

KUCT
University Examinations 2011/2012

**THIRD YEAR FIRST SEMESTER EXAMINATION FOR THE DEGREE OF
BACHELOR OF SCIENCE IN ELECTRONIC & ELECTRONIC
ENGINEERING, TELECOMMUNICATION & INFORMATION
ENGINEERING AND MECHATRONIC ENGINEERING**

EEE2302/ETI 2302: ANALOGUE ELECTRONICS III

AUGUST 2011

Time: 2 Hours

INSTRUCTIONS

This paper contains five questions

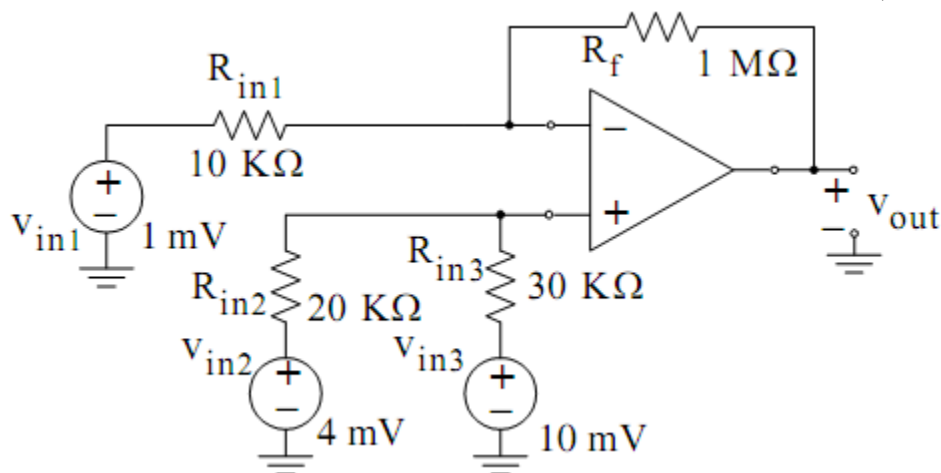
Answer **Question ONE** and any other **TWO** questions

QUESTION ONE [30 MARKS]

- a) Briefly explain the transfer characteristics of Ideal and practical Op-Amps. (8 marks)
- b) Explain the concept of feedback and its importance in Op-Amps. (8 marks)
- c) Derive the gain of a practical non inverting input Op-amp and draw its equivalent circuit showing the output as a dependent source. (14 marks)

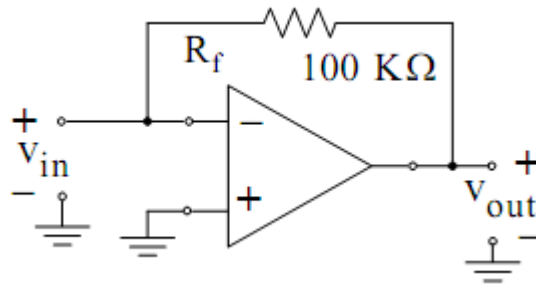
QUESTION TWO [20 MARKS]

- a) Compute the output voltage V_{out} for the amplifier circuit shown in Figure below. (12 marks)



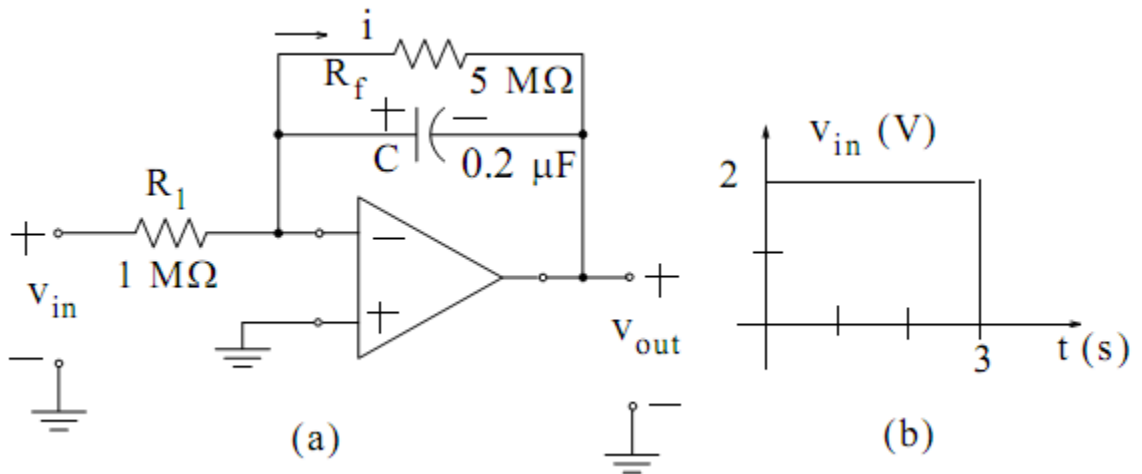
- b) Name any four fields of Op-Amp applications. (4 marks)

- c) Compute the input resistance R_{in} of the op amp circuit shown in Figure below. (4 marks)



QUESTION THREE [20 MARKS]

- a) Briefly describe a practical Op-Amp and explain any seven of its properties. (14 marks)
- b) The input voltage to the amplifier in Figure (a) is as shown in Figure (b) below. Find and sketch the output voltage for the interval $0 < t < 10s$ assuming that the initial condition is zero, that is, $V_0 = 0$ (6 marks)



QUESTION FOUR [20 MARKS]

- a) Derive the expression for a differentiator and explain its application. (10 marks)
- b) Illustrate how an Op-Amp can be used as an impedance matching device. (10 marks)

QUESTION FIVE [20 MARKS]

- a) Explain the operation of an ideal Op-Amp rectifier. (10 marks)
- b) Describe and numerically analyze a Wien-bridge oscillator. (10 marks)