

Code No: 133AB

R16

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, April/May - 2018

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) Write the characteristic of CE amplifier. [2]
- b) Discuss the need of Darlington pair circuit. [3]
- c) What is meant by gain bandwidth product? [2]
- d) Short circuit CE current gain of a transistor is 25 at a frequency of 2 MHz. if $f_\beta = 200$ kHz calculate f_T , h_{fe} and $|A_i|$ at frequency of 10 MHz and 100 MHz. [3]
- e) State the advantages and disadvantages of cascode stage. [2]
- f) What is the folded cascode amplifier? Discuss. [3]
- g) Classify the various negative feedback amplifiers. [2]
- h) For a phase shift oscillator, the feedback network uses $R = 6$ K Ω and $C = 1500$ pF. The transistorized amplifier used, has a collector resistance of 18 K Ω . Calculate the frequency of oscillation and minimum value of h_{fe} of the transistor. [3]
- i) What is the use of the heat sink in power amplifiers? [2]
- j) What is meant by loaded and unloaded Q. [3]

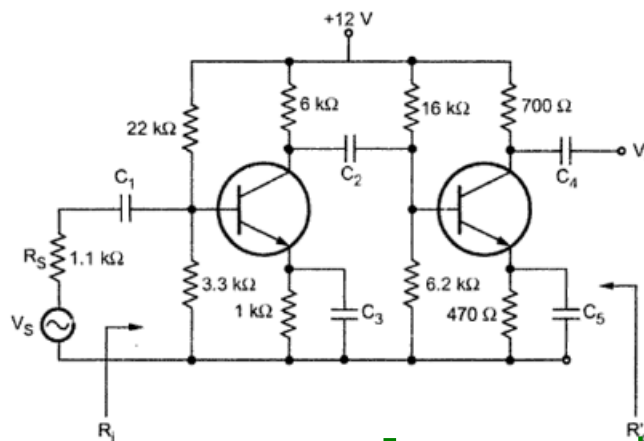
PART-B

(50 Marks)

- 2.a) Discuss the low frequency response of BJT amplifier and the effect of coupling and bypass capacitors.
- b) Explain the different coupling schemes used in amplifiers. [5+5]

OR

3. For a two stage amplifier shown in figure 1 calculate (a) A_v (b) A_{vs} , (c) R_i (d) R_o Neglect the effect of all capacitances, Assume that both the transistors are identical with following parameters. $h_{fe} = 50$, $h_{ie} = 1.1$ K Ω , $h_{re} = 2.5 \times 10^{-4}$ $h_{oe} = 24 \times 10^{-6}$ A/V. [10]



- 4.a) For a single stage CE amplifier whose hybrid Π parameters are given below. What value of R_s will give 3 dB frequency f_H which is half the value obtained with $R_s=0$. Hybrid ' Π ' parameters are: $g_m=50$ mA/V, $r_{bb'}=100\Omega$, $r_{b'e}=1$ K, $C_C=3$ pF, $C_e=100$ pF.
- b) A BJT has the following parameters measured at $I_c=1$ mA, $h_{ie}=3$ K Ω , $h_{fe}=100$, $f_T=4$ MHz, $C_C=2$ pF and $C_e=18$ pF. Find $r_{b'e}$, $r_{bb'}$, g_m and f_H for $R_L=1$ K Ω . [5+5]

OR

- 5.a) Prove that $h_{fe}=g_m r_{b'e}$.
- b) Derive the expression for CE short circuit current gain A_i as a function of frequency. [4+6]
- 6.a) Compare the performance of BJT and FET amplifiers.
- b) Draw and explain the CS amplifier with current source load. Derive an expression for A_v . [5+5]

OR

- 7.a) Draw and explain the MOS small signal model.
- b) Discuss the analysis of CD JFET amplifier. [5+5]
- 8.a) What are the advantages and disadvantages of negative amplifier in detail?
- b) For the given circuit shown in figure 2, calculate R_{mf} , A_{vf} and R_{if} . The transistors with parameters $h_{ie}=2$ K, $h_{fe}=100$. Neglect h_{oe} and h_{re} . [5+5]

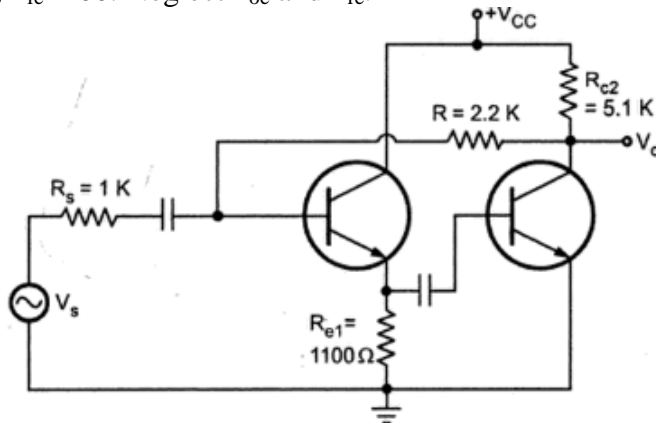


Figure: 2

OR

- 9.a) In a colpitt's oscillator, the values of the inductors and capacitors in the tank circuit are $L=40$ mH, $C_1=100$ pF, $C_2=500$ pF.
- i) Find the frequency of oscillation.
- ii) if the output voltage is 10 V, find the feedback voltage.
- iii) find the minimum gain, if the frequency is changed by changing ' L ' alone.
- iv) find the value of c_1 , for a gain of 10.
- v) also find the new frequency of oscillation.
- b) Compare the RC phase shift and wein bridge oscillators. [5+5]

- 10.a) Explain the principle of operation of class C amplifier.
b) Design a class B power amplifier to deliver 25 W to a load resistors $R_L=8\ \Omega$ using transformer coupling, $V_m=V_{CC}=25\text{ V}$. Assume reasonable data where ever necessary.

[5+5]

OR

- 11.a) An RF tuned voltage amplifier using FET with $r_d=100\text{ K}\Omega$ and $g_m=500\mu\text{s}$ has tuned circuit, consisting of $L=2.5\text{mH}$ and $C=200\text{ pF}$ as its load. At its resonant frequency, the circuit offers an equivalent shunt resistance of $100\text{ K}\Omega$. For the amplifier, determine the (i) the resonant gain (ii) the effective Q and (iii) the bandwidth.
b) Draw and explain the double tuned amplifier with the help of the frequency response.

[5+5]

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