

EN2532 Robot Design and Competition

Laboratory Sheet-Practical No: 2

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Name:	Mechanaders.....	Group No:	10.....

1) Why PWM modules are not suitable for RC servo pulse generation?

- a. Selectable 8 bit or 10-bit mode in PWM generation
- b. Typical hardware PWM generator is 8 or 10 bits say, then we can only use a small fraction of the bits to generate the pulse width we need and so we lose a lot of accuracy
- c. There are several PWM generators in a microcontroller
- d. More accurate pulse generation in PWM modules

2) What is the standard servo pulse period?

- a. Approximately 20us
- b. Approximately 2ms
- c. Approximately 1us
- d. Approximately 20ms

3) Choose the **incorrect** statement.

- a. The position-sensing mechanism tells the servo what position the shaft currently has
- b. The control circuitry notes the difference between the desired position and the current position
- c. A normal RC servo is mechanically capable of turning its shaft farther than 180 degrees
- d. All RC servos have three connections: power (positive), power (ground or negative), and the controlling signal

4) Error amplifier is

- a. An operational amplifier with positive feedback
- b. Always try to minimize the difference between the inverting (negative) and non-inverting (positive) inputs by driving its output to the appropriate direction
- c. An electronic circuit which converts pulse width signal to voltage signal
- d. A position sensor

5) If the circuit finds the angle position of the RC servo motor is not correct

- a. The motor shuts off
- b. It will turn the motor for 180 degrees

c. It will always try to minimize the difference between the inverting (negative) and non-inverting (positive) inputs by driving its output

d. It will stop the pulse width to voltage conversion

6) If the external oscillator of a microcontroller has a value of 40MHz, then what is the time taken to execute one instruction cycle?

↓
answers are in Hz
though.

a. 10MHz

b. 20MHz

c. 40MHz

d. 80MHz

7) Identify a disadvantage in using the microcontroller in the manner as in the above code to drive a servo motor

An issue with the above code is that the microcontroller is fully occupied with controlling the servo motor. The code uses a for loop with a delay of 15ms bet^e each degree of movement, and the microcontroller is executing these instructions without performing other tasks. During the servo movement (from 0° to 180° and back to 0°), the microcontroller is blocked by the delay(15) function, meaning it cannot execute any other tasks or handle inputs. This leads to poor multitasking capability.

8) Explain a way to circumvent this disadvantage.

- . Interrupts or timers to handle the servo movement while allowing the microcontroller to continue processing other tasks.
- . State machines or libraries that allow asynchronous control of the servo without blocking the main loop.