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**TECHNICAL UNIVERSITY OF KENYA**

**FACULTY OF APPLIED SCIENCES AND TECHNOLOGY**

**SCHOOL OF COMPUTING & INFORMATION TECHNOLOGY**

**END OF SEMESTER EXAMINATION SERIES**

**SECOND SEMESTER EXAMINATIONS 2019/2020**

**THIRD YEAR EXAMINATIONS FOR THE DEGREE OF**

**BACHELOR OF TECHNOLOGY IN COMMUNICATION AND COMPUTER NETWORKS**

**ECCI 3203 ANALOGUE ELECTRONIC –II**

**TIME: 2 Hours**

**Instructions to candidates:**

**This paper consists of FIVE Questions.**

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

**Write your college number on the answer sheet.**

**This paper consists of 2 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 -COMPULSORY (30Marks)**

1. Using illustration, explain four configuration of difference amplifier (4Marks)
2. Deduce an expression that describe the basic operation of a differential amplifier with its dc analysis (5Marks)
3. State four important characteristic of an ideal op-amp (2Marks)
4. Explain the following terms: (4Marks)
5. Open loop gain
6. Input bias current
7. Input impedance
8. Input bias vltage
9. Explain the reason why differential amplifier is used an input stage of an op-amp and what are the characteristic of ideal op-amp (4Marks)
10. i. Deduce an expression describing the voltage gain of non-inverting amplifier (4Marks)

ii Outline various characteristic of a comparator amplifier. (2Marks)

1. Explain the term precision rectifier hence explain its operation as halfwave rectifier. (4Marks)

**QUESTION TWO (20Mark)**

1. A dual differential amplifier has the following =3kΩ , = =200Ω, =4.5KΩ and + 12V and = -12V. Assume = 100, =0.72V and = 2.5kΩ. Determine the following (8Marks)
2. The operating point value
3. Differential gain
4. Input resistance and output resistance
5. Common mode gain
6. CMRR
7. The output voltage if =50mv (p-p) at 1KHzand =20mv (p-p) at 1KHz
8. With aid of circuit diagram, explain how constant current source improves CMRR of differential amplifier (6Marks)
9. With a aid of circuit diagram, explain any two compensation techniques used for frequency response in op-amp (6Marks)

**QUESTION THREE (20Marks)**

1. Derive an expression describing the voltage gain of integrator hence enlist its characteristic.

(12Marks)

1. Describe how an Op-amp can be used as comparator hence enlist its resilient characteristic

(8Marks)

**QUESTION FOUR (20Marks)**

1. Highlight the advantages of the three op- amp instrumentation amplifier hence using illustration explain its operation (8Marks)
2. Explain how log amplifier can be modelled as transistor temperature compensation and derived its output expression. (6Marks)
3. Design a Schmitt trigger having upper and lower threshold of 100m V. Input of this circuit is 1V peak to peak triangular wave of 100HZ. D raw the hysteresis loop (6Marks)

**QUESTION FIVE (20Marks)**

1. Explain the working principle of Astable- multivibrator using op-amp (10Marks)
2. With the help of block diagram and waveform explain the full wave precision rectifier circuit

(10Marks)