

**Sample EET-260 Final Exam for practice.**

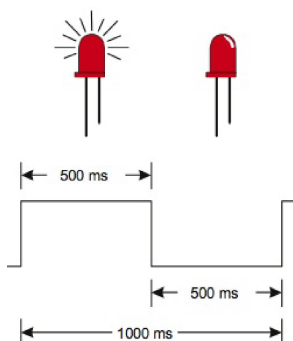
**It does NOT include the closed book portion of the exam or the questions which will be based upon the StampWorks & other experiments.**

**EET-260 Final Exam - Part 2**

**Multiple Choice**

*Identify the letter which best answers each question. Please write your answer in the line provided or you may not receive credit for the problem.*

- \_\_\_\_\_ 1. Which of the following commands will cause the BASIC stamp to delay for 100 seconds?
- |              |                       |
|--------------|-----------------------|
| A. PAUSE 10  | D. PAUSE 1000         |
| B. PAUSE 5   | E. PAUSE 100          |
| C. PAUSE 500 | F. None of the above. |
- \_\_\_\_\_ 2. Which set of instructions will create the waveform and light the LED as shown in the diagram? The LED is connected to P12.



- |  |
|--|
| A. HIGH 12, PAUSE 500, LOW 12, PAUSE 500   |
| B. HIGH 500, PAUSE 12, LOW 500, PAUSE 12   |
| C. HIGH 12, PAUSE 1000, LOW 12, PAUSE 1000 |
| D. HIGH 12, LOW 12, PAUSE 500, PAUSE 500   |
| E. HIGH 12, PAUSE 12, LOW 12, PAUSE 12     |
| F. None of the above.                      |
- \_\_\_\_\_ 3. An LED is connected to an output pin on the BS2. Which resistor below will set the LED current to approximately 5 mA. (NOTE: Assume the LED will drop about 2.0 volts.)
- |                           |                              |
|---------------------------|------------------------------|
| A. blue-red-brown-gold    | D. brown-black-yellow-silver |
| B. green-brown-red-gold   | E. brown-black-black-gold    |
| C. yellow-violet-red-gold | F. None of the above.        |

- \_\_\_\_\_ 4. An LED is connected to P14 of a BS2 with its anode connected to  $V_{DD}$  through a proper resistor. Which of the following commands will light the LED?
- |                    |                           |
|--------------------|---------------------------|
| A. PULSOUT 14, NOW | D. HIGH 13                |
| B. HIGH 14         | E. DEBUG "Light LED now!" |
| C. LOW 14          | F. LOOP                   |
- \_\_\_\_\_ 5. There are \_\_\_\_\_ numbered questions/problems on this final exam.
- |       |                                      |
|-------|--------------------------------------|
| A. 29 | D. 33                                |
| B. 10 | E. Wait! This is a final exam?!?!?!? |
| C. 25 | F. None of the above.                |
- \_\_\_\_\_ 6. Which of the following devices connected to the BS2 would be considered a *smart sensor*?
- |                             |                       |
|-----------------------------|-----------------------|
| A. LED                      | D. PING sensor.       |
| B. Thermistor               | E. None of the above. |
| C. light sensitive resistor |                       |
- \_\_\_\_\_ 7. *Input1*, *Input2* and *Output1* have been defined as *bit* variables. If both *Input1* and *Input 2* are equal to 1, what will the value of *Output1* be after the following program line:
- Output1 = Input1 + Input2**
- |      |                       |
|------|-----------------------|
| A. 1 | D. -1                 |
| B. 2 | E. None of the above. |
| C. 0 |                       |
- \_\_\_\_\_ 8. *Input1*, *Input2* and *Output1* have been defined as *bit* variables. If both *Input1* and *Input 2* are equal to 1, what will the value of *Output1* be after the following program line:
- Output1 = Input1 - Input2**
- |      |                       |
|------|-----------------------|
| A. 1 | D. -1                 |
| B. 2 | E. None of the above. |
| C. 0 |                       |
- \_\_\_\_\_ 9. The BS2 I/O references of INB, OUTB, DIRB correspond to which I/O pins? (Ref. Page 84 in BS2 Syntax and Reference Manual)
- |           |                               |
|-----------|-------------------------------|
| A. P0-P3  | D. P12-P15                    |
| B. P4-P7  | E. P1,P3,P5,P7,P9,P11,P13,P15 |
| C. P8-P11 |                               |
- \_\_\_\_\_ 10. The BS2 I/O references of INH, OUTH, DIRH correspond to which I/O pins? (Ref. Page 84 in BS2 Syntax and Reference Manual)
- |                               |           |
|-------------------------------|-----------|
| A. P0,P2,P4,P6,P8,P10,P12,P14 | D. P0-P15 |
| B. P8-P11                     | E. P8-P15 |
| C. P0-P7                      |           |
- \_\_\_\_\_ 11. Based upon Table on pages 8 & 9 in the *Basic Stamp Syntax and Reference Manual* v2.2, the microcontroller in the BS2 is the:
- |                        |                      |
|------------------------|----------------------|
| A. Ubicom SX28AC       | D. Ubicom SX48AC     |
| B. Microchip PIC16C57c | E. Intel Pentium 4   |
| C. Microchip PIC16C56a | F. Intel Pentium4 i7 |
- \_\_\_\_\_ 12. Based upon Table on pages 8 & 9 in the *Basic Stamp Syntax and Reference Manual* v2.2, the *program execution speed* of the BS2 is approximately:
- |                                   |                                   |
|-----------------------------------|-----------------------------------|
| A. 12,000 instructions per second | D. 4,000 instructions per second  |
| B. 19,000 instructions per second | E. 10,000 instructions per second |
| C. 2000 instructions per second   | F. Answer not given in the Table. |

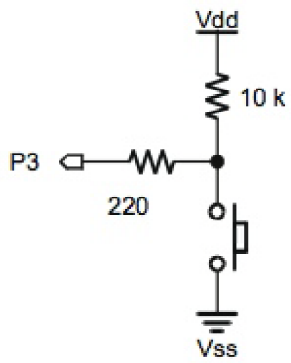
**A**

- \_\_\_\_ 13. In order to represent 2's complement negative numbers on the BS2, the variable must be defined as:
- |           |                      |
|-----------|----------------------|
| A. Word   | D. Byte              |
| B. Bit    | E. Double Word       |
| C. Nibble | F. All of the above. |

**Multiple Response**

*Identify the choices (more than one) that best answer each question.*

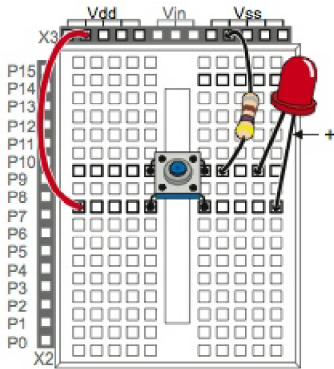
- \_\_\_\_ 14. A variable is defined as a *BYTE* in a program. Which of the following are possible (decimal) values which can be stored in this variable?
- |       |          |
|-------|----------|
| A. 0  | D. 275   |
| B. 1  | E. 65532 |
| C. -1 | F. 210   |
- \_\_\_\_ 15. Which of the following statements are true about the circuit shown below?



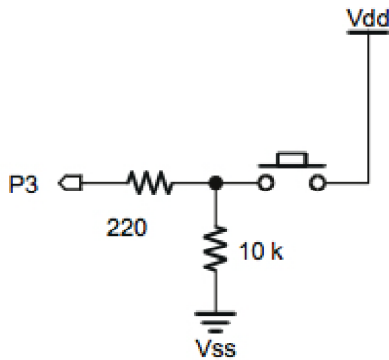
- |  |  |
|--|--|
| A. The brown-black-orange resistor is a pull-down resistor.            |  |
| B. The brown-black-orange resistor is a pull-up resistor.              |  |
| C. The switch used is a “normally closed” type.                        |  |
| D. The voltage at P3 will be about Vdd when the switch is pressed.     |  |
| E. The voltage at P3 will be about 0 volts when the switch is pressed. |  |
| F. The voltage at P3 will be about Vdd when the switch is not pressed. |  |
- \_\_\_\_ 16. A BS2 program contains a variable labelled *itemcount*. Which of the following variable definition statements would be acceptable if the maximum decimal value to be stored in *itemcount* is 14.
- |                              |                                    |
|------------------------------|------------------------------------|
| A. <i>itemcount</i> VAR Byte | D. <i>itemcount</i> VAR Word       |
| B. <i>itemcount</i> VAR Bit  | E. <i>itemcount</i> VAR DoubleWord |
| C. <i>itemcount</i> VAR Nib  | F. All of the above.               |

A

17. In the circuit shown below, what happens when the N.O. switch is pressed? Assume the LED is properly inserted with respect to polarity and that the resistor value is correct.



- A. The LED will go out.
  - B. The LED will light.
  - C. The pressed switch will “short out” the LED.
  - D. The LED color will change from Red to Green.
  - E. The LED will get brighter because the yellow-violet-red resistor will be shorted.
  - F. Nothing, this circuit is improperly wired.
18. Which of the following statements are true about the circuit below?



- A. The brown-black-orange resistor is a pull-down resistor.
  - B. The red-red-brown resistor is a pull-up resistor.
  - C. The switch used is a “normally open” type.
  - D. The voltage at P3 will be about 0 volts when the switch is pressed.
  - E. The voltage at P3 will be about 0 volts when the switch is not pressed.
  - F. The voltage at P3 will be about Vdd volts when the switch is pressed.
19. *Input1*, *Input2* and *Output1* have been defined as *bit* variables. If both *Input1* and *Input2* are equal to 1, which of the following PBASIC expressions will cause *Output1* to be a 1.
- A.  $Output1 = Input1 + Input2$
  - B.  $Output1 = Input1 - Input2$
  - C.  $Output1 = Input1 * Input2$
  - D.  $Output1 = Input1 / Input2$
  - E.  $Output1 = 1$

- \_\_\_\_ 20. Which of the following are common reasons to make use of smart sensors over simple sensor elements?
- A. Easier to interface and make operational.
  - B. They require considerably more voltage and current than a simple sensor.
  - C. Simplify programming.
  - D. Signal conditioning/biasing and even ADC circuits are included.
  - E. They are often more accurate since compensation circuitry is built-in.
- \_\_\_\_ 21. When you used the FREQOUT command and viewed it on your oscilloscope and posted your display on the forums (Week #6), which statements best describe the output using this command?
- A. The output signal was a perfect sinusoid at the frequency specified.
  - B. The output signal was a slightly distorted sinusoid at double the frequency specified.
  - C. The output did not resemble a sinusoid in any way.
  - D. The FREQOUT command synthesizes the sine wave using a pulse-width modulated output.
  - E. The FREQOUT command can blend two different frequencies together.
- \_\_\_\_ 22. Which PBASIC commands must be used when creating a subroutine?
- A. GOSUB
  - B. RETURN
  - C. PAUSE
  - D. SubroutineName: (i.e. a label)
  - E. RCTIME
- \_\_\_\_ 23. The PBASIC language supports “comment lines”. Which of the following are true in regards to the comment lines included in our BS2 and PBASIC 2.5 programs.
- A. Comment lines serve no real purpose.
  - B. Comment lines are downloaded into the BS2, but only on USB kits.
  - C. Comment lines can be used to help explain program operation.
  - D. The BS2 only allows 5 comment lines per program.
  - E. The Assembler Directive statements in PBASIC 2.5 programs are comment lines.
- \_\_\_\_ 24. Which of the following WERE NOT part of the 4 required *Advanced Peripheral* experiments?
- A. DS1620 Digital Thermometer
  - B. LCD Display
  - C. 4x4 keypad
  - D. StampWorks Digital Clock
  - E. ColorPAL Sensor
  - F. PING Ultrasonic Sensor
- \_\_\_\_ 25. Based upon Table on pages 8 & 9 in the *Basic Stamp Syntax and Reference Manual* v2.2, the *EEPROM* size of the BS2 is equal to:
- A. 2,048 bytes
  - B. 256 bytes
  - C. 2 kilobytes
  - D. 1,024 bits
  - E. 16 kilobytes
  - F. Approximately 500 instructions.
- \_\_\_\_ 26. Based upon Table on pages 8 & 9 in the *Basic Stamp Syntax and Reference Manual* v2.2, the *maximum current per I/O pin* of the BS2 is approximately:
- A. 20 mA source
  - B. 40 mA source
  - C. 50 mA sink
  - D. 25 mA sink
  - E. 60 mA source/sink

**A**

## Problem

27. The PWM program segment below is run on a BS2. Determine the following:

(Note: Total question value is 20 pts.)

**Accurately sketch the signal created on P5** being sure to indicate and record the following:

- a.) pulse width (high time)
- b.) space width (low time)
- c.) period
- d.) frequency
- e.) duty cycle
- f.) signal voltage levels

```
FOR counter = 1 to 400
  PULSOUT 5, 1000
  PAUSE 4
NEXT
```

[illegible]

28. Write a flow chart to describe the following program. (NOTE: Your flowchart should be in general (English) terms and NOT include a lot of PBASIC and BS2 specific commands & references.) (20 pts.)

- a.) The program will monitor the position of a reset switch (S1) connected to P6. At this time, no other information is known about the switch (i.e. normally open or normally closed, pull-up or pull-down configuration).
- b.) When the program is started, it will simultaneously light a red LED (R) on P2 and a green LED (G) on P4 for 2 seconds as a lamptest sequence. R and G are wired so they will light on a LOW signal on their respective ports (LED cathode toward I/O pin).
- c.) If the state of S1 is HIGH, then the program will shut off the red LED (R) if it's on, light the green LED (G), delay for 400 milliseconds and then return to check the state of S1. G is not extinguished when it returns to check S1.
- d.) If the state of S1 is LOW, then the program will shut off the green LED (G) if it's on, light the red LED (R), delay for 0.6 seconds and then check the position of (S1) again. R is not extinguished when it returns to check S1.

*NOTE: You should complete your flowchart on a separate sheet of paper.*

- 29.** Write a PBasic program which will implement the problem and flowchart you created in the previous problem. (20 pts.)

*NOTE: You should complete your program on a separate sheet of paper.*

**EET-260 Final Exam - Part 2**  
**Answer Section****MULTIPLE CHOICE**

- |            |        |
|------------|--------|
| 1. ANS: F  | PTS: 1 |
| 2. ANS: A  | PTS: 1 |
| 3. ANS: A  | PTS: 1 |
| 4. ANS: C  | PTS: 1 |
| 5. ANS: A  | PTS: 1 |
| 6. ANS: D  | PTS: 1 |
| 7. ANS: C  | PTS: 1 |
| 8. ANS: C  | PTS: 1 |
| 9. ANS: B  | PTS: 1 |
| 10. ANS: E | PTS: 1 |
| 11. ANS: B | PTS: 1 |
| 12. ANS: D | PTS: 1 |
| 13. ANS: A | PTS: 1 |

**MULTIPLE RESPONSE**

- |                     |        |
|---------------------|--------|
| 14. ANS: A, B, F    | PTS: 1 |
| 15. ANS: B, E, F    | PTS: 1 |
| 16. ANS: A, C, D    | PTS: 1 |
| 17. ANS: A, C       | PTS: 1 |
| 18. ANS: A, C, E, F | PTS: 1 |
| 19. ANS: C, D, E    | PTS: 1 |
| 20. ANS: A, C, D, E | PTS: 1 |
| 21. ANS: C, D, E    | PTS: 1 |
| 22. ANS: A, B, D    | PTS: 1 |
| 23. ANS: C, E       | PTS: 1 |
| 24. ANS: A, E       | PTS: 1 |
| 25. ANS: A, C, F    | PTS: 1 |
| 26. ANS: A, D       | PTS: 1 |



**PROBLEM**

27. ANS:
- a.) 2 milliseconds pulse width
  - b.) 4 millisecond space width
  - c.) 6 millisecond period
  - d.) 166.7 Hz
  - e.) 33%
  - f.) 0V to 5V
  - g.) See above for description.

PTS: 1

28. ANS:  
Flowchart.

PTS: 1