



MACHAKOS UNIVERSITY

University Examinations for 2019/2020 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

FIRST YEAR THIRD SEMESTER EXAMINATION FOR

CERTIFICATE IN INFORMATION TECHNOLOGY AND COMMS ENGINEERING

1601/102: ELECTRONICS

DATE: 16/12/2020

TIME: 8:30 – 11:30 AM

INSTRUCTIONS TO CANDIDATES

Answer All Questions

1. a) Differentiate between the following electronic materials
i) Conductors
ii) Insulators.
iii) Semiconductors (3 marks)
b) From (a) above, identify three electronic materials for each. (7 marks)
c) With the aid of a diagram describe the operation of a Zener diode (7 marks)
d) Explain three important aspects of electronics industry today. (3 marks)
2. a) Perform the following functions (5 marks)
i) $1111001+110001$
ii) $111X101$
b) Using two's complement perform the following (5 marks)
i) $1010-1100$
ii) $1100-1110$
Minimize and draw the logic circuit and the truth table for the three input logic circuit.
i) $F=\overline{A}BCD+AB\overline{C}D+ABC\overline{D}$ (5 marks)
ii) $F=\overline{A}B+ \overline{A}BCD +ABC\overline{D}$ (5 marks)

3. a) Convert the following decimal numbers , i) 345 ,ii) 654, iii) 1000 to octal
(5 marks)
- b) Convert the following octal numbers i) 367 ii) 342 iii) 471 iv) 23 to hexadecimal
(5 marks)
- c) Convert
i) $(1001)_{BCD}$
ii) $(100100)_{BCD}$ to Excess-3. (5 marks)
- d) Convert the following numbers in binary to BCD
i) 111100
ii) 1101100 (5 marks)
4. a) With illustrations, explain the following in semiconductors
i) Majority charge carriers' (3 marks)
ii) Minority charge carriers (3 marks)
- b) Using well labeled diagrams, explain the formation of a P-N junction(10 marks)
- c) Explain the effect of adding an external voltage to the P-N junction (4 marks)
5. a) A system has a gain of 120 dB Without feedback. If the negative feedback fraction is $1/50^{\text{th}}$. Calculate the closed loop gain of the system in dB with the addition of negative feedback. (10 marks)
- b) If after sometime the loop gain of the system without negative feedback has fallen to 60dB and the feedback fraction has remained constant at $1/50^{\text{th}}$. Calculate the new closed loop gain value of the system. (10 marks)