Q.2 a. In the circuit of Fig. 1, $V_A = 2V$, $I_A = 2A$, $R_1 = 4\Omega$ and $R_2 = 3\Omega$. Find the Thevenin equivalent voltage V_{th} and impedance Z_{th} for the network to the left of terminals 1, 2.

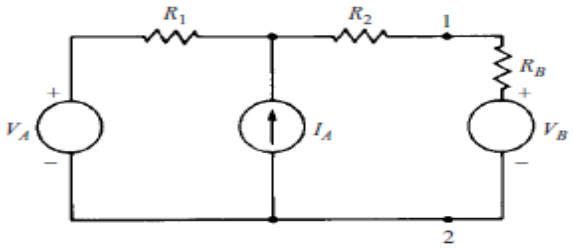


Fig.1

Answer:

Q:2

a. With terminals 1-2 open circuited, no current flows through R_2, by using KVL

$V_{th} = V_{12} = V_A + I_A R_1 = 2 + (2 \times 4) = 10\ V$ (2×3)

- Z_{th} - With V_A replaced by a short and I_A replaced by an open circuit.

$Z_{th} = R_{Th} = R_1 + R_2 = 4 + 3 = 7\Omega.$

b. Explain Duality. Obtain dual network for the circuit shown in fig.2.

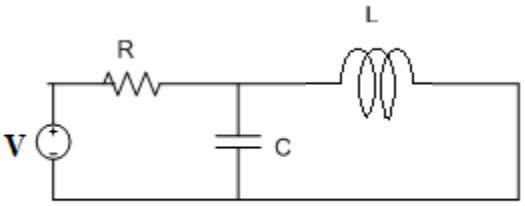


Fig.2

Answer:

Duality :- Networks which have identical describing differential equations are known as dual of each other, and the concept is known as DUALITY.

eg. dual of elements

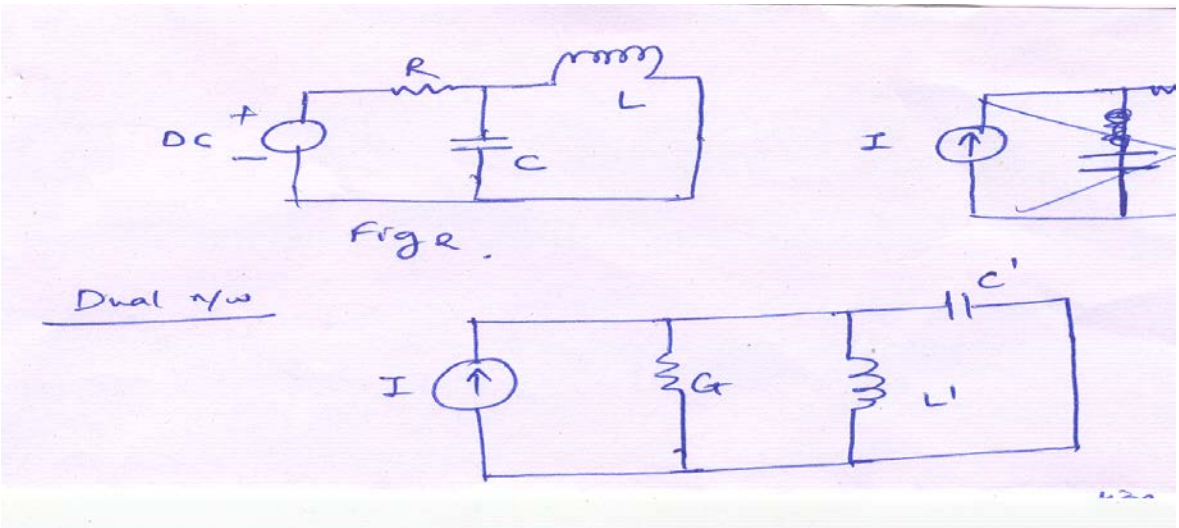
R ↔ G

L ↔ C

voltage source ↔ current source,

Q.3 a. Draw and explain switching characteristics of a diode.

Answer:



b. Plot the output voltage V_0

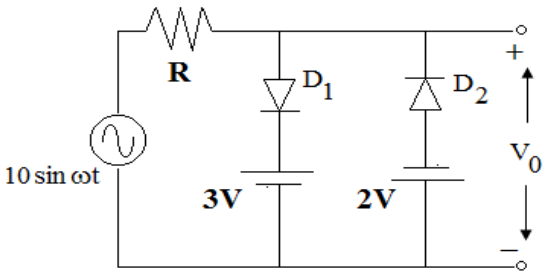


Fig.3

Answer: Topic 1.14 of Text Book 1

c. Write short note on:
(i) Transition and Diffusion capacitance
(ii) Zener diode as voltage regulator

Answer: Topic 1.13 of Text Book 1

Q.4 a. Explain the construction and operation of a n-channel E-MOSFET with suitable diagram and characteristics.

Answer: Topic 2.3 of Text Book 1

b. The transistor of Fig.4 is provided with the fixed and self biased emitter resistance with Rc = 4 k Ω, R_E = 2 kΩ, V_{cc} = 32 V and I_c = 4 mA.
(i) Calculate the value of R_B if β = 100
(ii) What will be the percentage change in I_C if actual β=40?

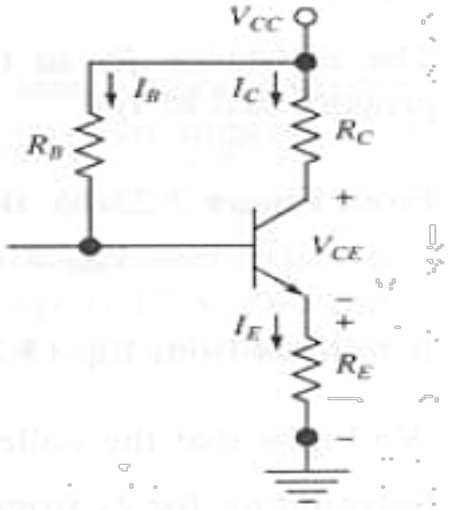
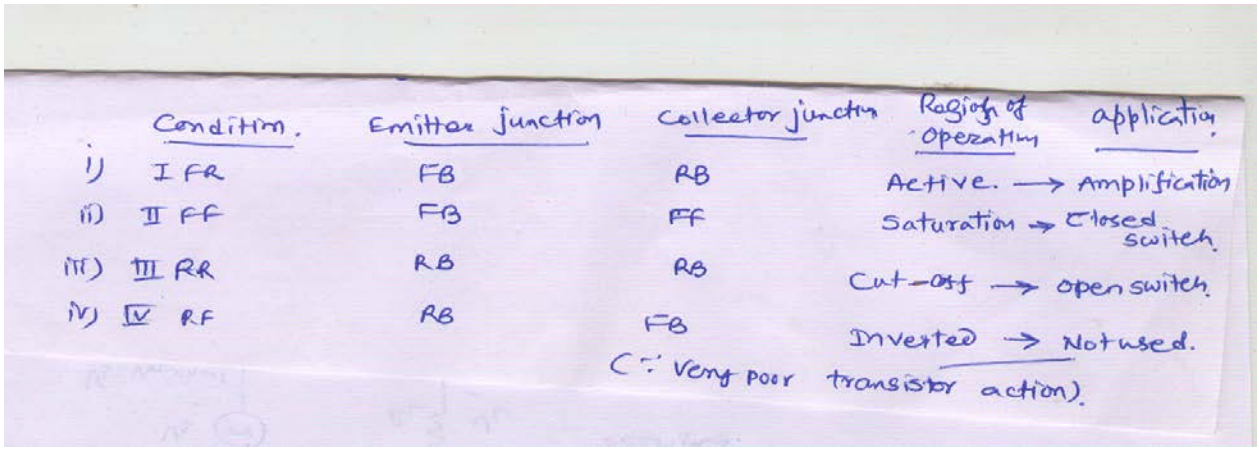


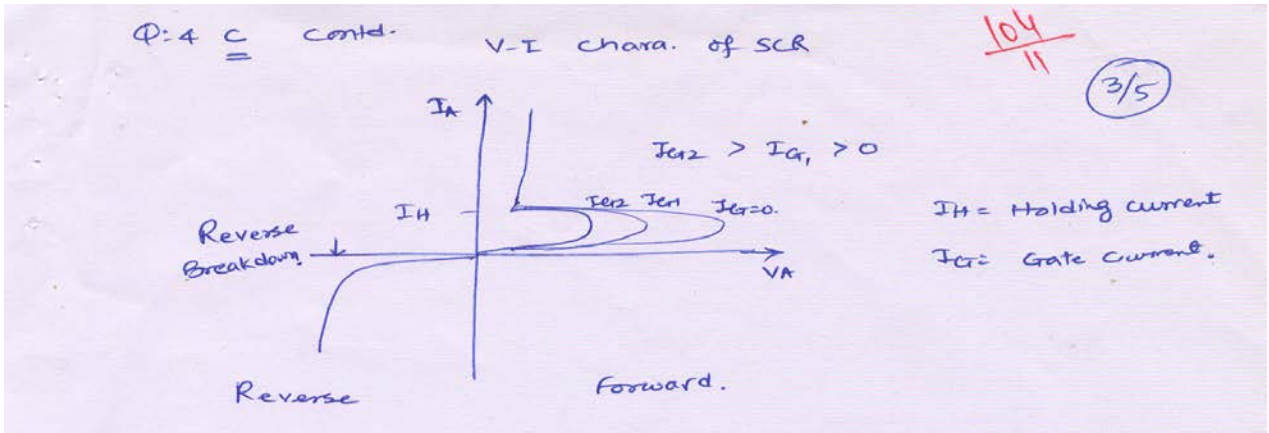
Fig. 4

Answer:



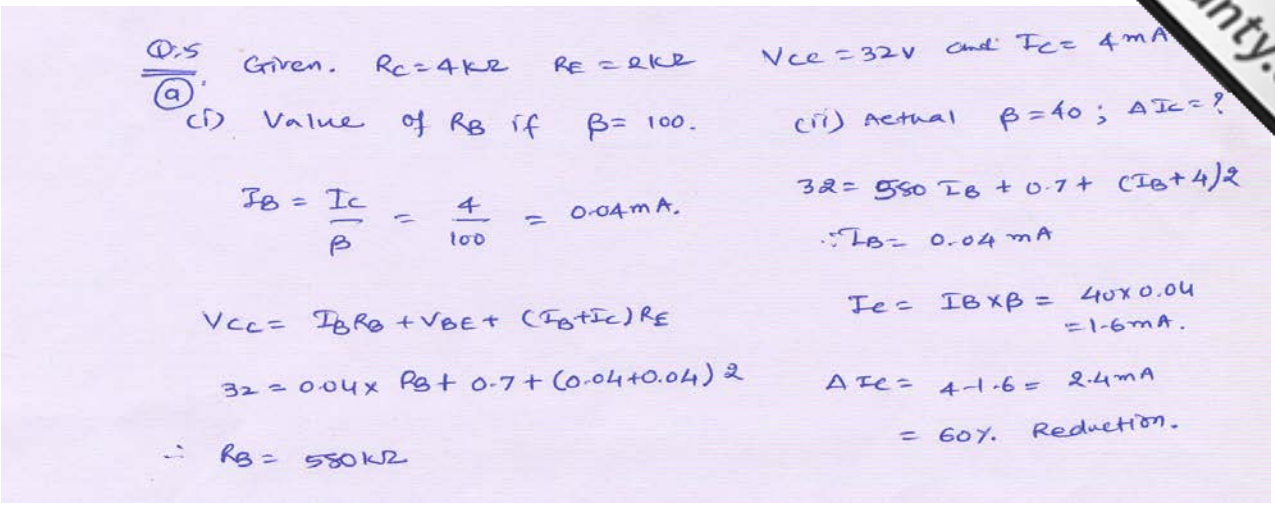
c. Draw V-I characteristics of an SCR.

Answer:



Q.5 a. Draw the small-signal model of Emitter follower and obtain the expression of voltage gain, current gain, input impedance and output impedance.

Answer:



b. Explain working of a Darlington pair amplifier in detail.

Answer: Topic 3.9 of Text Book 1

c. Write short note on CMOS.

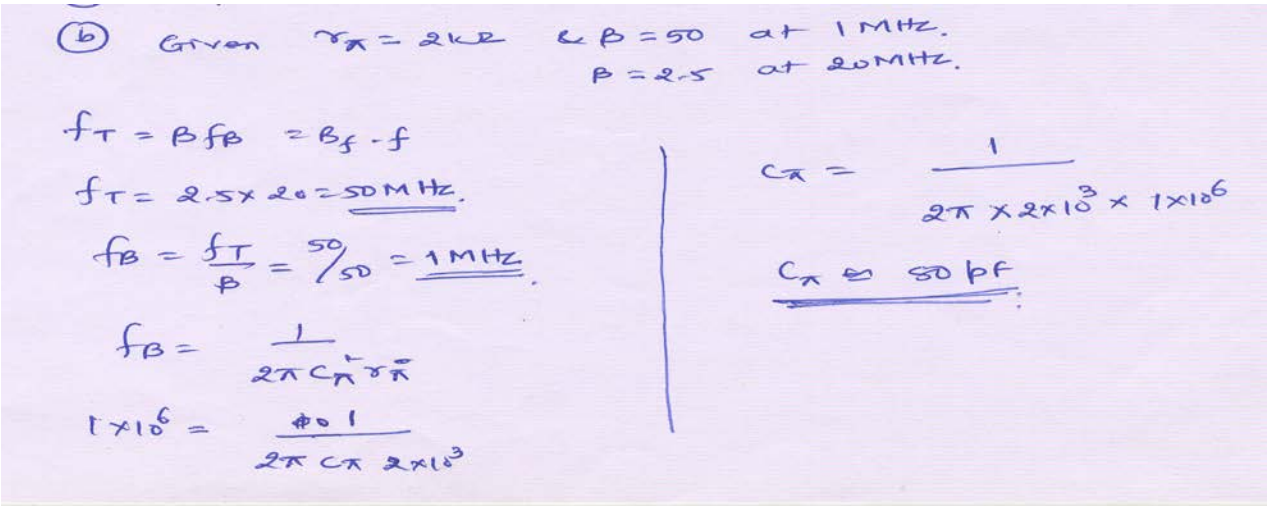
Answer: Topic 3.2 of Text Book 1

Q.6 a. Explain working of tuned amplifier. Also state its merit and application.

Answer: Topic 4.4 of Text Book 1

b. A certain BJT transistor has $r_\pi = 2\ k\Omega$ and $\beta = 50$ at 1MHz and $\beta = 2.5$ at 20MHz. Determine f_T, f_β and C_π.

Answer:



c. Write short note on cascaded amplifiers.

Answer: Topic 4.6 of Text Book 1

Q.7 a. Compare Class A, Class B, Class AB and Class C power amplifiers.

Answer: Topic 5.5 of Text Book 1

b. State performance parameters of power amplifier.

Answer:

i) Collector efficiency = ac power output / dc power input.

ii) Distortion –

iii) Power dissipation capability.

c. A transistor supplies 2W for a 5 kΩ load. The zero-signal dc collector current is 35 mA and rises to 40 mA when signal is applied. Determine the percent second- harmonic distortion.

Answer:

(c) $I_c = 35mA$

$I_c + B_0 = 40mA$ i.e.

i.e. $B_0 = 40 - 35 = 5mA.$

$P_1 = \frac{B_1^2 R_L}{2}$

$\therefore B_1 = 28.3mA$

$B_2 = B_0 = 5mA.$

Second harmonic distortion.

$D_2 = \left|\frac{B_2}{B_1}\right| \% \frac{5}{28.3} \times 100$

$= 17.66\%.$ Ans.

Q.8 a. Define feedback. Which type of feedback is used for oscillator circuit? Discuss feedback's effect on input and output impedance.

Answer:

Q:8 (a)

Feedback :- The process by which a fraction of output energy of device (amplifier) is injected back to its input is called feedback. (01 mark)

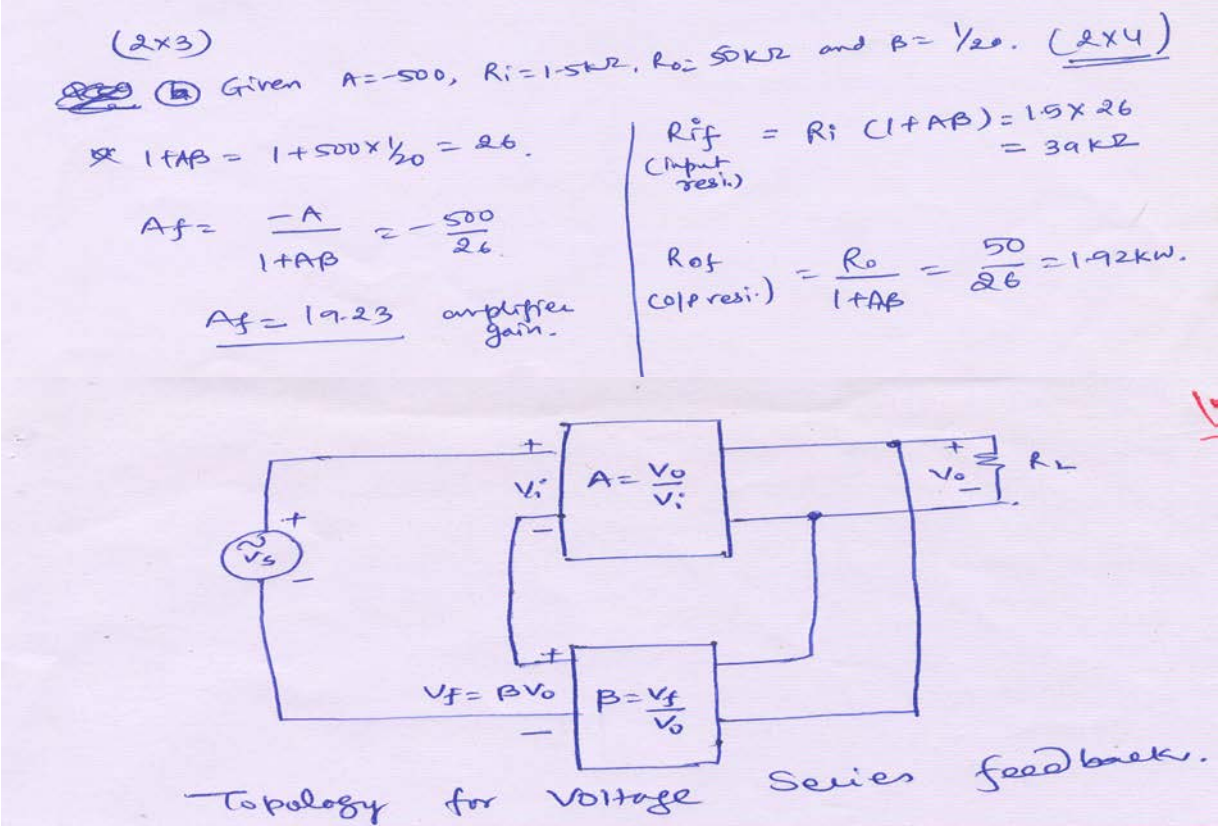
Type :- Positive Feedback :- Used for oscillator circuit.

(01 mark) negative feedback :- used for amplifier.

Rest Part :- Topic 6.4. Ref(F).

b. A voltage series feedback amplifier has the following data: A = -500, R_i = 1.5 kΩ , R_o = 50 kΩ and β = (1/10). Calculate amplifier gain, input and output resistances. Also draw topology for the same

Answer:



Q.9 a. Write short notes:
(i) Integrated resistors
(ii) Integrated capacitors

Answer: Topic 9.9 & 9.10 of Text Book 1

b. State characteristics of IC components.

Answer: Topic 9.12 of Text Book 1

c. State levels of integration of IC fabrication.

Answer: Topic 9.14 of Text Book 1

TEXT BOOK

Electronic Devices and Circuits, I. J. Nagrath, PHI (2007)