R15

Code No: 124CV

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year II Semester Examinations, December - 2017

ELECTRONIC CIRCUIT ANALYSIS

(Common to ECE, EIE, 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) Draw a small signal low frequency model of a transistor. [2]
b) State dual of Miller's theorem and also write its applications. [3]
c) What is unity crossover frequency? [2]
d) Define a short circuit gain of a transistor in CE configuration at high frequencies. [3]
e) What is effect of negative feedback on amplifier gain? [2]
f) State Barkhausen criterion of oscillator. [3]
g) Why heat sinks are needed? [2]
h) What is mean by crossover distortion? [3]
i) Define Q factor of tuned amplifier. [2]
j) What are the limitations of Single tuned amplifier? [3]

PART-B

(50 Marks)

2.a) The h parameters of a transistor used in single stage amplifier circuit are h_{ic} = 1100, h_{rc} =1, h_{fc}==51 and h_{oc}=25μA. Determine the amplifier parameters for CC configuration when R_S=R_L=10K.
b) For any single-stage amplifier express input resistance in terms of current gain and h-parameters only. [5+5]

OR

3.a) Derive the bandwidth of a multistage amplifier, assuming that each stage has same upper and lower cut off frequencies.
b) For the two stage amplifier of the figure 1, calculate the input and output impedance, and the individual and overall voltage gains. Assume h_{fe} =50, h_{ie}=1.1kΩ, h_{re} = h_{oe}= 0. [5+5]

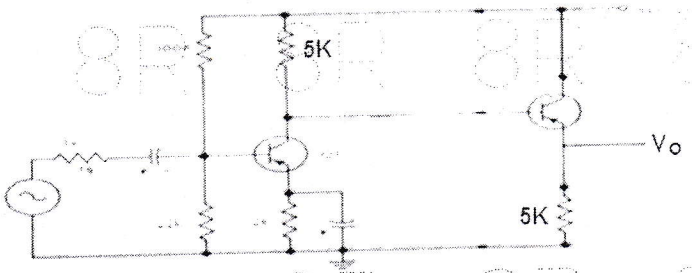

Figure: 1

4.a) A transistor biased at 20mA, 20V, it has the h-parameters at room temperature h_{ie} =500Ω, h_{fe}=100, h_{re} =10^{-4}, h_{oe} =4×10^{-5}℧. It has f_T =50MHz and C_C=3pF. Find all the values of hybrid π components.

b) The 3-db bandwidth of an amplifier extends from 20 Hz to 20 kHz. Find the frequency range over which the voltage gain differs by only 1 dB from the mid band value. [5+5]

OR

5.a) The amplifier of figure 2 uses a FET with I_{DSS} =3mA, V_p= -3V, r_d>>R_d. Find the quiescent drain current, quiescent drain to source voltage and A_V.

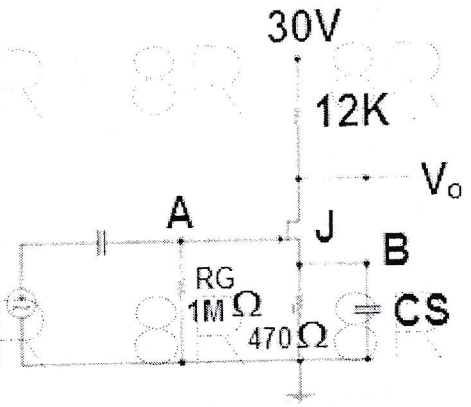

Figure: 2

b) Derive the equation for voltage gain of a CS FET amplifier. [5+5]

6.a) An amplifier has an open loop voltage gain of 1000 and delivers 10W output with 10% second harmonic distortion when the input is 10mV. Find the distortion of 60dB of negative feedback is applied.

b) Calculate A_{vf} = V_0/V_s, R_{if} and R_{of} for the circuit shown in figure 3 use typical h parameter values. Rs=R_C=10K and Re=1K. [5+5]

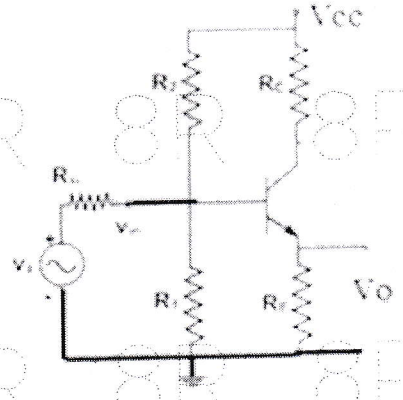

Figure: 3

OR

7.a) Derive an expression for frequency of oscillations of a RC phase shift oscillator using transistor.

b) A colpitts oscillator is designed with C_1 = 100pF and C_2=7500pF. Find the range of inductance values if the frequency of oscillations vary between 950 and 2050KHz. [5+5]

8.a) Classify amplifiers based on operating point selection. Compare them in terms of efficiency and distortion.

b) A transformer coupled class A large signal amplifier has maximum and minimum values of collector-to-emitter voltage of 25V and 2.5V. Determine its collector efficiency. [5+5]

OR

9.a) What is push pull configuration and how does this circuit reduce the harmonic distortion?

b) Given an ideal class B Push Pull amplifier whose collector supply voltage is V_{cc}, and $R_L' = n^2R_L$ are fixed as base current excitation is varied, show that the collector dissipation P_c is zero at no signal, rises as V_m increases and passes through a maximum at $V_m=2V_{cc}/\pi$. [5+5]

10. Draw the circuit diagram of double tuned amplifier and explain its working and derive the equation for bandwidth. [10]

OR

11.a) How to reduce the instability in tuned amplifier? Explain them with neat circuit diagram.

b) What are the advantages of stagger tuned amplifier? Draw its frequency response. [5+5]

---ooOoo---