Code : 041504

B.Tech 5th Semester Exam., 2015

ANALOG ELECTRONICS

Time : 3 hours *Full Marks* : 70

Instructions :

(i) The marks are indicated in the right-hand margin.

(ii) There are ***NINE*** *questions in this paper.*

(iii) Attempt ***FIVE*** *questions in all.*

(iv) Question No. ***1*** *is compulsory.*

1. Answer any *seven* of the following : 2×7=14

(a) Explain the role of amplifiers. Write the name of five types of amplifier.

(b) Explain the importance of gain bandwidth product.

(c) Demonstrate the *h*-parameter.

(d) Illustrate the difference between β_p and β_n.

(e) Draw the circuit for Darlington pair.

(f) Illustrate the −3dB cut-off frequency.

(g) Define the difference between oscillator and amplifier.

(h) Demonstrate the use of Wien bridge oscillator.

(i) Determine the input impedance of OPAMP.

(j) Explain noise figure and signal-to-noise ratio.

2. *(a)* Derive the expression for collector current. Define the CB, CE and CC configurations. Establish the relation between α, β and γ. 7

(b) Define ideal voltage amplifier, current amplifier and ideal transconductance amplifier. 7

3. *(a)* Explain Darlington pair in detail with suitable circuit diagram and mathematical expressions. 7

(b) Define the low-pass and high-pass filter, and calculate its cut-off frequencies and magnitude. 7

4. *(a)* Demonstrate the equivalent circuit for an emitter follower stage at high frequencies. 7

(b) A three-stage system voltage gain is 180 dB. The second-stage has twice of first-stage and third has 0·3 times of first. Calculate the voltage gain of the system in each stage. 7

5. *(a)* Design the Wien bridge oscillator and derive the mathematical expression for calculation of the frequencies. 7

(b) Explain the transmission path loss. Derive the Friis transmission formula and define all the terms. 7

6. *(a)* Define Hartley and Colpitts oscillator. Design T- and star-network, and calculate the input and output impedance. 7

(b) In Colpitts oscillator the value of C_1 and C_2 are in the ratio of 20 μF/2 μF. Calculate the value of inductance for oscillation frequency 100 kHz. 7

7. *(a)* Explain the noise. Explain the difference between thermal noise and flicker noise. 7

(b) Define tuned amplifier with suitable diagram. 7

8. *(a)* Demonstrate class *AB* amplifier in detail with suitable mathematical expression and diagram. 7

(b) A transformer-coupled class *A* amplifier drives a load of 18 Ω through 4 : 1 transformer. With V_{CC} = 25 V, the circuit derives 3 watt to the load. The transformer efficiency is 85%. Find power loss of the primary transformer and r.m.s. value of load current. 7

9. Write short notes on any *two* of the following : 7×2=14

(a) High-frequency amplifier

(b) Flicker noise

(c) *R-C* phase shift oscillator

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