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 $h_{ie} = 1100\Omega$, $h_{re} = 2.5 \times 10^{-4}$, $h_{fe} = 50$, h_{oe} 24 $\mu A/V$ and $R_s = 1K\Omega$, $R_L = 10K\Omega$. 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_β and f_T and derive the relation between f_β and f_T. [10]

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]

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