K 1102

B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2004.

Third Semester

Electronics and Communication Engineering

EC 234 — ELECTRONIC CIRCUITS — I

Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is the advantage of using emitter resistance in the context of biasing?

2. Draw a circuit that minimizes change in V_{BE} due to temperature variation.

3. Draw the small signal model of a Junction Field Effect Transistor and write down the equation which helps in deriving the equivalent circuit.

4. Mention two advantages which are specific to Darlington connection.

5. What is the drawback of class B amplifier? How is this minimized?

6. Define thermal resistance in the context of power amplifier.

7. Draw the high frequency equivalent circuit of a BJT.

8. Draw a basic optocoupler circuit.

9. What are the advantages of bridge rectifier over its center tapped counter part?

10. Define Line regulation and Load regulation.

PART B — (5 × 16 = 80 marks)

11. (i) Prove that self bias is better bias compared to collector to base bias. (8)

(ii) Design a fixed bias circuit to have operating point of (10 V, 3 mA); The circuit is supplied with 20 V and uses a silicon transistor of h_{fe} = 250. (8)

12. (a) Derive the expression for the voltage gain of

(i) Common source amplifier (8)

(ii) Common drain amplifier configurations, (8)

under small signal low frequency conditions.

Or

(b) Draw the frequency response curve of a single stage RC coupled amplifier and explain the reasons for its different slopes. What is the curve of an ideal response? (16)

13. (a) Prove that the maximum efficiency of class A transformer coupled power amplifier is 50% and that of class B type is 78.5%. (16)

Or

(b) (i) Draw a quasi complementary symmetry power amplifier and explain its merits. (8)

(ii) Draw the schematic of a MOSFET power amplifier and explain how does the heavy current flow is accounted for. (8)

14. (a) (i) What is the effect of $C_{b,c}$ on the input circuit of a BJT amplifier at High frequencies? (10)

(ii) Find the equivalent Miller capacitance if the $C_{b,c}$ is 10 pF, CB current gain is 0.99, the small signal resistance is 26 ohms and the load resistor is 10 kohm. (6)

Or

(b) (i) How does base compensation help in broadening the bandwidth of an amplifier? Explain with derivation. (10)

(ii) Find the D factor of such a circuit if CB current gain is 0.99, f_T is 100 MHz, and $C_{b,c}$ is 5 pF. The load resistor is 1 kohm. (6)

(a) (i) A system needs to be powered with a 9 V DC source of maximum load current 100 mA. Design a circuit to supply power with the available domestic AC line. Assume any data required, but reasonably. Provide short circuit protection. (10)

(ii) Design a SIMPLE zener regulator to give a DC fixed output of 5 V upto a load current of 50 mA. Draw its line and load regulation curves. (6)

Or

(b) Draw the block diagram of SMPS and explain its operation. What are its advantages? (16)
