272-Q19 BCTHS MECHATRONICS TECHNOLOGY

NAME: _____ ***START DATE:*** _____/_____/_____
COMPLETION DATE: _____/_____/_____

TASK: Q19 Basic use of the Oscilloscope

PERFORMANCE OBJECTIVE: Given an oscilloscope, the student will demonstrate the correct Settings of all operational controls to produce 2 cycles of 60 Hz AC voltage in less than 1 minute

ENABLING OBJECTIVE: Mis-align all the settings on an oscilloscope and readjust to Display a proper waveform

TOOLS REQUIRED: Oscilloscope and signal generator

SAFETY FACTORS: ***Complete Q01-Q02 and observe all school/classroom safety rules at all times***

ACADEMIC ANCHORS:
M11.A.1.1.2 Express numbers using scientific notation
M11.A.2.1.1 Solve problems operations with rational numbers using rates and percentages
M11.A.2.1.2 Solve problems using direct and inverse proportions
R11.A.1.3.5 Demonstrate after reading understanding of non-fiction text
R11.A.2.1.2 Identify meaning of content specific words used in text

CAREER & WORK ANCHORS:
13.2.11.E Demonstrate essential workplace skills.

PERFORMANCE CHECKLIST:

STUDENT CHECK	***TASK TO BE COMPLETED***	***TEACHER SIGN OFF***
	1. Identify academic anchors and complete learning guide AA01	_____
	2. View video @ https://youtu.be/47720KLng4Y	_____
	3. Read Safety and Information Sheets	_____
	4. Read oscilloscope instruction manual	_____
	5. Complete Performance Sheets	_____
	6. Complete hands on test given by Instructor	_____

PERFORMANCE LEVEL:
MASTERY ***SATISFACTORY*** ***FAMILIARIZATION*** ***INSTRUCTED/CANNOT PERFORM***

BUCKS COUNTY TECHNICAL SCHOOL – August 25, 2021

_____
INSTRUCTOR'S SIGNATURE

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INFORMATION – SAFETY SHEET

When using an oscilloscope you must always use an isolation transformer with the device that you are working on. Most oscilloscopes have a hot ground and this can cause a shock hazard and potential damage to equipment that it is hooked up to. Always follow the safety rules for servicing electronic equipment in learning guide Q02 and Q04 when using the oscilloscope.

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OSCILLOSCOPE OPERATION

OBJECTIVE

To use the oscilloscope to view A.C. waveforms.

EQUIPMENT

1. Oscilloscope
2. Audio-Frequency Generator
3. Multimeter
4. Interconnecting Leads

INTRODUCTION

The oscilloscope is a useful piece of test equipment. It is capable of displaying voltage, amplitude, phase relationships, distortion, and time factors. The waveform is viewed on the screen and is capable of displaying voltage over time. Not every oscilloscope has the same controls or operates in the same way. However, there are certain basic parameters that must be controlled in every oscilloscope. The relationships among these control elements must be understood if the oscilloscope is to be used correctly.

PROCEDURE

NOTE: This exercise was designed for the Tenma Model 72-6800 Oscilloscope. Oscilloscopes of similar quality also can be used. But you should read the manufacturer's literature before starting.

1. With power off, set the focus and intensity controls, then the horizontal (↔) and vertical (↕) position controls at the middle of their range.

2. Set the horizontal gain controls at the mid-range setting.

3. Set the trigger selector to auto.

4. Set the sweep frequency selector at a range which includes 60hz.

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5. Connect the oscilloscope to the power source, turn it on, and set the intensity control at its mid-range position.

6. Connect the audio generator to the power source. Make sure that the generator output level (amplitude) control is set at zero. Turn it on.

7. Connect the generator ground jack to the oscilloscope vertical ground jack.

8. Connect the terminal adapter to the vertical input terminal.

9. Connect the generator output jack to the oscilloscope vertical input jack.

10. The oscilloscope will probably have warmed up by now and a line should be visible on its face (CRT).

11. Adjust the intensity, focus, and positioning controls to obtain a clear, sharp display in the middle of the CRT.
    CAUTION: You should adjust the intensity control for minimum comfortable brightness. A very bright, steady dot of light can damage the CRT.

12. Set the range switch to 10 on the signal generator.

13. Set the generator output frequency at 60 hz. Make sure the frequency range switch is set at the range position which includes 60 hz. For this setting turn the frequency range switch to the 20 → 200 position.

14. Set the sine-square switch to the sine wave position.

15. Increase the generator output level to 1 volt, rms, as indicated on a multimeter.

16. Slowly adjust the sweep variable control of the oscilloscope to obtain a steady 1-cycle display.

17. Adjust the vertical gain control to obtain a four-division CRT display. (Each major division is either 1 cm or 0.5 inch; depending on the graticule used.)
    NOTE: The plastic plate in front of the CRT is called the graticule. Horizontal lines, 1 cm or ½ inch apart, usually are scribed on the plastic. The brightness of these lines are adjusted by a scale illumination control.

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18. Sketch the display.

19. Adjust the sweep variable control to lock in a 2-cycle display. Sketch the display over the 1-cycle sketch.

21. Adjust the frequency switch to the 2K-20K range.

22. Set the generator frequency at 10,000 hz, adjust the scope controls as necessary, then sketch two cycles of the waveform displayed. Record the sweep frequency range used on the oscilloscope.

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REPORT INSTRUCTIONS

1. List the controls you used in the exercise and explain the function of each.

2. Describe the relationship between input frequency and the number of cycles displayed on the CRT.

3. Describe how to lock in a waveform, vary its display amplitude, and control the number of cycles displayed.

ANSWER THE FOLLOWING:

1. Discuss shock hazard.

_____

_____

_____

_____

2. Define:

Oscilloscope - _____

_____

_____

_____

AC voltage - _____

_____

_____

_____

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Probe - _____

_____

_____

_____

X-10 probe - _____

_____

_____

_____

DC voltage - _____

_____

_____

_____

Sine-wave - _____

_____

_____

_____

Square wave - _____

_____

_____

_____

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Time base - _____

_____

_____

_____

Frequency - _____

_____

_____

_____

Amplitude - _____

_____

_____

_____

GRADING RUBRIC

	Instructed/Cannot 0 points	Familiarization 1 point	Satisfactory 2 points	Mastery 3 points
Safety	Student rarely follows industry standard safety rules	Student needs to be frequently reminded to follow industry standard safety rules	Follows all industry standard safety rules, but required one reminder.	Student always follows all industry standard safety rules
Task	Student is unable to complete task	Student requires frequent assistance to complete task, and/or is familiar with some parts of the task	Student requires very little assistance to complete task, or has only completed task once or twice, but completed it satisfactorily with little to no assistance	Student can perform task with no assistance and has completed the task many times with no errors.

Mastery = 6 points
Satisfactory = 4-5 points
Familiarization = 2-3 points
Instructed cannot perform = <2 points