S.No. : 565

BEC 401

No. of Printed Pages : 05

Following Paper ID and Roll No. to be filled in your Answer Book.

PAPER ID : 3406 Roll No.

# B. Tech. Examination 2021-22

## (Even Semester)

## ADVANCE ANALOG CIRCUITS

*Time : Three Hours]* *[Maximum Marks : 100*

**Note :–** Attempt all questions.

1. Attempt any two parts of the following : 10×2=20

(a) What are operational amplifiers? Explain with proper diagram the equivalent circuit of an op-amp. Why op-amps are called so?

(b) Explain the principle of current mirror circuit. Why current mirror circuits are preferred for biasing purpose?

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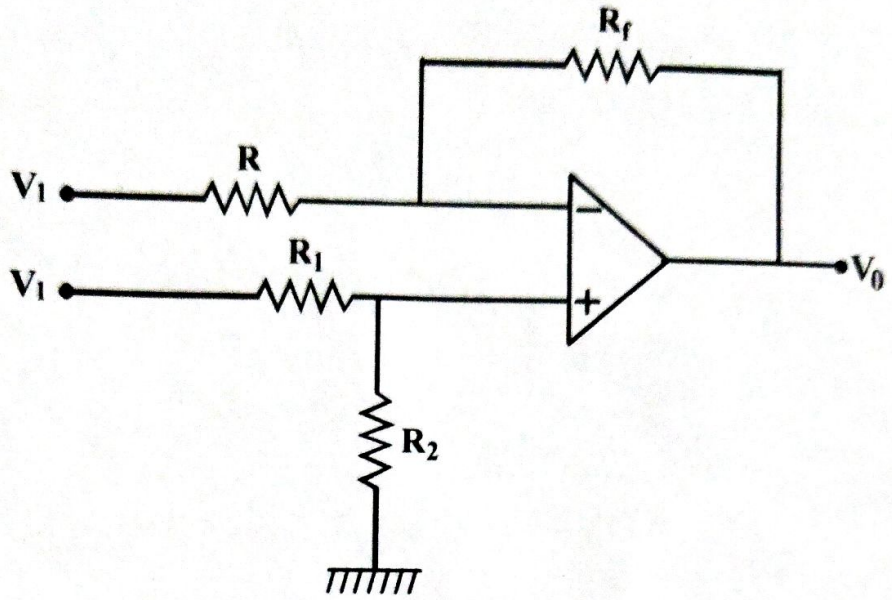
(c) Find the output of following circuit :




2. Attempt any two parts of the following : $10 \times 2 = 20$

(a) Draw the block diagram of a PLL and explain its working. What are the applications of PLL?

(b) Draw the circuit diagram of triangular wave form generator and explain its working. Also find the expression for the frequency of the triangular wave form generated.

(c) Explain astable multivibrator circuit using 555 IC. What will be the time period of the output waveform? Why this circuit is called as free running?

3. Attempt any two parts of the following : 10×2=20

(a) Explain the general feedback concept. What is the Barkhausen criteria? Enlist the characteristics of ideal op-amp.

(b) Explain the salient feature of the Piezoelectric crystal and hence describe the crystal oscillator.

(c) Design a sample and hold circuit using op-amp. Draw its performance characteristics curve and state its applications.

4. Attempt any four parts of the following : 5×4=20

(a) What do you mean by comparator? Draw the circuit diagram of zero crossing detector using op-amp and explain its working with proper input and output waveforms.

(b) Explain the circuit diagram and working of Schmmit trigger. Draw the output waveform if the sawtooth wave is given in the input of Schmmit trigger circuit.

(c) Explain the operation of peak detector circuit using op-amp. Write down the conditions for proper working of the peak detector.

(d) Draw the circuit diagram of differentiator using op-amp. Derive the output expression of an integrator. Draw the output waveform if input square wave is applied in the input of an integrator.

(e) Explain the working of 2 bit simultaneous A/D converter. How many comparators will be needed if digital output of n bit is required?

(f) Explain the following :

(i) CMRR

(ii) Slew rate

(iii) Input offset voltage

(iv) Concept of virtual ground

5. Attempt any four parts of the following : $5 \times 4 = 20$

(a) Why do we need precision rectifier? Draw the circuit and explain the operation of precision rectifier.

(b) Design a first order Butterworth low pass filter at a cutoff frequency of 1 KHz with a passband gain of 2. Draw the circuit diagram.

(c) Find the output voltage from a 5 bit R-2R ladder that has a digital input of 11010. Assume that 0 = 0V and 1 = +10. Also find the output voltages caused by each bit.

(d) Draw the diagram of counter type A/D converter and explain its operation. For an 8 bit converter driven by 500 kHz clock. Find the averation conversion time.

(e) For a 4 input resistive divider (0 = 0 V and 1 = +10V). Find :

(i) The full scale output voltage

(ii) The output voltage change due to LSB

(iii) Analog output voltage for a digital input of 1011

(f) What are the logarithmic amplifiers? How can the temperature dependence the output of basic log amplifier be avoided?

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