

NAME: \_\_\_\_\_

**Print your initials on all odd pages after this cover sheet.**

This is a closed-book, off-grid (no Internet searches) quiz. You have 10 minutes to complete it.

**DO NOT TURN OVER THIS PAGE  
UNTIL INSTRUCTED TO DO SO.**

Determine the duty cycle for each of the PWM waveforms shown in questions 1-6.

1. (5 points) Active High: \_\_\_\_\_ % Duty Cycle Pulse Width Modulation



2. (5 points) Active High: \_\_\_\_\_ % Duty Cycle Pulse Width Modulation



3. (5 points) Active Low: \_\_\_\_\_ % Duty Cycle Pulse Width Modulation



4. (5 points) Active Low: \_\_\_\_\_ % Duty Cycle Pulse Width Modulation



5. (5 points) Active High: \_\_\_\_\_ % Duty Cycle Pulse Width Modulation



6. (5 points) Active Low: \_\_\_\_\_ % Duty Cycle Pulse Width Modulation



7. (10 points) A motor requires speed control with 4% resolution (off plus 25 speeds – 4%, 8%, 12%, ... 100%). The PWM cycle must repeat 800 times per second. What is the required PWM clocking frequency?

8. (5 points each) Name the four signals in the SPI bus and what those names stand for:

8a:

8b:

8c:

8d:

9. (5 points) The SPI bus is (circle your answer):

Synchronous

Asynchronous

10. (10 points) What makes it possible to have more than one peripheral on a SPI bus?

11. (5 points each) Name the two signals in the I2C bus and what those names stand for:

11a:

11b:

12. (5 points) The I2C bus is (circle your answer):

Synchronous

Asynchronous

13. (10 points) What makes it possible to have more than one peripheral on an I2C bus?