NOTE: It is my policy to give a failing grade in the course to any student who either gives or receives aid on any exam or quiz.

INSTRUCTIONS: Circle the letter of the best choice for multiple choice questions. Answer orher questions in the spaces provided.

1. What is the main difference between a variable of type *ram* and an array?
   A. A *ram* can be both written to and read from, but arrays are read-only.
   B. An array can hold any type of number, but a *ram* can hold only integers.
   C. Only one *ram* element can be accessed per clock cycle, but multiple array elements can be accessed at the same time.
   D. If a variable is a *ram*, there must be corresponding *rom* and *wom* variables to match it. But you can have an array without a corresponding *rom* (although you do need a matching *wom* for a correct design.)
   E. Arrays are volatile, but *rom*s are non-volatile.

2. When should a pipelined design be used?
   A. Whenever a design needs to perform a multiplication.
   B. Whenever there is a stream of input values that need to be processed, producing a new result on each clock cycle despite the need for several clock cycles to process each value.
   C. Whenever the output value determines what the next input value will be.
   D. All complex calculations should be pipelined.
   E. Whenever a video image needs to be updated more often than once per clock cycle.

3. Which is the best declaration for a variable that has to hold one of 4096 values?
   A. int X;
   B. long X;
   C. short X;
   D. unsigned 4096 X;
   E. signed 12 X;

4. Many of the timing constraints for Video projects use the value *39 nsec*. Where does this number come from?

5. How long does it take a Handel-C assignment statement take to execute?
   A. It depends on the instruction set architecture of the CPU.
   B. It depends on the complexity of the expression on the right side of the equal sign.
   C. It depends on how many assignments are being executed at the same time.
   D. It depends on whether the foreground or background color is being drawn.
   E. One clock cycle.

6. What's wrong with the following code? Assume that all four procedures are properly defined elsewhere.

```
void main( void ) {
  while (1) { getInput(); sendData(); }
  while (1) { receiveData(); displayResults(); } }
```

7. What role does the C preprocessor (*cpp*) play in Handel-C development?

8. What is the difference between a macro proc and a macro expr?

9. Which of *par block* and *par loop* is evaluated at execution time and which one is processed by the compiler? *Explain your answer*.

10. What is the purpose of using a *header file* when developing and using *library code*?

11. Explain why we are using two different design flows, *simulation* and *EDIF*.

12. Describe what the *chan* data type is used for, and tell exactly what happens when the two operators associated with it are used. *Any sample code you write as part of your answer will be ignored!*

13. X is a 17 bit integer, Y is a 12 bit integer, and Z is a 9 bit integer. Write declarations for these variables, and write code that will assign to Z the sum of the leftmost 9 bits of X subtracted from the rightmost 9 bits of Y.

14. How long does this Handel-C statement take to execute?

```
PalKeyboardReadASCII(keybd, &inChar);
```

15. Write a loop that takes exactly one millisecond to execute. Assume PAL_ACTUAL_CLOCK_RATE is properly defined. *This is not the msecDelay() procedure from Laboratory III.*

16. The intensity of a sound is represented by a 6-bit unsigned integer named *intensity*. Write code that will smoothly fade *intensity* to zero over a 2.048 second interval in 2048 steps equally-spaced steps. You may assume *msecDelay()* from Laboratory III is available.