(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 0321 Roll No. | | | | | | | | | | |

B.Tech.

(SEMESTER-IV) THEORY EXAMINATION, 2012-13

ELECTRONIC CIRCUITS

Time : 3 Hours] *[Total Marks : 100*

Note : Attempt questions from **all** sections. Assume missing data if any.

Section – A

1. Attempt **all** the parts : **10 × 2 = 20**

(a) Why the power amplifiers are called large signal amplifiers ?

(b) What are the factors affecting the bandwidth of the RC coupled amplifier ?

(c) Explain merits of negative feedback.

(d) Explain the condition for oscillation.

(e) Explain bias stabilization.

(f) Write the advantages of DA with active-load.

(g) Explain full power bandwidth in operational amplifier.

(h) Define trans-conductance and trans-resistance amplifier.

(i) Draw the PMOS high-frequency model.

(j) Compare the properties of an BJT-amplifier and MOS-amplifier.

Section – B

2. Attempt any **three** parts : **3 × 10 = 30**

(a) Sketch the circuit of Wien bridge oscillator. What determine the frequency of oscillation ? Will oscillation take place if bridge is balanced ? Explain.

(b) Explain base-width modulation with aid of plots of potential and minority concentration throughout the base region. Explain qualitatively the three consequences of base width modulation.

(c) (i) Explain the frequency response of CS-amplifier.

(ii) Why biasing is needed at all ? Draw the circuit diagram of potential bias and explain its working with mathematical expression.

(d) (i) Prove that, thermal runway cannot take place if the quiescent point is located at $V_{ce} < 1/2\ V_{cc}$.

(ii) Obtain the output resistance of a CE amplifier taking into the consideration of load and source resistance.

(e) (i) Obtain small signal model of a FET. Compare FET Model with the h-Parameter model of the BJT.

(ii) Can a depletion type MOSFET operate in enhancement mode ? If yes, why and how, and if no, why ?

Section – C

Answer the following questions : **5 × 10 = 50**

3. (i) Why is potential divider biasing preferred over all other biasing circuits ?

(ii) Explain the effect of finite open-loop gain and bandwidth on circuit performance.

OR

It is desired to have a high-gain amplifier with high input impedance and low output impedance. If a cascade of four stages is used, what configuration should be used for each stage ? Explain.

4. List the three source of instability of collector current and define three stability factors. How does the designer minimize the percentage variation in I_c due to variation in I_{co}, V_{BE}.

OR

Nonlinear distortion greater for a sinusoidal-input-base current or for sinusoidal-input base voltage. Explain with the aid of the input and output transistor characteristics.

5. Discuss the effect of negative feedback on voltage gain, stability, distortion, bandwidth of an amplifier.

OR

Explain why :

(i) A negative feedback is always employed in high gain amplifiers.

(ii) Emitter-follower circuit is also called common-collector amplifier circuit.

(iii) A common emitter circuit without by-pass capacitor is called a negative current feedback circuits.

6. Draw the structures of enhancement mode and depletion mode MOSFET . Show the formation of channel in these two modes and explain their behaviour.

OR

Draw a self bias circuit, explain qualitatively why such a circuit is an improvement on fixed bias circuit, as far as stability is concerned.

7. State the three fundamental assumptions which are made in order that the expression $A_f = \frac{A}{1 + A\beta}$ be satisfied correctly. Also explain the working of OPAMP-RC oscillator.

OR

What are the different parameters of amplifier that are modified with the series-series feedback ? Show the effect of each parameter by deriving its expression.