



MACHAKOS UNIVERSITY

University Examinations 2016/2017

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

FIRST YEAR SECOND SEMESTER EXAMINATION FOR DIPLOMA IN
ELECTRICAL AND ELECTRONICS ENGINEERING

SUPPLEMENTARY EXAMINATION

EED 108: ELECTRICAL ENGINEERING PRINCIPLES II

DATE: 31/8/2017

TIME: 2:00 – 4:00 PM

INSTRUCTIONS:

Attempt Question ONE And Any Other Two Questions

1. (a) A coil have an inductance of 0.1 H and an internal resistance of $10\ \Omega$ if it is connected across a 240 V, 50 Hz supply. Calculate the;
 - I. circuit impedance
 - II. supply current
 - III. phase angle
 - IV circuit power factor (11 marks)
- (b) With an aid of a labeled diagram explain the principle of a.c generation.(9 marks)
- (c) Derive the equation for resonance frequency in RLC series circuit. (10 marks)

2. (a) State three conditions of an RLC series circuit at resonance frequency. (3 marks)
- (b) A series circuit consists of a resistance of $47\ \Omega$, a coil of inductance 0.3H and a $1\mu\text{F}$ capacitor. The circuit is connected to a 50 V a.c supply. For this circuit, calculate the;
- I. Resonance frequency
 - II. Supply current
 - III. Voltage across each of the three components
 - IV. Active power absorbed by the circuit (12 marks)
- (c) Derive the formula for Q factor in RLC series circuit. (5 marks)
3. (a) Draw a sinusoidal waveform and indicate the following terms with reference to alternating systems.
- I. peak value
 - II. Instantaneous value
 - III. period (6 marks)
- (b) A simple a.c generator has a coil of 200 turns rotated at 3600 rpm in a magnetic field having a uniform density of 0.1 T , the axis of rotation is at right angles to the direction of the flux. If the mean area per turn is 80 cm^2 . Calculate the;
- I. frequency
 - II. maximum value of e.m.f generated
 - II. generated e.m.f when the coil is rotated through 30° from the position of zero e.m.f (6 marks)
- (c) An alternating voltage has an equation $V = 100 \sin 314t$. Determine for this voltage;
- I. r.m.s voltage
 - II. average voltage
 - III. frequency
 - IV. The instantaneous voltage when $t = 0.3\text{ sec}$ (8 marks)

- 4 (a) Draw a labeled waveform diagram for voltage and current in RC series circuit. (6 marks)
- (b) Describe three advantages of improving power factor in electrical engineering . (6 marks)
- (c) Derive the emf equation of a single phase AC generator (8 marks)
5. (a) Define the following with reference to sinusoidal waveforms;
- I RMS value
- II form factor (4 marks)
- (b) A voltage of 240V at 50Hz is applied across a circuit consisting of a pure resistor of 15Ω connected in series with a pure inductor of 0.03H;
- I determine the current flowing in the circuit
- II if the inductor is replaced with a capacitor of $100\mu\text{F}$, calculate the new value of current. (8 marks)
- (c) Explain each of the following terms wrt alternating current.
- I. Cycle
- II. phasor diagram
- III. Amplitude
- IV. Frequency (8 marks)