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**Code No: 114CV** **R13**

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**

**B.Tech II Year II Semester Examinations, May - 2017**

**ELECTRONIC CIRCUIT ANALYSIS**

**(Common to ECE, EIE)**

**Time: 3 Hours** **Max. Marks: 75**

**Note:** This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

**PART- A** **(25 Marks)**

| | | |
|---|---|---|
| 1.a) | Why is a CE amplifier widely used? List down its main limitations. | [2] |
| b) | What are the typical values of h-parameters of CE configuration? | [3] |
| c) | What is $f_T$ of a BJT? | [2] |
| d) | State Miller's theorem. | [3] |
| e) | Compare Frequency stability of crystal oscillator, RC and LC oscillators. | [2] |
| f) | What are the advantages of negative feedback? | [3] |
| g) | What is Class-A power amplifier? | [2] |
| h) | Classify power Amplifiers. | [3] |
| i) | What is effect of cascading on single tuned amplifier? | [2] |
| j) | What is stagger tuned amplifier? | [3] |

**PART-B** **(50 Marks)**

2.a) Draw the CE amplifier with un bypassed emitter resistance and derive expression for $R_i$ and $A_v$.

b) A transistor in CB circuit has the following set of 'h' parameters. $h_{ib}$ = 20, $h_{fb}$ = 0.98, $h_{rb} = 3\times10^{-4}$, $h_{ob} = 0.5\times10^{-6}$. Find the values if $R_i$, $R_o$, $A_i$ and $A_v$, if $R_s = 600\Omega$ and $R_L = 1.5\ k\Omega$. [5+5]

**OR**

3.a) Draw the Darlington circuit and derive the expressions for the overall current gain, voltage gain, input impedance and output impedance.

b) With the help of a neat circuit diagram describe the working of a cascade amplifier. [5+5]

4.a) Draw the hybrid-Π model of common emitter configuration and describe each component in the Π-model.

b) Derive the equation for voltage gain bandwidth product for CE amplifier. [5+5]

**OR**

5.a) Discuss the effect of different types of loads to a common source MOS amplifier.

b) Draw the CS FET amplifier equivalent circuit looking into the drain and find its gain and output impedance. [5+5]

6.a) Explain the principle of negative feedback in amplifiers. Show quantitatively the

effect of negative feedback on (i) Gain (ii) Stability (iii) Noise (iv) Distortion.

b) Show that current–series negative feedback increases the input impedance and increases the output impedance. [5+5]

**OR**

7. Starting from the description of a generalized Oscillator, derive the expression for frequency of Oscillation in a Colpitts Oscillator. [10]

8. Describe the operation of Class B Push pull amplifier and show how even harmonics are eliminated. [10]

**OR**

9. a) Derive the expression for maximum conversion efficiency for a simple series fed Class A power amplifier.

b) A push pull amplifier utilizes a transformer whose primary has a total of 160 turns and whose secondary has 40 turns. It must be capable of delivering 40W to an 8 Ω load under maximum power conditions. What is the minimum possible value of $V_{cc}$? [5+5]

10. Explain the operation of doubled-tuned amplifier with a neat circuit diagram and derive the equation for its gain bandwidth product. [10]

**OR**

11. What is the effect of cascading double tuned Amplifiers on Band width? Derive the related equations. [10]

**Code No: 133AB** **R16**

# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

**B.Tech II Year I Semester Examinations, November/December - 2018**

**ANALOG ELECTRONICS**

**(Common to ECE, ETM)**

**Time: 3 Hours** **Max. Marks: 75**

**Note:** This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

## PART- A

**(25 Marks)**

1.a) What are the types of distortion in amplifiers. [2]
b) Classify the amplifiers according to the method of coupling. [3]
c) Why the h parameter model is not suitable to analyze transistor at high frequencies. [2]
d) What are the elements in the Hybrid 'Π' model? [3]
e) What is cascode amplifier? [2]
f) State the advantages and disadvantages of the source follower. [3]
g) What is meant by positive and negative feedback? [2]
h) State the Barkhausen criterion for oscillations. [3]
i) What are the requirements of a tuned amplifier? [2]
j) Give the definition of power amplifier. Also list the types in it based on location of Q point. [3]

## PART-B

**(50 Marks)**

1. Draw the h-parameter equivalent circuit for a typical common emitter amplifier and derive expression for $A_i$, $A_v$, $R_i$ and $R_o$ [10]

**OR**

2. Draw simplified h parameter equivalent circuit and calculate $A_i$, $A_v$, $A_{vs}$, $R_i'$ and $R_o'$ for the cascode circuit shown in figure 1. Assume that transistors are identical with $h_{fe}$=10, $h_{ie}$=2 KΩ, $h_{re}$=$h_{oe}$=0. [10]

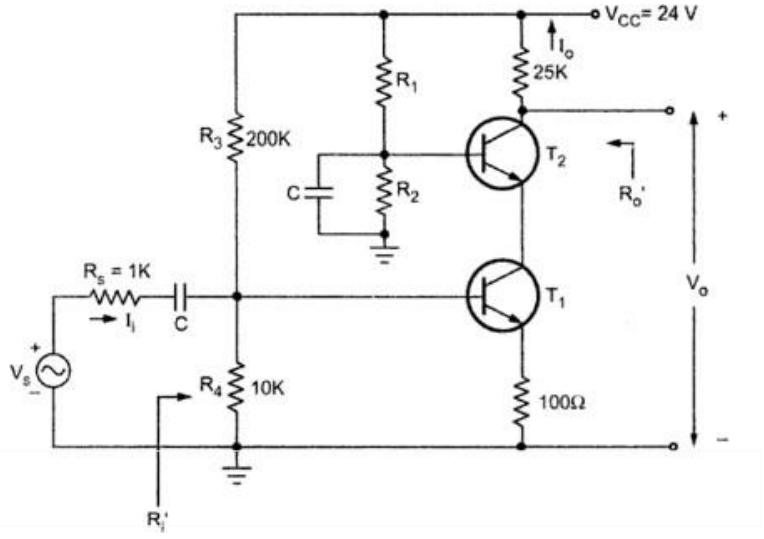



**Figure: 1**

3. a) Derive an expression for current gain with resistive load.

b) The hybrid- Π parameters of the transistor used in the circuit shown in figure 2 are $g_m$= 50 mA/V,$r_{b'e}$=1 KΩ, $r_{b'c}$=4 MΩ , $r_{ce}$=80 KΩ, $C_c$=3 pF, $C_e$=100 pF and $r_{bb'}$=100 Ω, find (i) upper 3 dB frequency of current gain (ii) the Magnitude of voltage gain at $A_{vs}=V_0/V_s$ at frequency of part (i) [5+5]

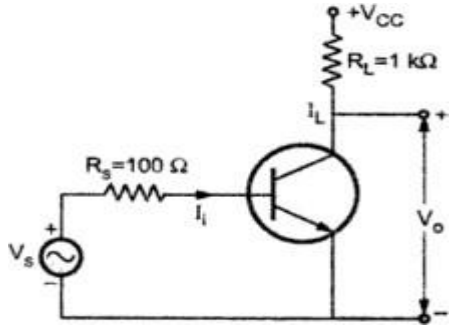



**Figure: 2**

**OR**

4. a) A single stage CE amplifier is measured to have a voltage gain bandwidth $f_H$ of 5 MHz with $R_L$=500 Ω. Assume $h_{fe}$=100, $g_m$=100 mA/V, $r_{bb'}$=100Ω, $C_C$=1pF and $f_T$=400 MHz. (i) find the value of source resistance that will give the required bandwidth. (ii) with the value of Rs found in (i), find the mid band voltage gain $V_0/V_s$.

b) In hybrid 'pi' model of a transistor at high frequencies, show that the $g_m$ is proportional to the collector current. [5+5]

5. a) Discuss the input and output characteristics of a folded cascade amplifier with NMOS input.

b) Derive expression for $A_v$ and $R_o$ for common gate amplifier. [5+5]

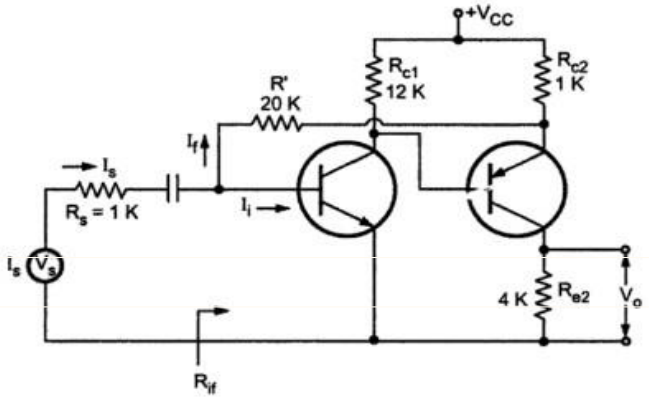
**OR**

6. a) Draw and explain the CS stage with diode connected load.

b) Discuss the MOSFET characteristics in depletion mode. [5+5]

7. a) Show that for a current series feedback amplifier the input and output resistances are increased by a factor if (1+Aβ) with feedback.

b) Identify the topology of feedback in the circuit of figure 3 giving Justification. Two transistors are identical with $h_{ie}$=2 K and $h_{fe}$=100. Calculate i)$R_{if}$ (ii) $A_{if}$ (iii)$A_{vf}$ [5+5]



**OR**

8. a) Explain the principle of operation of the wein bridge oscillator.
b) Mention the features and advantages of the crystal oscillator. [5+5]

9. a) Show that the transformer coupled class A amplifier maximum efficiency is 50%.
b) Compare the push-pull class B and complementary symmetry class B amplifier. [5+5]

**OR**

11.a) A tuned amplifier is required to have a voltage gain of 30 at 10.7 MHz with 200 KHz BW. An FET with $g_m$=5 mA/V and $r_d$=100 KΩ is available. Calculate the values of tank circuit elements.
b) Draw and explain the frequency response of tuned amplifier. [5+5]

**R16**

**Code No: 133AB**

# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

**B.Tech II Year I Semester Examinations, November/December - 2017**

**ANALOG ELECTRONICS**

**(Electronics and Communication Engineering)**

**Time: 3 Hours** **Max. Marks: 75**

**Note:** This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

## PART-A

**(25 Marks)**

1.a) What is Bias? What is the need for biasing? [2]
b) How does the input impedance increases due to darlington connection? [3]
c) Define Gain bandwidth product. [2]
d) Mention important characteristics of CE amplifier. [3]
e) Write the expression for basic current equation in MOSFET. [2]
f) Compare the AC circuit characteristics of the CS, CG and CD. [3]
g) List the four basic feedback topologies. [2]
h) State Barkhausen criterion for sustained oscillation. What will happen to the oscillation if the magnitude of the loop gain is greater than unity? [3]
i) Define Harmonic distortion and intermodulation distortion. [2]
j) What are the advantages of push pull amplifiers? [3]

## PART-B

**(50 Marks)**

2.a) In a single stage CB – amplifier circuit, $R_E$ = 20K, $R_c$ = 10K, $V_{EE}$ = -20V, $V_{cc}$ = 20V, $R_L$ = 10K. Find out $R_i$, $R_o$ , $A_i$, $A_v$ and power gain in dB.
b) Draw the circuit of two stage R-C coupled transistor amplifier and explain the working of it. [6+4]

**OR**

3.a) The h-parameters of CE-amplifier are $h_{ie}$ = 1100Ω, $h_{re}$ = 2.5 × $10^{-4}$ , $h_{fe}$ = 50, $h_{oe}$ 24 μA/V and $R_s$ = 1KΩ, $R_L$ = 10KΩ. Find out current and voltage gains with and without source resistance, input and output impedances.
b) Discuss briefly Cascode amplifier. [6+4]

4. Derive the expression for the CE short circuit current gain Ai as a function of frequency using Hybrid - π model. [10]

**OR**

5. Define $f_B$ and $f_T$ and derive the relation between $f_B$ and $f_T$ .

6.a) What is square law distortion? What is its effect in FET amplifiers?
b) Draw the small-signal high-frequency circuit of a common source amplifier and derive the expression for voltage gain. [4+6]

**OR**

7.a) Why self-bias is not suitable for depletion type and enhancement type MOSFET?

b) In a Drain-to-gate bias circuit $V_{CD}$ = 12V, $R_d$ = 2k,$R_f$ = 10m. Calculate $V_{GS}$, $I_D$ and $V_{DS}$ for $I_{D(ON)}$ = 6mA, $V_{GS(ON)}$ = 8V, $V_{GS(TH)}$=3V. [4+6]

8.a) Explain with the help of mathematical expressions, how the negative feedback in amplifiers increases amplifier bandwidth and reduces distortion in amplifiers.

b) In a transistorized Hartley oscillator the two inductances are 2mH and 20μH while the frequency is to be changed from 950KHZ to 2050KHZ. Calculate the range over which the capacitor is to be varied. [5+5]

**OR**

9.a) An amplifier circuit has a gain of 60 dB and an output impedance $Z_o$=10KΩ. It is required to modify its output impedance to 500Ω by applying negative feedback. Calculate the value of the feedback factor. Also find the percentage change in the overall gain, for 10% change in the gain of the internal amplifiers.

b) What are the factors that affect the frequency stability of an oscillator? How frequency stability can be improved in oscillators. [5+5]

10.a) Derive the equation for maximum efficiency of a class A transformer coupled amplifier.

b) Explain the principle of stagger tuning technique of transformer – coupled amplifier that is used to obtain band pass filter characteristic with pass band of 10 KHZ with all necessary diagrams for illustration. [5+5]

**OR**

11.a) Design a class B power amplifiers to deliver 25w to a load resistor $R_L$=8ohms, using transformer coupling. $V_m$=$V_{cc}$=25V. Assume necessary data.

b) Draw the circuit of double-tuned transformer-coupled amplifier. Discuss the nature of responses of the amplifier for different values of KQ=1; KQ>1 and KQ<1. [5+5]