Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
Manipal University

FOURTH SEMESTER B.TECH (E & C) DEGREE END SEMESTER EXAMINATION
JAN/MAY 2016
SUBJECT: IC SYSTEMS (ECE - 202)

TIME: 3 HOURS **MAX. MARKS: 50**

Instructions to candidates
- Answer **ANY FIVE** full questions.
- Missing data may be suitably assumed.

1A. Draw the circuit diagram of an emitter coupled differential amplifier. Derive the expressions for the following: i) Differential gain ii) Common mode gain and iii) CMRR

1B. Design a current mirror circuit to mirror a current of 5mA. Assume transistors used are identical and β of 50 and V_{BE} of 0.7V.

1C. Why is the emitter resistor and collector resistor replaced by a constant current in differential amplifier?

(5+3+2)

2A. Using single Op-amp, design a suitable circuit to solve the following equation.

$V_0 = 5V_1+V_2-V_3-2V_4$. (Do not invert the inputs)

2B. With necessary derivation and circuit explain the measurement of input and output impedance of an Op-amp.

2C. Find the gain V_0/V_I for the circuit shown in **Fig.2C**

(5+3+2)

3A. With the help of a circuit diagram and analysis explain the working of instrumentation amplifier using three OPAMPs. Mention any three features of the circuit.

3B. Design a third order Butterworth low pass filter for the cut off frequency of 3.3kHz and pass band gain of 10.

3C. Design a circuit using single OPAMP to obtain output $V_0 = 5V_1 – 3V_2$ where V_1 and V_2 are the inputs.

(5+3+2)

4A. With the help of a circuit diagram and input-output waveforms, explain the working of full wave precision rectifier. Also derive the expression for the output voltage.

4B. With the help of a circuit diagram and waveforms, explain the working of sample and hold circuit.

4C. Design an inverting Schmitt trigger for the following specifications:

V_{UT} =4V, V_{LT} = -4V
$+V_{CC} = -V_{EE}$ = 12 Volts

(5+3+2)

5A. Draw a circuit of dual slope integrating type ADC. Explain the process of conversion with suitable example. Derive the equations used.

5B. Draw a circuit of R-2R 2-bit DAC. Give the expression for the output voltage. List its advantages over Binary weighted resistor type DAC.

5C. Define the following terms with respect to ADC/DAC (i) Linearity (ii) Accuracy

(5+3+2)

6A. Analyse application of IC NE555 timer as a linear ramp generator.

6B. Draw the block diagram of PLL. Explain the functions of each block.

6C. Design a square wave generator using IC555 to obtain a frequency of 5 kHz, duty cycle of 30%.

(5+3+2)

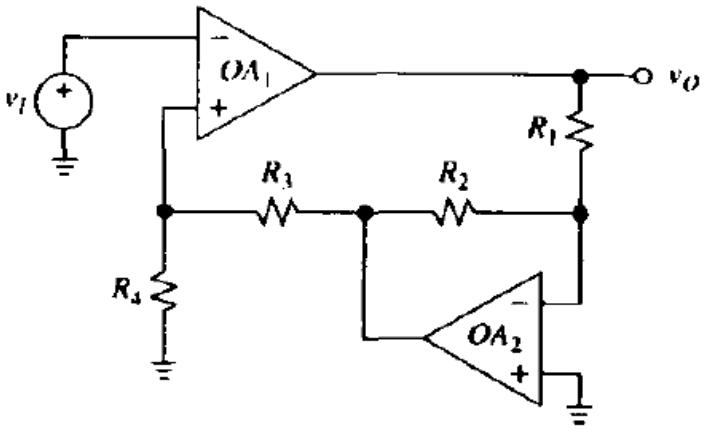

Fig. 2C