Title: **AC Measurement** Worksheet: 24

Course: Electrical Applications Unit: Electrical Theory CLO: 3

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Grade \_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Objectives**

1. Student shall determine the types of measurement associated with an AC source.
2. Student shall calculate various AC quantities base on the given information.

**Assessment**

Students shall demonstrate a comprehension of the objectives listed above by scoring a minimum of 75% on this Worksheet. Grading shall be based on an answer key.

**Theory**

An AC sine wave can be measured in three basic methods. A forth method shall be discussed as well. An AC sine wave that represents the voltage has three basic measurements; peak voltage (EP), peak to peak voltage (EPP), and root-mean-square voltage (ERMS). Below is a graphic displaying each.



90˚

360˚

180˚

270˚

0V

EP – From x axis to maximum (peak) amplitude.

EPP – From maximum (peak) amplitude to minimum (-peak) amplitude

ERMS – Root, Mean, Square of waveform

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |

Because the cycles of voltage correspond to the rotation of a generator, a cycle is expressed as 360˚. A fourth method is a calculation that produces the instantaneous voltage at a specific location on the sine wave. The point at which the voltage is read is denoted in degrees. Below is the formula to calculate the instantaneous voltage at a given degree.

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

Where;

EI – Instantaneous voltage @ θ˚.

EP – From x axis to maximum (peak) amplitude.

θ – Angle of rotation/point of sinewave the voltage occurs

**Circuit**



**Instructions**

Complete the tables below based on the information given and the formulas on page 1.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | P | I | R | ERMS | EP | EPP |
| R1 |  | 16mA |  |  |  |  |
| R2 |  | 87mA |  |  |  |  |
| Total |  |  |  |  | 39V |  |

**Circuit**



|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | P | I | R | ERMS | EP | EPP |
| R1 |  | 480mA |  | 16V |  |  |
| R2 |  | 600mA |  |  |  |  |
| R3 |  |  |  |  |  |  |
| Total |  | 1.4A |  |  |  |  |

**Circuit**



|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | P | I | R | ERMS | EP | EPP |
| R1 |  | 5.682mA |  |  |  |  |
| R2 |  |  | 5.6kΩ |  |  |  |
| R3 |  |  |  |  |  | 35.355V |
| Total |  |  |  |  | 70.711V |  |

**Circuit**



Where;

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | P | I | R | ERMS | EP | EPP |
| R1 |  |  | 2.2kΩ |  |  |  |
| R2 |  |  |  |  |  |  |
| R3 |  |  |  |  |  |  |
| Total |  |  |  |  |  |  |

**Circuit**



Where;

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | P | I | R | ERMS | EP | EPP |
| R1 |  |  |  |  |  |  |
| R2 |  |  | 74.805kΩ |  |  |  |
| R3 |  |  |  |  |  |  |
| Total |  |  |  | 87.5V |  |  |