



MACHAKOS UNIVERSITY

University Examinations for 2020/2021

SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING
SECOND YEAR SECOND SEMESTER EXAMINATION FOR
CERTIFICATE IN ELECTRICAL ENGINEERING
ELECTRICAL PRINCIPLES II

DATE: 31/8/2021

TIME: 8:30 – 11:30 AM

INSTRUCTIONS: Answer all the questions

1.
 - a)
 - i) Define a Megger
 - ii) Explain how a wattmeter works in the workshop. (4 marks)
 - b)
 - i) Name two coils found in the wattmeter
 - ii) Analogue electrical indicating instruments have three essential devices. Explain them. (6 marks)
 - c)
 - i) Explain how an attraction type of moving iron operates. (5 marks)
 - ii) Name the three advantages and two disadvantages of moving coil over moving iron instrument. (5 marks)
2.
 - a) Give three differences between the null and the deflection types of measuring instruments (6 marks)
 - b)
 - i) Explain what a shunt is as used in electrical principles (4 marks)
 - ii) A 20Ω galvanometer with a full scale deflection of 5mA is used to measure a current of 100mA. Calculate the value of the shunt resistance required. (6 marks)

3. a) i) Define the following an amplitude, period and frequency. (6 marks)
- ii) A sinusoidal waveform is has a period of 0.02sec and a root mean square value of 12V.sketch the wave, show the period and the peak. (4 marks)
- b) i) Calculate the peak to peak value, the frequency, and the average value of the wave. (4 marks)
- ii) An alternating voltage is given by $v=50\sin(100\pi t-0.25)$ Volts. Find i) the amplitude, (ii) peak to peak value (iii) the r.m.s. value (iv) the periodic time (v) the frequency (vi) the phase angle. (6 marks)
4. a) i) Explain how a Wheatstone bridge operates
- ii) Define an ohmmeter and explain how it measures resistance using a diagram. (6 marks)
- b) i) In a Wheatstone bridge circuit, calculate the unknown resistor given that $R_1 = 400 \Omega$, $R_2 = 200 \Omega$ and $R_3 = 600 \Omega$ named clockwise (4 marks)
- ii) A 50Ω galvanometer with a full scale deflection of 100mA is used to measure a current of 10A. Calculate
- c) i) The value of the shunt resistance needed.
- ii) If it were to be converted to a voltmeter to measure up to 50V, calculate the required multiplier value needed. (10 marks)