

**THE TECHNICAL UNIVERSITY OF KENYA**

**FACULTY OF APPLIED SCIENCES AND TECHNOLOGY**

**SCHOOL COMPUTER SCIENCE & INFORMATION TECHNOLOGY**

END OF SEMESTER OCTOBER 2017 EXAMINATION SERIES

THIRD SEMESTER EXAMINATIONS 2016/2017

THIRD YEAR EXAMINATIONS FOR

BACHELOR OF COMMUNICATIONS AND NETWORK TECHNOLOGY

**ECCI 3203 ANALOG ELECTRONIC II**

**TIME: 2 Hours OCTOBER 2017**

**Instructions to candidates:**

This paper consists of FIVE Questions.

Answer Question ONE [30 Marks] and any other TWO Questions [20 Marks Each].

Write your university number on the answer sheet.

This paper consists of 3 printed pages

**Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.**

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**QUESTION ONE (30 MARKS) COMPULSORY**

1. Define the term differential amplifier hence enlist any three of its features (4Marks)
2. Explain briefly the basic operation of a differential amplifier (3Marks)
3. Highlight the four differential amplifier configuration. Which is the mostly commonly used and why? (4Marks)
4. Briefly discuss any four important characteristic of an ideal op-amp (4Marks)
5. Define the following parameter as applied to an op-amp (3Marks)
6. Input bias current
7. Input offset current
8. Slew rate
9. Explain the reason why differential amplifier is used an input stage of an op-amp (2Marks)
10. i. Describe how a comparator can be used as zero crossing detector (3Marks)
11. ii Outline various characteristic of a comparator (2Marks)
12. Explain the term precision rectifier hence describe how they differ from conventional rectifier

(3Marks)

1. Distinguish between monostable and a stable multivibrator (2Marks)

**QUESTION TWO(20 MARKs)**

1. Determine the input voltage of differential amplifier for the input of 30V and 24V. The differential gain of the amplifier is 500 and the value of the CMRR is (i) 100 and (ii)

(4Marks)

1. A dual differential amplifier has the following =2.2kΩ , = =50Ω, =4.7KΩ and + 10V and = -10V. Assume = 100, =0.72V and = 2.5kΩ. Determine the following (8Marks)
2. The Q point value for each transistor
3. Voltage gain
4. Input resistance and output resistance
5. The output voltage if =50mv (p-p) and =20mv (p-p)
6. What is the maximum output voltage without clipping?
7. Describe any two methods of improving CMRR (8Marks)

**QUESTION THREE(20 MARKS)**

1. Briefly explain the necessity and the function of different stage of op-amp with respect to its block schematic (8Marks)
2. Derive the slew rate equation expression for an op- amp hence describe the three methods used in improving the slew rate (12Marks)

**QUESTION FOUR (20 MARKS)**

1. Highlight the advantages of the three op- amp instrumentation amplifier hence using illustration explain its operation (12Marks)
2. Discuss the basic requirement of a good instrument amplifier (3Marks)
3. With an aid of circuit diagram, explain the operation of transistor log amplifier and state its limitation (5Marks)

**QUESTION FIVE (20Marks)**

1. Illustrate the operation of anti-log amplifier (6Marks)
2. Derive the expression for pulse width T of monostable multivibrator (4Marks)
3. With the help of block diagram and waveform explain the full wave precision rectifier circuit

(10Marks)