Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐☐

S 4031

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2007.

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 Kirchoff's voltage and current law.

2. Express Z parameters in terms of Y parameters.

3. What is reverse saturation current in a diode?

4. For a transistor, the thermal resistance is 8° C/W for the ambient temperature T_A of 27°C. If the transistor dissipates 3 W of power, calculate the junction temperature, T_j.

5. What is the need for regulated power supply?

6. What is a voltage multiplier?

7. What are audio and radio oscillators? Distinguish them.

8. Give the hybrid model of a common emitter transistor.

9. List the ideal characteristics of op-amp.
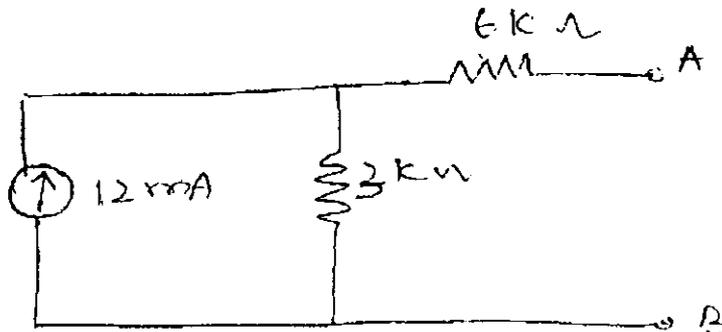
10. What is a window detector?

11. (a) Thevenise the circuit shown below. Also determine the current through a load resistance R$_L$, if its value is 4 kΩ. (16)
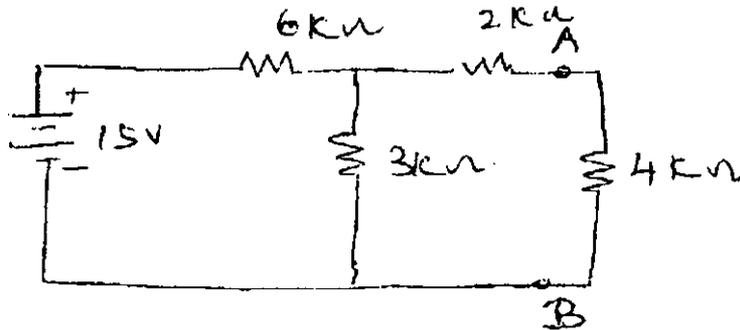
Or

(b) (i) Find the Norton's equivalent circuit for the network shown below. (11)

(ii) State superposition theorem. (5)

12. (a) Describe the construction and explain the operation of depletion, enhancement IGFET. Also draw the static characteristics.

Or

(b) Draw the circuit of a CE transistor amplifier with self bias and explain its operation.

13. (a) Explain with circuit diagram, the operation of a Zener shunt regulator.

Or

(b) Briefly explain the behaviour of PN junction diode in forward bias and reverse bias mode and draw its volt-ampere characteristics.

14. (a) Find the values of voltage gain, current gain, input resistance and power gain for a common emitter transistor amplifier, with $R_L = 1600\,\Omega$ and $R_S = 1000\,\Omega$. The transistor has the following set of h parameters ; $h_{ie} = 1100\Omega$ $h_{re} = 2.5 \times 10^{-4}$; $h_{fe} = 100$; $h_{oe} = 25\,\mu\,A/V$.

Or

(b) Draw a neat circuit diagram of a transistorised colpitt's oscillator with a suitable equivalent circuit, give the expressions for the following :

(i) Frequency of oscillation.

(ii) Minimum gain for sustained oscillations.

15. (a) Show with the help of circuit diagram an op-amp used as (i) scale changer (ii) phase shifter (iii) inverting adder and (iv) non-inverting adder. Draw an op-amp circuit whose output is $V_1 + V_2 - V_3 - V_4$.

Or

(b) Draw and explain the operation of Astable multivibrator using OPAMP IC 741C.

S 4031