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S.E. (Electronics & TC / Electronics & Comm Engg) Semester- IV  
(Revised Course 2007-08) EXAMINATION Nov/Dec 2019  
Linear Integrated Circuits

[Duration : Three Hours]

[Total Marks : 100]

**Instructions:**

1. Answer any 5 questions with atleast one question from each module.
2. Assume suitable data, only if necessary.

Module 1

- Q1 a) For a DIUBO differential amplifier draw AC equivalent circuit. Hence derive expressions for (8 marks)  
differential voltage gain, input resistance and output resistance.
- Q1 b) With a neat diagram explain the equivalent circuit of an opamp. List the characteristics of an (6 marks)  
ideal op-amp.
- Q1 c) Draw the circuit diagram of an op-amp differentiator and explain its operation. (6 marks)
- Q2 a) Draw the circuit diagram of a summing amplifier in the inverting configuration with three (8 marks)  
inputs. Obtain an expression for the output voltage. How can the circuit act as a scaling  
amplifier and an averaging amplifier.
- Q2 b) Draw the circuit diagram and explain the basic op-amp integrator. Obtain the expression for (8 marks)  
output voltage. What are the practical problems of this circuit and how is it overcome.
- Q2 c) What is V and I converter? Draw the circuit diagram and write the expression for the output (4 marks)  
current.

Module 2

- Q3 a) Explain the working of an Op-Amp based Schmitt trigger. Explain what is meant by (6 marks)  
hysteresis with reference to this circuit.
- Q3 b) With the help of neat diagram and waveforms, explain the working of a ramp generator using (6 marks)  
op-amp.
- Q3 c) What is the criterion for oscillations? Show that for wein bridge oscillator  $f_0 = 1/2\pi RC$  (8 marks)
- Q4 a) Explain with suitable diagram how IC 723 works as low voltage regulator (7 marks)
- Q4 b) Draw the connection diagram and list the features of the following ICs (7 marks)  
i) IC LM 105  
ii) IC 78540

- Q4 c) Write short notes on:
- i) Dual tracking regulator (6 marks)
  - ii) Switching mode regulator

Module 3

- Q5 a) Explain the following terms with respect to data converters. (6 marks)
- i. Resolution
  - ii. Accuracy
  - iii. Quantization error
- Q5 b) Explain the working of ADC using successive approximation method. (7 marks)
- Q5 c) Draw and explain the functional block diagram of 0808 ADC (7 marks)
- Q6 a) Explain the following terms with reference to PLL (6 marks)
- i. Free running frequency
  - ii. Lock range
  - iii. Capture range
- Q6 b) Explain the following applications of PLL (12 marks)
- i) Frequency multiplier
  - ii) AM demodulation
  - iii) FM demodulation
- Q6 c) Find the error in reading of 20V, if the accuracy of 6 bit D/A converter is .02% (2 marks)

Module 4

- Q7 a) Explain the working of IC 555 timer as an astable multivibrator. Derive an expression for its duty cycle and frequency. (8 marks)
- Q7 b) With suitable diagram explain the use of IC 566 for generation square and triangular waves. (8 marks)
- Q7 c) Design IC 555 monostable multivibrator for pulse width of 100ms (4 marks)
- Q8 a) With the help of a functional block diagram, explain the working of IC 8038 function generator. (8 marks)
- Q8 b) Explain the working of IC XR 2206 (6 marks)
- Q8 c) Explain how IC 555 can be used as pulse width modulator. (6 marks)