

S.No. : 253

BEC 3401

No. of Printed Pages : 05

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

PAPER ID : 33406

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B. Tech. Examination 2021-22

(Even Semester)

ADVANCE ANALOG CIRCUITS

Time : Three Hours]

[Maximum Marks : 60

Note :— Attempt all questions.

SECTION – A

1. Attempt all parts of the following : $8 \times 1 = 8$

- (a) Explain Barkhausen criterion.
- (b) State the difference between Colpitts and Clapp oscillator.
- (c) What is common mode rejection ratio in operational amplifier?
- (d) State the applications of log amplifier.
- (e) Draw the diagram of sample and hold circuit.

[P. T. O.

- (f) Calculate the ON time, OFF time, total time period, duty cycle and frequency of the output generated by an astable multivibrator using resistors $R_A = 5k$, $R_B = 5K$ and capacitor $C = 10 \mu f$.
- (g) For perfect lock what should be the phase relation between the incoming signal and VCO output signal?
- (h) What is differential amplifier?

SECTION – B

2. Attempt any two parts of the following : $2 \times 6 = 12$

- (a) What is an oscillator? How does it differ from an amplifier? What are the essential parts of an oscillator?
- (b) Explain the following properties of a practical opamp :
 - (i) Bandwidth
 - (ii) Slew rate
 - (iii) Input offset voltage
 - (iv) Input offset current

- (c) With the help of circuit diagram, internal functional diagram and relevant graphs, explain the working of a monostable multivibrator using IC 555.
- (d) With the help of block diagram explain the working of PLL. Explain any two applications of PLL.

SECTION – C

Note :- Attempt all questions. Attempt any two parts from each questions. $5 \times 8 = 40$

3. (a) Derive the equation for frequency of oscillation (f_0) of a Wein Bridge oscillator. Design a Wein Bridge oscillator for $f_0 = 1 \text{ KHz}$.
- (b) With the help of a circuit diagram, derive the equation for load current I_L , for a V to I converter with grounded load.
- (c) Sketch the block diagram of negative feedback arrangements. Derive an expression for gain with negative feedback.

[P. T. O.]

4. (a) Draw the circuit of a log amplifier with temperature compensation and derive the equation for its output voltage.
- (b) Derive the equation for the transfer function of a first order wide band pass filter. Design a first order wide bandpass filter with $f_H = 2 \text{ KHz}$ and $f_L = 500 \text{ Hz}$.
- (c) With the help of circuit diagram and relevant equations, explain the disadvantages of a differentiator. How are the disadvantages removed in a practical differentiator?
5. (a) Derive the equation for frequency of oscillation for a square-triangular waveform generator.
- (b) Design a Schmitt Trigger with hysteresis width, $V_H = 2\text{V}$. Assume $\pm V_{\text{sat}} = \pm 14\text{V}$.
- (c) What is sample and hold circuit? Point out where it is used? Why? Draw the diagram of sample and hold circuit.
6. (a) Draw and explain the working principle symmetrical emitter coupled differential amplifier and derive for CMRR.

- (b) What is the principle of operation of Wilson current mirror and its advantages? Deduce the expression for its output current.
- (c) Define slew rate. What causes slew rate? Derive the equation for maximum input frequency at which an undistorted signal is obtained in terms of slew rate?

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