S 344

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2005.

Third Semester

Electronics and Communication Engineering

EC 234 — ELECTRONIC CIRCUITS — I

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Draw two different circuits that bias a JFET amplifier.

2. Define stability factor of an amplifier. What is its ideal value?

3. Write the equation from which the small signal low frequency equivalent circuit of JFET is formed.

4. What are the features of cascode amplifier?

5. Show the input and output waveforms of class A, B and AB power amplifiers.

6. Draw a quasi complementary symmetry power amplifier.

7. If the rise time of a BJT is 35 nano seconds, what is the bandwidth that can be obtained using this BJT?

8. Draw the Eber Moll model of a BJT.

9. Compare the transformer utility factors of half wave rectifier and bridge rectifier and reason out the better one.

10. Why is a simple capacitor filter not suitable for heavy loads?

PART B — (5 × 16 = 80 marks)

11. (i) Prove that collector to base bias is better than fixed bias. (8)

(ii) Design a collector to base bias circuit to have operating point of (10 V, 4 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 collector amplifier (8)

(ii) Common Drain amplifier configurations, under small signal low frequency conditions. (8)

Or

(b) Draw a two stage RC coupled amplifier of identical stages and derive the expressions for its overall voltage gain and current gain, if the individual stage gains are A and A, respectively. Assume ideal source. (16)

13. (a) Draw a transformer coupled class B amplifier using PNP transistors and explain its operation, with the waveforms at various terminals. What is the modification done to alter it to function as a class AB amplifier? What is the need for such a modification? (16)

Or

(b) Draw a complementary symmetry power amplifier using BJTs and a dual power supply. Explain its operation. How can it be converted to work with a single supply? Compare the circuits in terms of component counts. (16)

14. (a) Derive expression for the short circuit current gain of common emitter amplifier at HF. Define alpha cutoff frequency, beta cutoff frequency and transition frequency and derive their values interms of the circuit parameters. (16)

Or

(b) (i) Draw a video amplifier circuit diagram and explain the various stages used. (10)

(ii) Draw four types of optocoupler circuits. (6)

15. (a) (i) A system needs to be powered with a 12 V DC source of maximum load current 150 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 6.2 V upto a load current of 50 mA for a unregulated DC input of 10 – 12 V. (6)

Or

(b) What is a switched mode power supply? Why it is named so? Discuss its merits and demerits by way of explaining a typical circuit. (16)
