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B. E. (Fourth Semester) Examination,  
April-May, 2008

(EEE, EIT & T, IT Engg. Branch)

ANALOG ELECTRONIC CIRCUITS

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : Part (a) of every unit is compulsory. Attempt any two part of (b), (c) & (d). Answer should be brief and to the point. Unnecessary long answer may result in loss of marks.

Unit--

- 1. (a) State Miller's theorem. 2
- (b) Draw the low frequency hybrid model for CE

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configuration and derive an expression of voltage gain, current gain and output admittance for  $CE$  configuration.

(c) Draw the circuit diagram of Darlington pair & give comparison between  $CE$ ,  $CH$  &  $CC$  configurations.

(d) Draw the circuit diagram of common drain (CD)  $FET$  amplifier and show that its voltage gain is less than unity.

## Unit-II

2. (a) Define Noise Figure.

(b) Draw the circuit diagram of hybrid  $\pi$  model in  $CE$  configuration at high frequencies. Explain the different parameter involved in the circuit.

(c) A high frequency transistor is used in  $CE$  configuration has following  $\pi$  parameters:

$$r_{be} = 100 \Omega, r_{bc} = 1 \text{ k}\Omega, r_{ce} = 80 \text{ k}\Omega$$

$$C_{\mu} = 100 \text{ pF}, C_{c} = 3 \text{ pF and } g_m = 5 \text{ mA/V}$$

If the load resistance  $R_L$  is  $1 \text{ k}\Omega$

Calculate the value of upper 3-dB cut off frequency

$f_{HF}$

(d) A single stage high frequency  $CE$  amplifier shows a GBW (Gain Bandwidth Product) of  $5 \text{ MHz}$  when  $R_L$

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=  $500 \Omega$ . If the high frequency  $CE$  used the following parameters

$$h_{FE} = 100, g_m = 100 \text{ mA/V}$$

$$r_{be} = 100 \Omega, C_{\mu} = 1 \text{ pF and } f_{\beta} = 400 \text{ MHz}$$

Find,

(i) the value of source resistance that will give required bandwidth.

(ii) with this value of source resistance find the mid band gain.

## Unit-III

3. (a) What do you mean by frequency response of an Amplifier?

(b) Draw the circuit diagram of a two stage  $R-C$  coupled amplifier. Show how the magnitude and phase angle of its voltage gain vary with frequency?

(c) What are the requirements of a multistage amplifier? List the advantages & disadvantages of  $R-C$  coupled amplifier.

(d) Explain different types of distortion exist in amplifiers.

## Unit-IV

4. (a) An amplifier having an open-loop gain of  $10,000$  is connected in a negative feedback configuration with

- a feedback factor of 0.1, what is the closed loop gain of the amplifier? 2
- (b) Explain the concept of feedback in amplifier. List the important properties of negative feedback. 7
- (c) Draw the circuit diagram of voltage shunt feedback amplifier and derive an expression for input and output impedance. 7
- (d) Define bandwidth and stability related to feedback amplifier. Show that stability and bandwidth of an amplifier increases by employing negative feedback. 7

#### Unit-V

5. (a) Draw the equivalent circuit of crystal. 2
- (b) Draw the circuit diagram of phase shift oscillator and explain its working principle. 7
- (c) Draw the circuit diagram of Wien bridge oscillator. Derive an expression of frequency of oscillation. 7
- (d) Draw the basic circuit diagram of Hartley and Colpitts oscillator. Write expression for oscillation frequency and also mention the minimum gain required for sustained oscillation. 7