

4E4120

Roll No. \_\_\_\_\_

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4E4120

B. Tech. IV Sem. (Main/Back) Exam., June/July-2014

Electronics Instrumentation & Control Engg.

4E11A Analog Electronics

Common with EE, EX, EC & EI

Time: 3 Hours

Maximum Marks: 80

Min. Passing Marks: 24

*Instructions to Candidates:-*

*Attempt any five questions, selecting one question from each unit. All Questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

*Units of quantities used/ calculated must be stated clearly.*

*Use of following supporting material is permitted during examination.*

1. \_\_\_\_\_

2. \_\_\_\_\_

### UNIT-I

Q.1. (a) Discuss with the help of a circuit example, the purpose of providing (i) negative feedback (ii) positive feedback in amplifiers. [8]

(b) A negative feedback of  $\beta = 0.002$  is applied to our amplifier of gain 1000. Calculate the change in overall gain of the feedback amplifier if the internal amplifier is subjected to a gain reduction of 15%. [8]

OR

Q.1. (a) Show that the negative feedback in amplifiers increases the bandwidth and improves signal to noise ratio. [8]

- (b) Draw and explain the current shunt feedback. [8]

## UNIT-II

- Q.2. (a) State the Barkhausen conditions for an electronic system to oscillate with feedback. [8]
- (b) Draw the circuit diagram of a colpitts oscillator and explain its working. [8]

### OR

- Q.2. (a) Draw the circuit diagram of an R-C phase shift oscillator and obtain an expression for its frequency of oscillation. [8]
- (b) Differentiate between the monostable and bistable multivibrator. [8]

## UNIT-III

- Q.3. (a) Explain how would you arrive at the hybrid -  $\pi$  equivalent circuit model in CE configuration at high frequencies. Explain the different parameters involved in the circuit. [8]
- (b) A CE – connected amplifier has  $C_{cb} = 5\text{pF}$ ,  $C_{be} = 12\text{pF}$ ,  $h_{fe} = 100$ ,  $h_{ie} = 1.5\text{ k}\Omega$ . Determine input capacitance to the circuit for a circuit collector resistance of  $12\Omega$ . [8]

### OR

- Q.3. (a) Draw the circuit of emitter follower at high frequencies and explain its working. [8]
- (b) A transistor with alpha cut-off frequency = 5 MHz and  $h_{fe}$  or  $\beta = 50$  is used in a CE configuration. When connected to an amplifier, it has stray capacitance of 80 pF at the output terminals. Determine the upper 3dB frequency when
- (i)  $R_L = 10\text{k}\Omega$  and (ii)  $R_L = 100\text{k}\Omega$  [8]

## UNIT-IV

- Q.4. (a) What is parallel resonances? What are its features? How is it different from series resonances? [8]
- (b) Explain the reasons for potential instability in tuned amplifiers. [8]

OR

- Q.4. (a) Draw the circuit diagram of a collector tuned amplifier and derive expressions for the voltage gain at the tuned frequency and bandwidth. [8]
- (b) Explain in brief the advantage of using double – tuned circuit over a single tuned circuit. Draw the circuit diagram of double tuned amplifier and its frequency response. [8]

## UNIT-V

- Q.5. (a) What is a power amplifier? In what respects does it differ from a voltage amplifier? Why heat sink are needed. [8]
- (b) Explain collector efficiency, distortion and power dissipation. [8]

OR

- Q.5. (a) Prove that for class B push-pull power amplifier the theoretical conversion efficiency is 78.5% and power dissipation capability of each transistor used shall be at least 0-2 times the maximum power output of the amplifier. [8]
- (b) Draw the circuit of class D and class E amplifier and their application. [8]

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