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328551(28)

B. E. (Fifth Semester) Examination, April-May/Nov. Dec. 2020

(New Scheme)

(Et & T Engg. Branch)

LINEAR INTEGRATED CIRCUITS & APPLICATIONS

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

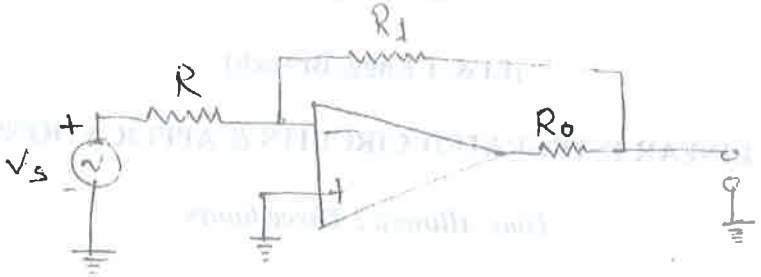
***Note** : Attempt all questions. Part (a) of each question is compulsory. Attempt any **two** parts from (b), (c) and (d) of each question. The figures is the right-hand margin indicate marks.*

1. (a) What do you mean by Input Offset voltage? Why there is a need to compensate for the same? 2

(b) Amplification factor in voltage shunt feedback amplifier is voltage gain. Justify with appropriate circuit diagram and mathematical analysis? 7

(c) For the circuit shown with $R_i = \infty$, show that

$$Y_{OF} = \frac{1}{R_0}\left[1 - A_v \cdot \frac{R_1}{R+R_1}\right] + \frac{1}{R+R_1} \quad 7$$



(d) For an op-amp the values of R_F and R_1 are 100 kΩ and 1 kΩ respectively. It is an inverting amplifier with intput offset voltage drift of 14 μ V/°C and input offset current drift of 0·5 nA/°C. The amplifier is nulled at 25°C. Evaluate the error voltage and the output at 45°C if input is TmVdc. 7

2. (a) Draw the circuit diagram of an ideal integrator op-amp and write expression for output. 2

(b) Design a Schmitt trigger circuit with the help of op-amp. Explain how it eliminates comparator chatter? 7

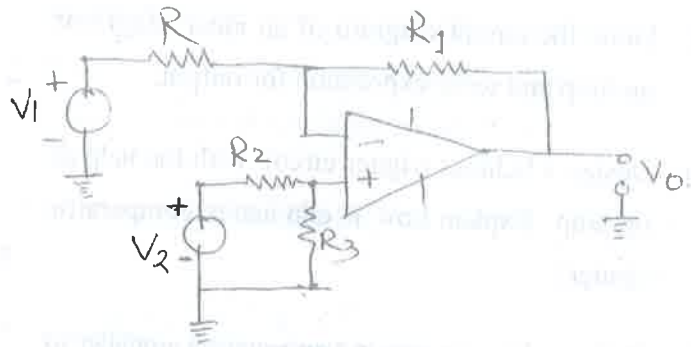
(c) Define a three op-amp instrumentation amplifier to vary gain from 1 to 10,000. 7

(d) The circuit shown is a differential amplifier using an ideal op-amp : 7

(i) Find the output voltage V_0.

(ii) Show that the output corresponding to $V_c = \frac{1}{2}(V_1 + V_2)$ is equal to zero if $\frac{R_1}{R} = \frac{R_3}{R_2}$ find output voltage in this case.

(iii) Find the common mode rejection ratio of amplifier if $\frac{R_1}{R} \neq \frac{R_3}{R_2}$



3. (a) Define resolution of DAC. 2

(b) What are important specification required for designing Analog to Digital converter. 7

(c) Draw circuit diagram of Dual slope ADC and explain how an analog signal is converted to Digital signal? 7

(d) Draw neat diagram for 4-bit R-2R ladder D/A converter and weighted resister type D/A converter. Compare them? 7

4. (a) Define safe operating area. 2

(b) Differentiate between series and shunt op-amp voltage regulator? 7

(c) Explain short circuit protection and foldback current limiting with characteristic for a voltage regulator. 7

(d) Draw the experimental setup block diagram and circuit diagram to convert 230V AC 50 Hz supply into 5 V DC supply using 78XX series IC. Also explain each and every stage in brief. 7

5. (a) What do you mean by lock range and capture range? 2

(b) Draw and explain the block diagram of PLL? 7

(c) Discuss application of PLL circuits in AM detection? 7

(d) Draw and explain the block diagram of PLL? 7