FAST – National University of Computer and Emerging Sciences, Lahore.

Computer Organization & Assembly Language – Fall 2012

Final Exam

Time Allowed: 3 hours
Total Marks: 100

- **The exam is OPEN BOOK and OPEN NOTES**
- **Solve all questions on answer sheets.**

Q# 1
[35 Marks]

Consider a multi-tasking kernel running 'n' parallel tasks. The kernel is hooked on interrupt 0x80 (just as the example given in book). Apart from creating new tasks, our multi-tasking kernel is now also capable of "suspending" and "resuming" tasks. The kernel takes as parameter service number in ah, such that when ah=0 , the kernel creates new tasks, when ah=1 it suspends and when ah=2 it resumes the particular task requested by the user. SUSPEND and RESUME services take the PID of the process to be suspended as parameter passed in the CX register. A suspended task can only be resumed by a RESUME request from the user (calling int 0x80 with appropriate parameters). Implement these new services in the multitasking kernel as a code snippet (don't copy the kernel code).

Q# 2
[25 Marks]

BIOS has its keyboard services hooked at int 0x16. Update its "get character" service (ah=0) such that whenever an alphabet's key (a-z) is pressed on keyboard, this service returns the ascii of the respective upper case letter (A-Z) in al. For every other service the 0x16 behavior remains unchanged.

Q# 3 **[20 Marks]**

Suppose that we have a pcb layout as follows. We want to push all these values on stack such that dummy is pushed first and ax is on top of stack. Using string instructions only, implement the code to copy all the register values from PCB to the stack.

```
; PCB layout:
; ax,bx,cx,dx,si,di,bp,sp,ip,cs,ds,ss,es,flags,next,dummy
;  0, 2, 4, 6, 8,10,12,14,16,18,20,22,24,  26 , 28 ,  30
```

Q# 4 **[5 x 3 Marks]**

Answer the following questions.

(a) What will be the value in al and ah (in hexadecimal) after the following instructions?

```
mov ah, 0
mov al, 152
shl ax, 1
```

(b) What will be the value in bx (in hexadecimal) after the following instructions?

```
mov bx, 0x90F4
rol bx, 1
```

(c) What will be the value in ax (in hexadecimal) after the following instructions?

```
mov ax, 0x40
mov bx, 0x10
push ax
```

```
push bx
add sp, 2
pop ax
```

5 MARKS ARE SET ASIDE AS BONUS FOR ***GOOD CODE***

☠☺--GOOD LUCK--☺☠