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)

2. 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

3. 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]

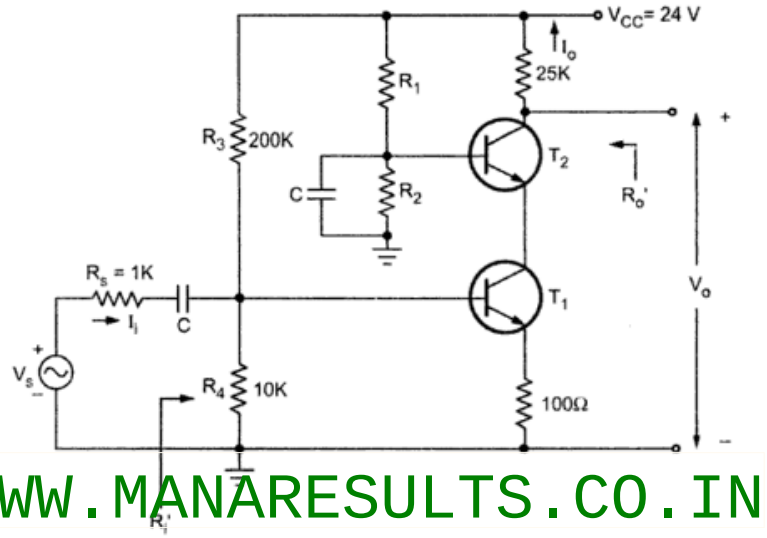

Figure: 1

4.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]

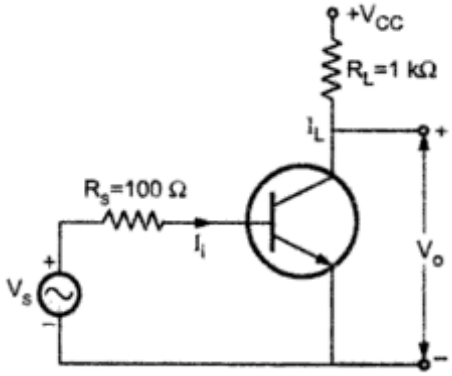

Figure: 2

OR

5.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]

6.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

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

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

8.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]

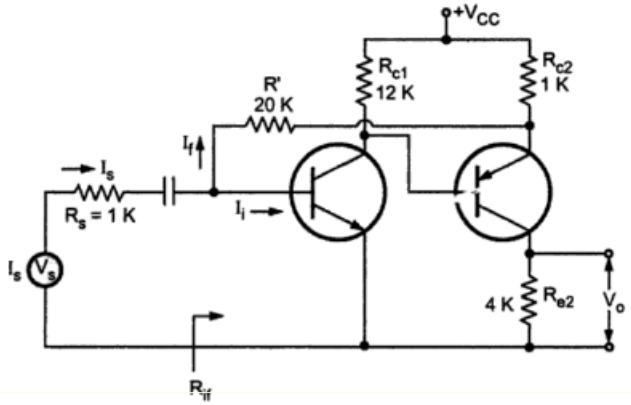

Figure: 3

OR

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

10.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]

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