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333454(28)

BE (4th Semester)
Examination, April - May, 2017

[New Scheme]

Analog Electronics Circuits

Time Allowed : 3 hours | *Maximum Marks* : 80
Minimum Pass Marks : 28

Note : (*i*) **All questions are compulsory. Part (*a*) of each question is compulsory. Attempt any two parts from (*b*), (*c*) and (*d*) of each question.**

(*ii*) **The figures in the right-hand margin indicate marks.**

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1. (*a*) Write down the value of n_{fe}, h_{re}, h_{ie} and h_{oe}. [2]

(*b*) Explain Miller theorem and Dual of Miller theorem. [7]

(*c*) Derive *H* parameter model for CB and CC configuration. [7]

(*d*) Prove that $y_o = h_o\left(\frac{R_s + R_{ioo}}{R_s + R_{io}}\right)$

where $R_{ioo} = R_i$ for $R_L = \infty$

and $R_{io} = R_i$ for $R_L = 0$ [7]

2. (*a*) Draw the circuit diagram and small signal equivalent circuit for an emitter follower stage at high frequencies. List its three most important characteristics. [2]

(*b*) What are hybrid π capacitance? Show that diffusion capacitance is proportional to emitter bias current I_E. [7]

(*c*) Derive the expression for transconductance g_m. How transconductance varies with temperature? [7]

(*d*) Give the following parameters measurement made at room temperature :

$I_C = 5$ mA

$V_{CE} = 10$V

$n_{fe} = 100$

$h_{ie} = 60\,\Omega$

$A_i = 10$ at 10 MHz

$C_i = 3$pF

Find I_B, F_T, C_e, $r_{b'e}$, and $r_{bb'}$ [7]

3. (*a*) Define Bandwidth of an amplifier. [2]

(*b*) Write a short note on Darlington configuration. [7]

(*c*) Prove that $F^*_H = F_H \sqrt{2^{1/n} - 1}$ in non-cascading stage. [7]

(*d*) Define noise. Explain shaft key noise and also explain noise figure. Find the noise bandwidth B_n for an amplifier for which

$$A_{V_0} = 1, F_L = 0\text{Hz and } |A_V(F)| = \frac{1}{\sqrt{1+\left(F/FH\right)^2}}$$

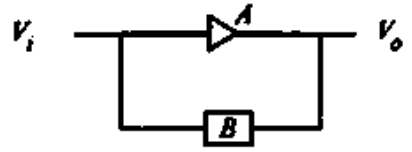
[7]

4. (*a*) Define positive and negative feedback. [2]

(*b*) Write down the comparison between voltage series, current series, voltage shunt and current shunt. [7]

(*c*) Calculate the value of R_{IF} and R_{OF} for current shunt and voltage shunt feedback circuit. [7]

(*d*) An amplifier open loop voltage gain A_v = 1000 + 100 is available. It is necessary to have an amplifier whose voltage gain varies by no more than ±.1 percent tilt.



(*i*) Find the reverse transmission factor β of the feedback n/w used.

(*ii*) Find the gain with feedback. [7]

5. (*a*) Define Barkhausen criteria. [2]

(*b*) Explain frequency stability of oscillator. [7]

(*c*) Explain Hartley oscillator. [7]

(*d*) Explain Wien Bridge oscillator. [7]