

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)**

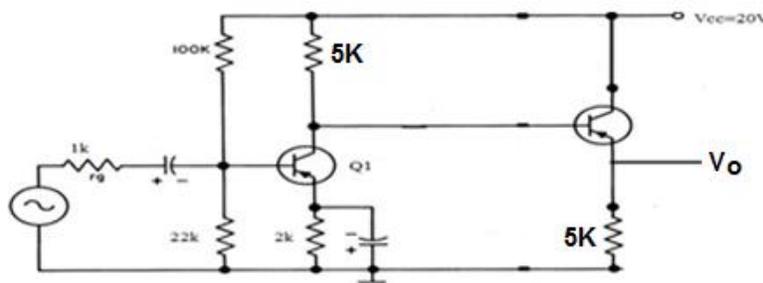
- 1.a) Draw a small signal low frequency model of a transistor. [2]
- b) State dual of Miller's theorem and also write its applications. [3]
- c) What is unity crossover frequency? [2]
- d) Define a short circuit gain of a transistor in CE configuration at high frequencies. [3]
- e) What is effect of 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  $h_{oc} = 25 \mu A$ . 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  $h_{fe} = 50$ ,  $h_{ie} = 1.1k\Omega$ ,  $h_{re} = h_{oc} = 0$ . [5+5]

[www.ManResults.co.in](http://www.ManResults.co.in)**Figure: 1**

- 4.a) A transistor biased at 20mA, 20V, it has the h-parameters at room temperature  $h_{ie} = 500\Omega$ ,  $h_{fe} = 100$ ,  $h_{re} = 10^{-4}$ ,  $h_{oe} = 4 \times 10^{-5}\text{S}$ . It has  $f_T = 50\text{MHz}$  and  $C_C = 3\text{pF}$ . Find all the values of hybrid  $\pi$  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  $I_{DSS} = 3\text{mA}$ ,  $V_p = -3\text{V}$ ,  $r_d \gg R_d$ . Find the quiescent drain current, quiescent drain to source voltage and  $A_V$ .

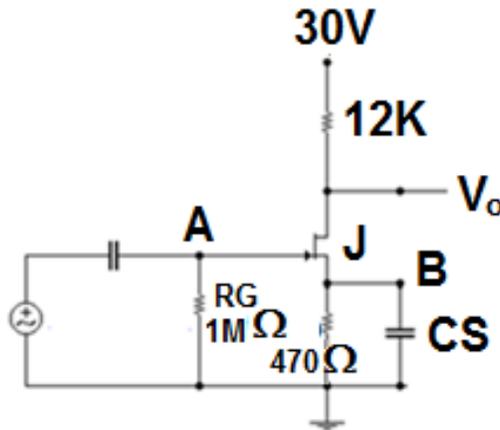


Figure: 2

- 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  $A_{vf} = V_o/V_s$ ,  $R_{if}$  and  $R_{of}$  for the circuit shown in figure 3 use typical h parameter values.  $R_s = R_C = 10\text{K}$  and  $R_e = 1\text{K}$ . [5+5]

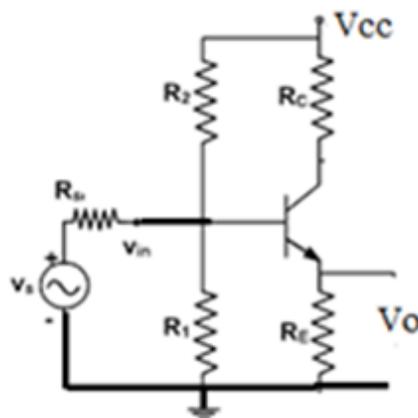


Figure: 3

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  $C_1 = 100\text{pF}$  and  $C_2 = 7500\text{pF}$ . 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  $R_L' = n^2 R_L$  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]

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