Reg. No. : | | | | | | | | | | | |

T 3200

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2008.

Second Semester

Mechatronics Engineering

EC 1161 — ELECTRONIC DEVICES AND CIRCUITS

(Regulation 2004)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State superposition theorem.

2. Draw the z-parameter model of a two-port network.

3. Give the energy band diagram of a conductor, an insulator, and a semiconductor.

4. Define pinch-off voltage of a JFET.

5. Draw the circuit of a biased positive clipper and give its input and output waveforms.

6. Distinguish between line regulation and load regulation.

7. Mention the four types of feedback connections.

8. Calculate the oscillator frequency for an FET Hartley oscillator with C = 250 pF, L_1 = 1.5 mH, L_2 = 1.5 mH and M = 0.5 mH.

9. Mention the ideal characteristics of an operational amplifier.

10. What is the difference between monostable and astable multivibrators?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Obtain the Thevenin's and Norton's equivalent circuit at the terminals ab for the network shown in Fig. 1. (10)

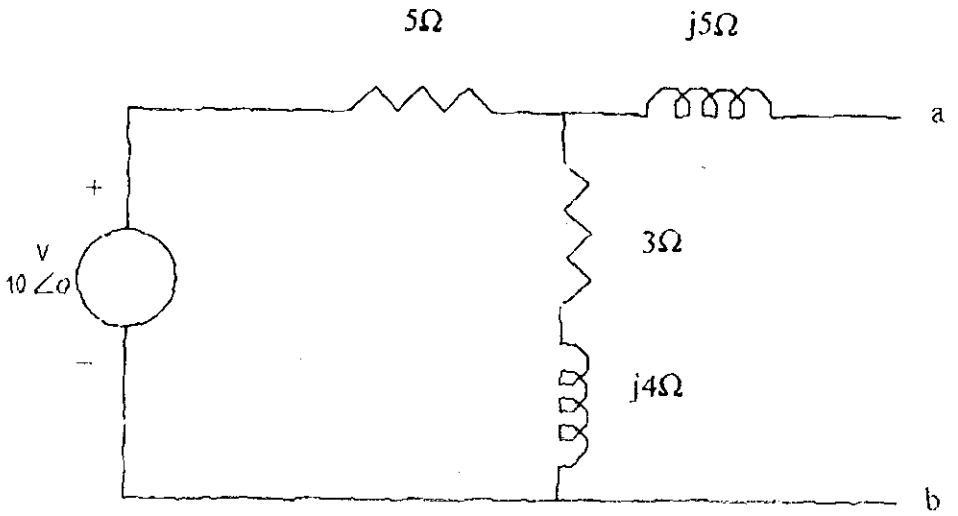

Fig. 1

(ii) Reduce the network shown in Fig. 2, into a single resistance between A and B by suitable star-delta transformation. (6)

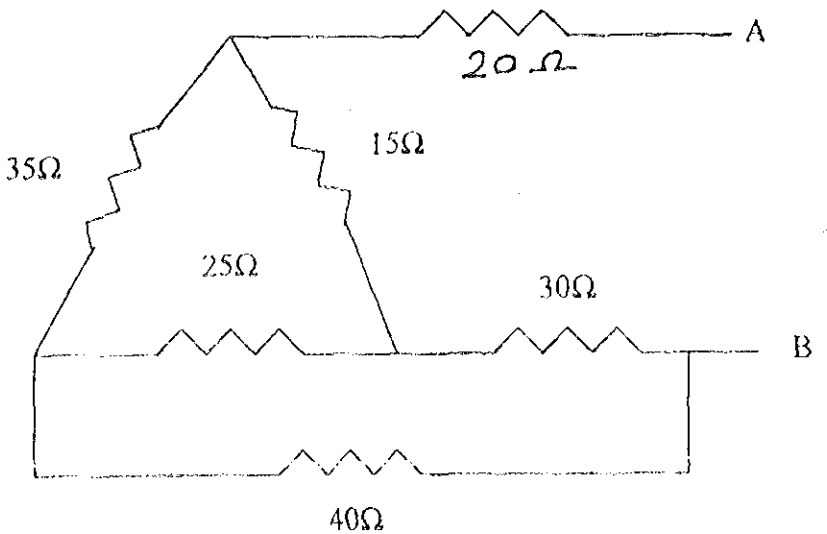

Fig. 2

Or

(b) (i) Show that when two, two-port networks are connected in parallel, Y-parameters are convenient to work with. Obtain the Y- parameters of the parallel connected network. (6)

(ii) Obtain the ABCD parameters and h-parameters of the network shown in Fig. 3. (10)

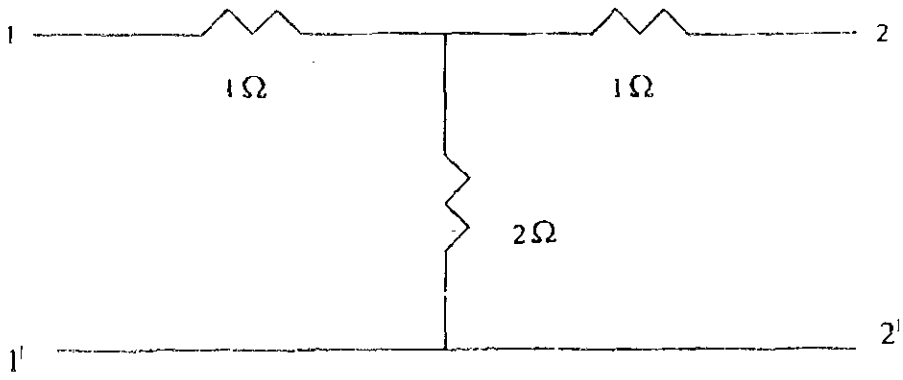

Fig. 3

12. (a) (i) Draw the structure of a PNP transistor in CB configuration showing various current components. Explain early effect and its influence on the transistor characteristics. (8)

(ii) Explain collector-to-base type of biasing of a transistor amplifier and mention its advantages and disadvantages over other types of biasing. (8)

Or

(b) (i) Write the diode equation. With the help of this equation, explain the VI characteristics of a pn junction diode. (8)

(ii) Describe the construction, principle of operation and characteristics of an N-channel depletion type of MOSFET. (8)

13. (a) (i) Draw and explain the circuit of a full-wave rectifier with suitable waveforms. (8)

(ii) Explain the working of a voltage multiplier circuit. (8)

Or

(b) (i) Explain the operation of a negative clamper. (8)

(ii) Describe the working of a shunt voltage regulator. (8)

14. (a) (i) Obtain the small signal equivalent circuit of a single-stage CE transistor amplifier applicable at low frequencies. (8)

(ii) Explain the operation of a Colpitt's oscillator and give its frequency of oscillation. (8)

Or

(b) (i) Show that for a current series feedback amplifier the input impedance and output impedance increases by the factor $(1 + A\beta)$ with negative feedback. (8)

(ii) An amplifier with voltage gain of 60 dB uses 1/20 of its output in negative feedback. Calculate the gain with feedback in dB. (8)

15. (a) (i) Show how an op-amp can be used as a comparator and summer. (8)

(ii) Draw the circuit of a Schmitt trigger and explain its operation with necessary waveforms. (8)

Or

(b) (i) Explain the working of an RC phase shift oscillator with a neat sketch. (8)

(ii) Describe the working of a monostable multivibrator. (8)
