



This exam measures competences: A1, A2, B1, B2, C1, C2.

Question #1: (22 Mark) (all answer with sketch).

a- Explain the class B push-pull amplifier and its operation. (10 Mark)

b- Calculate the ac power delivered to the 8-ohm speaker for the circuit of the figure 1. The circuit component values result in a dc base current of 6 mA, and the input signal V_i results in a peak base swing of 4mA. $V_{CC}=10V$, $N1/N2=3:1$, $R_L=8\Omega$, $I_B=6\text{ mA}$, $I_{bpeak}=4\text{ mA}$ with comment the action of transformer in the circuit (12 Mark).

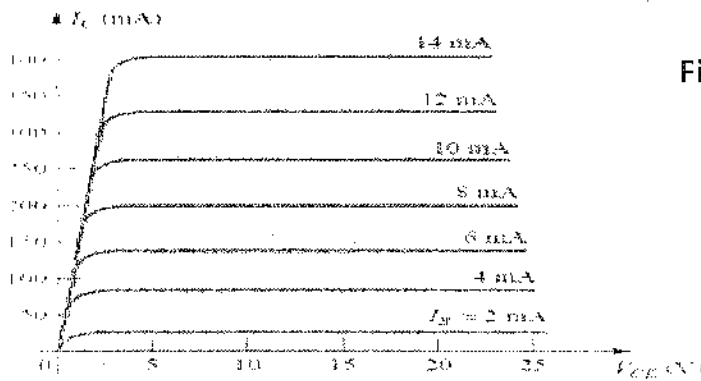
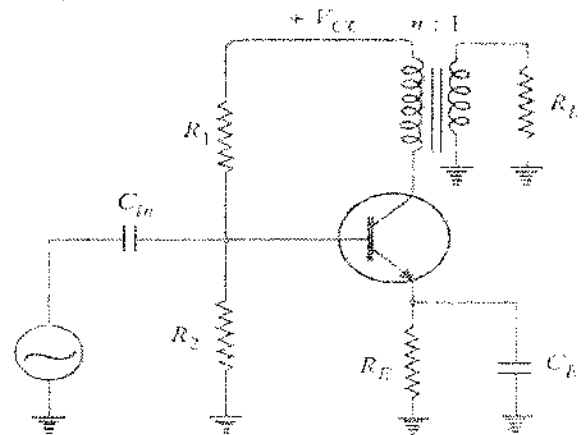


Fig.1



Question #2: (24 Mark) (all answer with sketch).

a- answer the following questions:

- 1- State the Barkhausen criterion for an oscillator. (2Mark)
- 2- From where starting voltage for the oscillator is derived? (2Mark)
- 3- Why in practice $A\beta$ is kept greater than unity. (2Mark)
- 4- What are the frequency sensitive arms? (2Mark)

b- write down the comparison between (6Mark)

- 1- L.C oscillators and crystals oscillators
- 2- Phase shift oscillator and Wein bridge oscillator.

c- Calculate the value of R_f and resonance frequency of the circuit in fig.2. (5Mark)

d- For the circuit in figure 3 and identify the type of oscillator. Assume $Q > 10$. What is the Barkhausen Criterion for a feedback amplifier to function as an oscillator? (5Mark).

Question #3: (24 Mark) (all answer with sketch).

a- For the following circuit as shown in Fig.4. find the Closed-loop current gain: $A_{if} = I_o/I_i = (\beta/(1+\beta)) = (A_v/(1+A_v))$ and Amplifier gain: $I_o/I_E = A_i = \beta$, then find: the type of feedback "with comment". (12 Mark).

b- Find the equivalent circuit of Fig. 5, then calculate the gain, R_{if} and R_{of} . Identify the type of feedback configuration. (12 Mark).

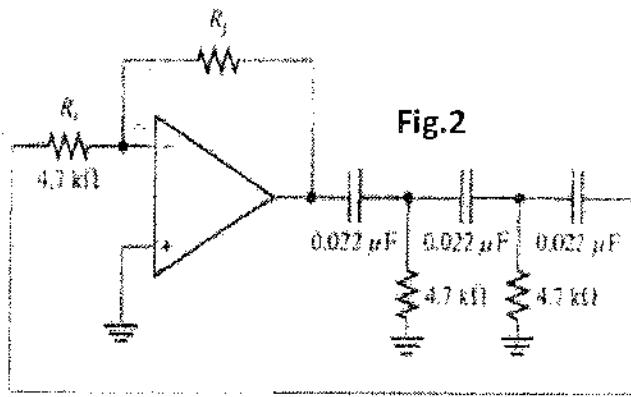


Fig.2

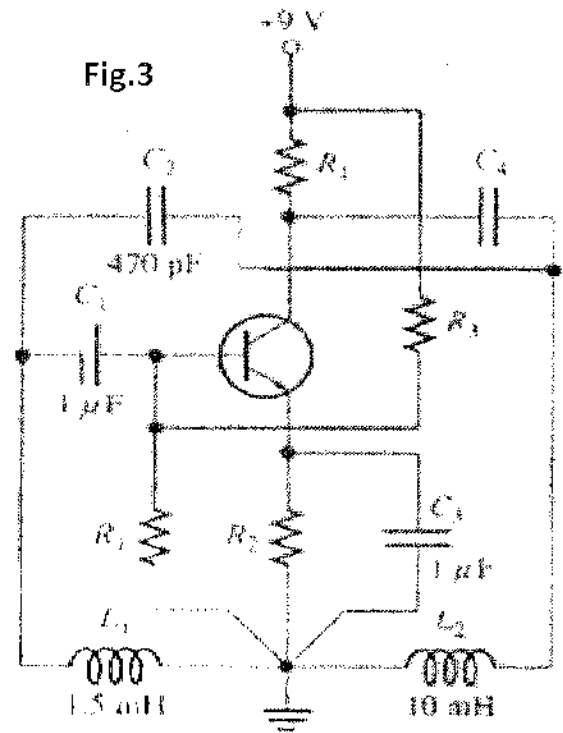


Fig.3

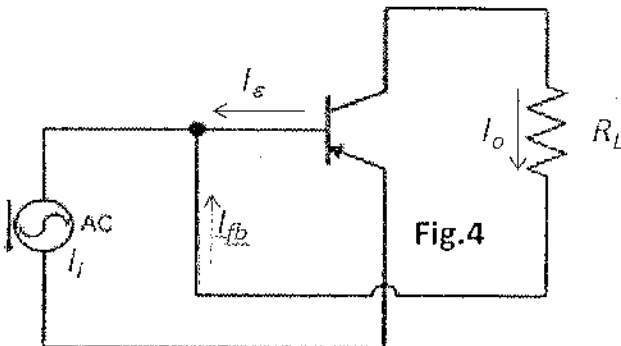


Fig.4

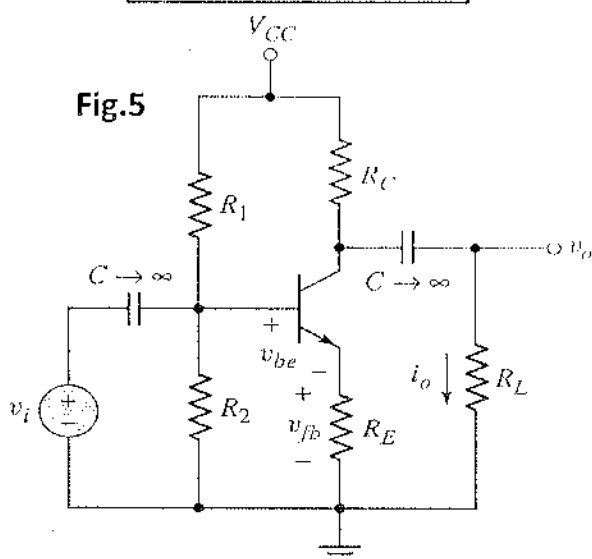


Fig.5

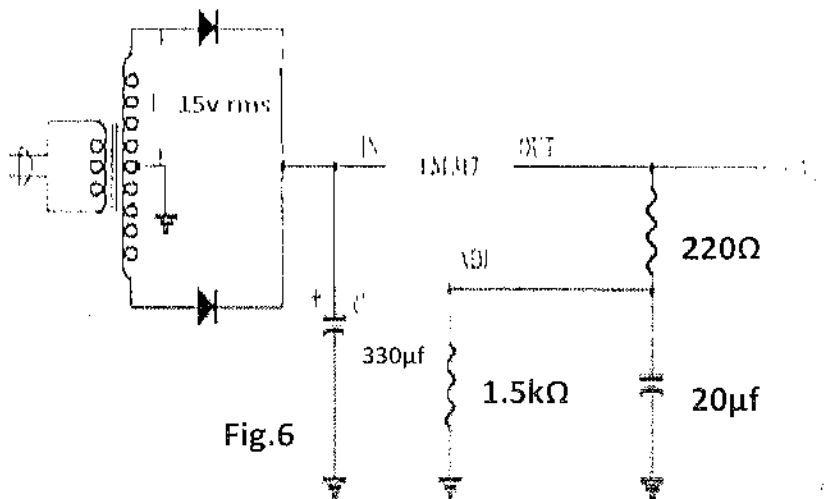


Fig.6

Question#4: (30Mark) (all answer with sketch).

a- Why is monostable Multivibrator called delay circuit? What is the main characteristics of the Astable Multivibrator. (6 Mark).

b- Explain the operation of transistor monostable multivibrator and its circuit details. (10 Mark).

c- Determine the regulated output voltage from the circuit of Fig.6 (6 Mark).

d- Design shunt and series voltage regulator by using operation amplifier (sketch only), explain the main difference between the two design.(8marks)