



MACHAKOS UNIVERSITY

University Examinations for 2020/2021 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

FIRST YEAR FIRST TERM EXAMINATION FOR

DIPLOMA IN AUTOMOTIVE ENGINEERING

MECHANICAL ENGINEERING

2501/102/ 2502/102: ELECTRICAL PRINCIPLES

DATE: 7/6/2021

TIME: 2.30-5.30 PM

INSTRUCTIONS

- (i) *Answer all questions*
- (ii) *Neat work recommended*

1.
 - a) Explain the following materials
 - i. Insulators
 - ii. Semi- Conductors
 - iii. Conductors (9 marks)
 - b) with the aid of a diagram describe the following methods of biasing a PN junction diode
 - i. Forward bias
 - ii. Reverse Bias (6 marks)
 - c) Differentiate extrinsic and intrinsic semi- conductors (5 marks)
2.
 - a) Show the circuit symbols for light emitting diodes and a photo diode respectively (4 marks)
 - b) State an application of the devices in Q2(a) (2 marks)

- c) Draw a labeled block diagram of a regulated power supply and explain the functions of any **THREE** blocks (8 marks)
- d) A circuit consisting of **THREE** resistors 16Ω , 24Ω , 32Ω connected in parallel is connected in series to a fourth resistor R. The whole circuit is supplied with $50 V_{DC}$ and is found that the power dissipated by the 16Ω resistor is $48W$. Determine
- Value of the fourth resistor (R)
 - Total power consumed by the circuit (6 marks)
3. a) Describe the **THREE** classes of operation in amplifiers (12 marks)
- b) Differentiate n-channel JFET and p-channel JFET (2 marks)
- c) Show how currents flow in JFET Circuits (2 marks)
- d) State a reason why Field effect transistors are preferred to Bipolar Junction Transistors (2 marks)
- e) Explain a Dual JFET (2 marks)
4. a) Three resistors of resistances 2Ω , 4Ω and 6Ω are connected in parallel. This parallel combination is connected in series with a resistor of 1.5Ω a voltage of $10V$ is then applied across the circuit
- Draw the circuit
 - Determine the current through each resistor (10 marks)
- b) Distinguish between Transmissive and reflective liquid crystal displays (LCDs) (4 marks)
- c) i Define the following terms as applied in semi- conductors
- Doping
 - Donor
- ii State **THREE** advantages of Field effect transistors over Bipolar junction transistors (6 marks)
5. a) Briefly explain how frequencies are received into a cellular mobile phone (6 marks)
- b) Describe a cathode Ray Oscilloscope (CRO) (10 marks)
- c) State any **TWO** applications of a CRO (2 marks)
- d) Show how an alarm system works (2 marks)