King Saud University
College Of Computer and Information Sciences
Computer Science Department
CSC 227: Operating Systems

Total Marks: 41 **Serial #**
Spring 2015-16 **Name:** ……
Midterm Exam I **ID#:** ……
Date: 17-July-2015 **Section#:**…… **or Instructor Name**: ……**class time**:……

Question 1. [20 marks] Select ONLY ONE ANSWER (the best answer).
Copy your answer for question 1-1 to 1-20 in the table on page2. ONLY THAT TABLE WILL BE GRADED.

1.	**The processor can transit from kernel mode to user mode, if _____**		**2.**	**_____specifies the location of next instruction to execute.**
a.	the user executes a privileged instruction		a.	Instruction register
b.	the user executes a trap instruction		b.	Program counter
c.	I/O is completed		c.	Cache coherency
d.	None of the above		d.	None of the above
3.	**_____ is an operating system function that controls the order and time in which programs are run**		**4.**	**_____ is an operating system function that manages the placement of programs and data in memory.**
a	File Management		a	Task Management
b	Job Scheduling		b	Device Management
c	Task Management		c	Job Management
d	I/O Management		d	Memory Management
5.	**_____ implies that a computer is simultaneously running two or more programs (task) at the same time**		**6.**	**_____ is used to allows execution of processes not completely in memory**
a.	Client		a.	Bootstrap program
b.	Cursor		b.	Virtual memory
c.	Multitasking		c.	Main memory
d.	Mouse		d.	Dual mode
7.	**Bootstrap program is stored in _____.**		**8.**	**The _____ routine determines the nature of the interrupt and performs whatever actions are needed.**
a.	magnetic disks		a.	interrupt handler
b.	Read Only Memory (ROM)		b.	device controller
c.	Random Access memory (RAM)		c.	program handler
d.	tap drivers		d.	interrupt signal
9	**_____ is a program that assists the user in maintaining a computer's magnetic disks to ensure optimal performance**		**10**	**_____ is a program that accepts requests for action from the operating system and causes a device, such as a printer, to execute the requests**
a.	File Compression		a.	Driver
b.	Storage Management		b.	Utility
c.	File Management		c.	Taskbar
d.	Mass Storage Management		d.	Icon

11	**When a process makes an I/O operation during execution its state changes from**		12	**Which of the following is not contained (saved) in a PCB?**
a.	Ready to waiting		a.	Program counter
b.	Running to ready		b.	CPU registers
c.	Running to waiting		c.	A list of open files
d.	Running to terminated		d.	Non of the above
13	When an interrupt occurs, ……. is used to get address of interrupt service routine.		14	**A CPU-bound process spends most of its time**
a.	memory		a.	either executing or in the ready queue
b.	hardware		b.	waiting in some I/O device queue
c.	interrupt vector		c.	waiting for some interrupt to occur
d.	operating system		d.	waiting for some resource to be available
15	**The scheduler that selects the process that should be executed next is called**		16	**A Zombie process is**
a.	Long-term scheduler		a.	a process whose parent terminated without invoking wait().
b.	Short-term schedule		b.	A process that executes concurrently with its parent process
c.	Medium-term scheduler		c.	A process that shares the same resources with its parent.
d.	Any of the above can do that		d.	a process that terminates but its parent has not invoked wait() is called
17	**The context-switch time is:**		18	**Which of the following statements is true?**
a.	dependent on the underlying hardware support		a.	Message passing is most useful for exchanging large amounts of data.
b.	The size and complexity of the PCB		b.	In single core processors, shared memory is typically faster than message passing
c.	The size of the ready queue		c.	Share memory is more suitable for distributed systems
d.	A and B only		d.	All of the above
19	**Rendezvous synchronization occurs when**		20	**The dynamically allocated objects are stored in**
a.	The sender uses blocking send and the receiver, uses a non-blocking receive.		a.	Heap
b.	The sender uses a blocking send and the receiver uses a blocking receive.		b.	Stack
c.	If both send and receive are non-blocking		c.	Text section
d.	None of the above		d.	Data section

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.

11.	12.	13.	14.	15.	16	17	18	19	20

Q 2 [3 marks]

A) What is the purpose of system programs?

B) What is the purpose of system calls?

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c) Explain how does the CPU know when the memory operations are complete.

Q3)[4 marks]

a) Explain why we cannot store global variables in the stack of a process.

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b) Explain why a long-term scheduler needs to select a good mix of I/O-bound and CPU-bound processes?

Q.4) [6 marks] Consider the following Java program for socket communication

```
import java.net.*;
import java.io.*;

public class DateServer
{
   public static void main(String[] args) {
      try {
1)       ServerSocket sock = new ServerSocket(6013);

         /* now listen for connections */
         while (true) {
2)          Socket client = sock.accept();

3)          PrintWriter pout = new
             PrintWriter(client.getOutputStream(), true);

            /* write the Date to the socket */
            pout.println("Hello User ");

            /* close the socket and resume */
            /* listening for connections */
            client.close();
         }
      }
      catch (IOException ioe) {
         System.err.println(ioe);
      }
   }
}
```

a) What is the port number used by the program? _____

b) Explain the purpose of the statement labeled as 2 in the program

c) When does statement 3 execute?

d) What would a client receive as a result of using (communicating with) this server?

Q.5) [4marks]Answer following statement using True (T) or False (F):

Statement	Answer
1. Every parent process must wait for its child process to terminate.	
2. A process can communicate with another process via a number of different mailboxes.	
3. Mail boxes are also called ports.	
4. In indirect communication a mail box can only be used by exactly 2 processes.	
5. Every shared device, has a queue for the processes waiting to use it.	
6. In modern systems all instructions can be directly executed by a user code.	
7. Debugging a layered operating system is hard.	
8. Designing a layered operating system is easy.	

Q.6)[4 marks]

A) In designing an operating system, the separation of policy and mechanism is an important principle. Explain why.

B) List two advantages for designing an operating system using a microkernel structure

1.

2.