



MACHAKOS UNIVERSITY

University Examinations for 2019/2020 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

SECOND YEAR SECOND SEMESTER EXAMINATION FOR

CERTIFICATE IN ELECTRICAL ENGINEERING

EPC 213: PRINCIPLES IV

DATE: 27/10/2020

TIME: 8.30-10.30 AM

INSTRUCTIONS

1. You should have mathematical tables / Scientific Calculators for this Examination.
1. Take $\mu = 2\pi \times 10^{-7}$ H/M and $\epsilon = 8.85 \times 10^{-12}$ F/M
2. Answer Q1 and any other 2 questions
3. Neat work required

QUESTION ONE (30 MARKS)

- a) Explain the following terms
- i. Resistance
 - ii. Capacitance
 - iii. Inductance
 - iv. Reliability
 - v. Tolerance (10 marks)
- b) Two resistors 10Ω and 15Ω are connected in parallel across a battery of 8V which has four cells in series. Each cell has an E.M.F of 2 V and an internal resistance of 0.2Ω calculate.
- i. P.D across the battery terminals
 - ii. Current through each resistor
 - iii. Total power dissipated in the Resistors
 - iv. Energy dissipated in the resistors (20 marks)

QUESTION TWO (20 MARKS)

- a) Explain the following terms applied in capacitors
- Permittivity
 - Dielectric
 - Charge
- a) With an aid of wave forms show how a capacitor motor is used in a motor vehicle wind-screen (4 marks)
- b) A car battery is made up of cells show how charging takes place when acid is powered inside the plates (4 marks)
- c) A lamp uses 12 V, 150 W when connected to a supply voltage of 240v. Find the current consumed by the Lamp (3 marks)
- d) List ant THREE materials used as dielectrics in capacitors (3 marks)

QUESTION THREE (20 MARKS)

- a) Explain the following terms
- Peak value
 - R.M.S value
 - Average value
 - Frequency
 - Time period (10 marks)
- b) The instantaeous value of a sinusoidal current is given by the Expression $i = 141.4 \sin 314t$. Determine all the values given in Q 1(a) (10 marks)

QUESTION FOUR (20MARKS)

- a) Define electric flux density (3 marks)
- b) A capacitor consists of two paper plates each having an area of 0.01m^2 spaced 0.5 mm apart. The relative permittivity of the dielectric is 2.25. If a p.d of w40v is maintained across the plates , determine
- Capacitance in pico farads
 - Charge in micro- coulombs
 - Electric flux density
 - Electric field strength of the Dielectric (8 marks)
- c) Describe a two Transistor Amplifier (9 marks)

QUESTION FIVE (20MARKS)

- a) With an aid of labeled diagrams), explain a single-phase transformer (5 marks)
- b) Give an expression for the induced E.M.F (E) in a coil of N-turns (3 marks)
- c) A 5kva single phase Transformer has a turns ratio of 10.1 and is fed from a 2.5 kv supply. Neglecting losses determine
 - i. Full- load secondary current
 - ii. Minimum resistance which can be connected across the secondary winding to give full load KVA
 - iii. The primary current at full load KVA (12 marks)