ONLY ONE ANSWER (the best answer).

1.	Which of the following statements is correct about operating systems
A.	OS is a resource distributer
B.	OS is a mind control program
C.	OS is a everything a vendor ships when you order an operating system
D.	OS is a collection of applications and services provided outside of the kernel.

2.	Which of the following storage media can be accessed directly by the CPU
A.	Internal hard disk
B.	USB flash memory
C.	Video card memory
D.	Registers

3.	Disk surfaces are logically divided into _____ which are subdivided into _____.
A.	Track, sectors
B.	Disk controller, driver
C.	Platters, plates
D.	Sectors, tracks

4.	Which of the following parameter passing methods is used in Linux?
A.	Parameters are stored in registers
B.	Parameters are stored in a block and the address of the block is passed in a register.
C.	Parameters push onto a stack.
D.	All of the above.

5.	Most current operating systems for PCs offer the following
A.	Graphical user interface only
B.	Command interpreters only
C.	Graphical user interface and command interpreters
D.	Morris codes interface

6.	Common bootstrap loader, ……., allows selection of kernel from multiple disks, versions, and kernel options
A.	GRUB
B.	EEPROM
C.	SYSGEN
D.	Cocoa

7.	A parent process may terminate execution of its child process when the:
A.	Child has exceeded allocated resources
B.	Child did not cooperate very well
C.	Child is sleeping
D.	None of the above

8.	`exec` system call used after a fork to:
A.	Create a new process
B.	Terminate a process

C.	Duplicate the process
D.	replace the process' memory space with a new program

9.	An acceptable sequence of process state can be (order from left to right)
A.	Terminated, New, Ready, waiting
B.	New, waiting, running, terminated
C.	New, ready, running, terminated
D.	New, ready, waiting, running, terminated

10.	The processes that are residing in main memory and are ready and waiting to execute are kept on a list called
A.	job queue
B.	ready queue
C.	execution queue
D.	process queue

11.	Some operating system do not allow child to continue if its parent terminates, therefore, all children will be terminated, this is known as
A.	Zombie elimination
B.	Cascade termination
C.	Starvation
D.	Orphans elimination

12.	…….. controls the degree of multiprogramming
A.	Long-term scheduler
B.	Short-term scheduler
C.	Medium-term scheduler
D.	Dispatcher

13.	The scheduling in which CPU is allocated to the process with least CPU-burst time is called ……
A.	Priority Scheduling
B.	Shortest job first scheduling
C.	Round Robin Scheduling
D.	Multilevel Queue Scheduling

14.	CPU scheduling decisions may take place when a process: 1. Switches from running to waiting state 2. Switches from running to ready state 3. Switches from waiting to ready 4. Terminates
A.	Scheduling under 1 and 4 is **preemptive**
B.	Scheduling under 1 and 4 is nonpreemptive
C.	Scheduling under 2 and 3 is **nonpreemptive**
D.	Scheduling under 1 , 2, 3 and 4 is **nonpreemptive**

15.	Among the scheduling algorithm optimization criteria is the ……
A.	Minimization of the CPU utilization

B.	Maximization of the throughput
C.	Maximization of the turnaround time.
D.	Maximization of the response time.

16.	The next CPU burst of the newly arrived process may be shorter than what is left of the current executing process. A ……will preempt the current executing process.
A.	Preemptive priority scheduling algorithm
B.	Non-preemptive SJF algorithm
C.	Preemptive SJF algorithm
D.	First-come, First-Served scheduling

17.	Which of the following CPU scheduling algorithms is most likely to reduce the response time?
A.	Round Robin
B.	Shortest job first
C.	Shortest remaining time first
D.	First come first served

18.	……. is the module that gives control of the CPU to the process selected by the short-term scheduler.
A.	Interrupter
B.	Dispatcher
C.	Program counter
D.	Long-term scheduler

Question 2.

2-a) [1 mark] Explain the term Caching.

2-b) [1 mark] Differentiate between Symmetric Multi-processing and Asymmetric Multi-processing

2-c) [1 mark] Differentiate between Protection and security in OS.

Question 3.

3-a) [1 mark] What is the major difference between MS-DOS and Unix OS?

3-b) [1 mark] What are the advantages of programming using an API rather than invoking actual system calls?

3-c) [1 mark] How does a virtual machine help in running multiple OS on the same hardware?

Question 4.

3.1 Cooperating processes need inter-process communication (IPC) mechanism to exchange data and information, explain two models of IPC. [2 Marks]

3.2 Explain the concept of Context Switching? Can the system do useful work while context switching? [2 Marks]

3.3 List two reasons why Medium-term scheduler might be needed? [1 Mark]

3.4 Print the output of the following code? [2 Marks]

/* Assume all headers are included and no errors when fork() is used */

```
int main() {
pid_t  pid;
     pid = fork();
     printf ("Tweet\n");
     pid = fork();
     pid = fork();
}
```

Question 5.

a) [1 mark] What advantage is there in having different time-quantum sizes on different levels of a multilevel queuing system?

b) [1 marks] The performance of the RR algorithm depends heavily on the size of the time quantum.

c) [5 marks] Given the processes as described in the following table

Process	Arrival time	Burst time
P1	0	6 ms
P2	1	4 ms
P3	3	1 ms
P4	4	4 ms

- Draw a Gantt chart that illustrates how these processes would be scheduled using the **shortest remaining time first algorithm** (preemptive)

- What is the waiting time and turnaround time for each process? You can use the following table to fill in your answers.

Process	Waiting time	Turnaround time
P1		
P2		
P3		
P4		