4E2109

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B.Tech. IVth Semester (Main/Back) Examination, June - 2010

Electrical Engineering

4EE1, Power Electronics - II

Time : 3 Hours **Maximum Marks : 80**

Min. Passing Marks : 24

Instructions to Candidates:

*Attempt overall **five questions** selecting **one question** from **each unit.** All questions carry **equal marks**.*

Unit - I

1. a) Define Desensitivity D for large value of D, what is Af ? What is the significance of this result. **(6)**

b) Obtain input and output resistance with and without feedback for the circuit of Fig.(1) **(10)**

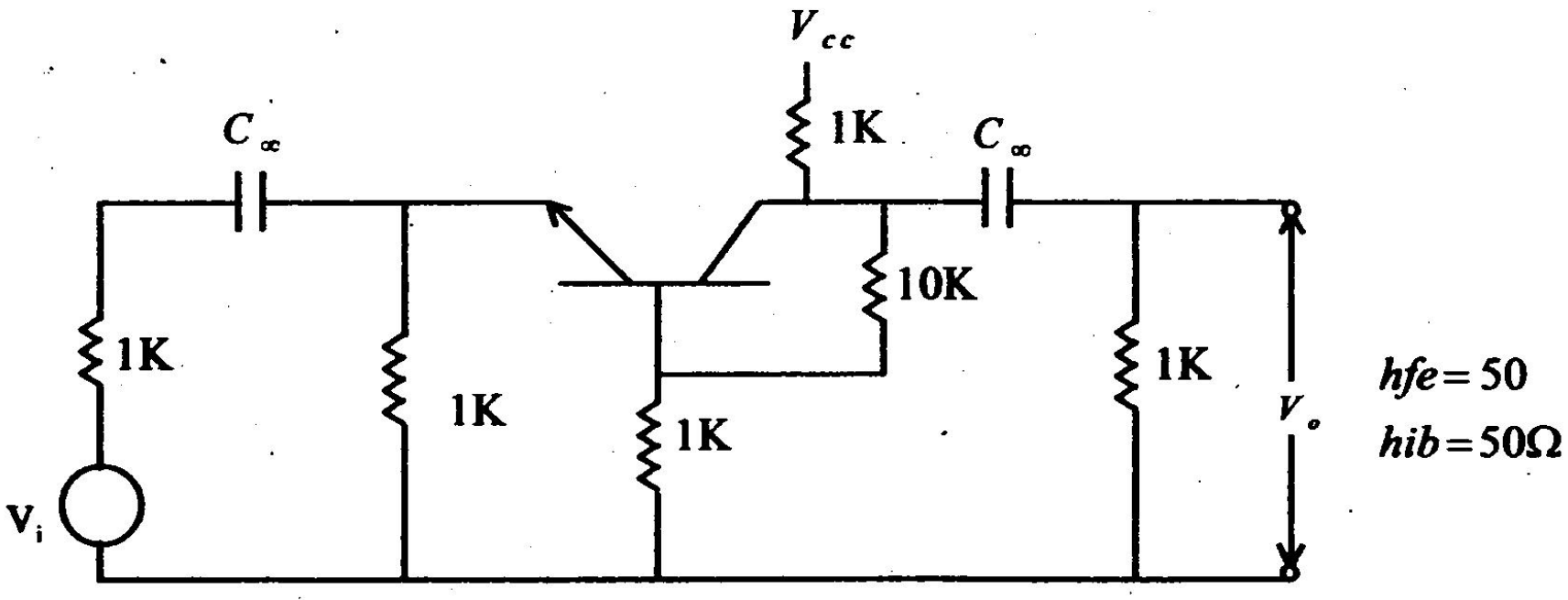

Fig. (1)

OR

a) A music program of frequency range from $25H_z$ to $15KH_z$ is to be amplified 30 times by an amplifier whose input and output voltage are out of phase. The amplifier while delivering output produces 5% harmonic distortion also.

i) What type of feedback will reduce the harmonic distortion?

ii) What is % distortion if 2% of the output voltage is feedback?

iii) What is the output voltage?

iv) What is the bandwidth with and without feedback?

v) What is the gain of the amplifier with and without feedback? **(8)**

b) What happens to the stability of the gain of an amplifier with negative feedback? What is the effect of negative feedback on bandwidth of an amplifier? **(8)**

Unit - II

2. a) Draw and explain working of BJT monostable multivibrator. Draw the voltage wave form of Base -1, Base -2, collector -1 and collector-2. Calculate the delay time T for which the circuit will remain in quasistable - state after triggering. **(10)**

b) Sketch the circuit of a wien bridge oscillator? What determine the frequency oscillation. **(6)**

OR

a) Sketch the topology for a generalized resonant circuit oscillator, using impedance Z_1, Z_2, Z_3. At what frequency will the circuit oscillate? Under what condition does the configuration reduce to a colpitts oscillator. **(10)**

b) A BJT Schmitt trigger has the following characteristics $V_T^+ = 5v$, $V_T = 4v$, high state 12v and low stage 3v. A 10v peak sine wave drive the Schmitt trigger, sketch the following

i) Transfer characteristics

ii) Out put wave form with input sine wave given. **(6)**

Unit - III

3. a) Draw and explain logarithmic and antilog amplifier by using Op-Amp. Drive the expression of logarithmic amplifier **(8)**

b) Explain the parameters of operational amplifier and write the ideal characteristics of Op-amp. **(8)**

OR

a) Draw and explain the differential amplifier with darlington connection, and explain the d.c. analysis. **(8)**

b) Explain the slew rate. For an Op-amp having a slew rate of 3v/sec. What is the maximum closed loop voltage gain that can be used when the input signal varied by 0.4v in 12μ sec? **(8)**

Unit - IV

4. a) Explain the successive approximation A-D converter. An eight-bit successive approximation A-D converter has a resolution of 20 mV. If the analog input is 1.085V. Find out its digital output in binary form. **(5+3=8)**

b) Draw and explain the series emitter follower regulated power supply circuit. **(8)**

OR

a) Draw and explain the internal structure of IC 555 timer **(8)**

b) For the circuit shown in fig. (2). Find the maximum and minimum value of zener diode current **(8)**

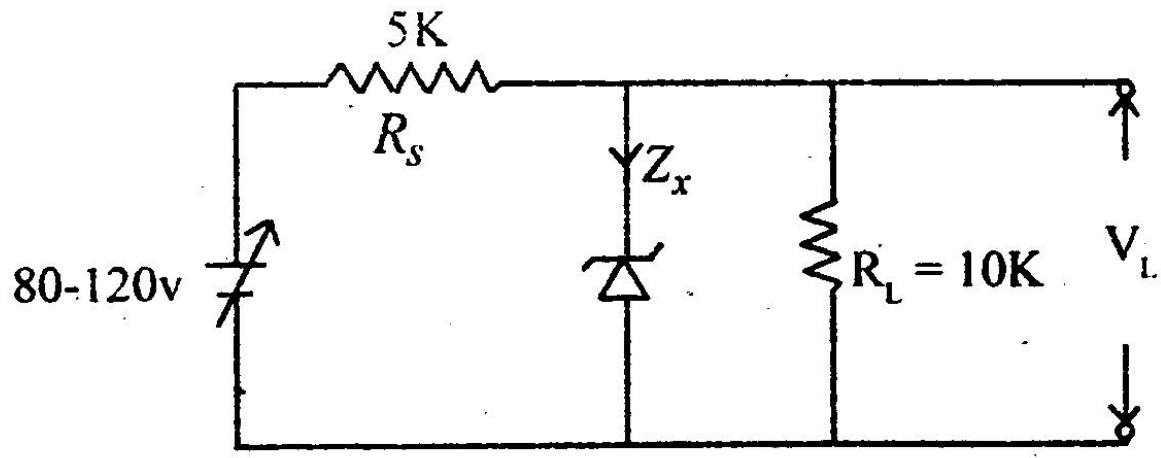

Fig. (2)

Unit - V

5. a) Draw the diagram of a transformer coupled single transistor output stage and explain the need for impedance matching. **(8)**

b) A transformer coupled class A power amplifier having collector supply voltage of 15V, delivers maximum output power of 3W to a load resistance of 1.5Ω connected to the secondary of the ideal output transformer. Determine

i) Turn ratio of the output transformer

ii) Power rating of the transistor

iii) D.C. power input to the amplifier

Assume maximum symmetrical swing for the output voltage. **(8)**

OR

a) Compare the power output, efficiency and rating of devices required for class-A push pull and class-B push-pull stages Derive the required expression. **(8)**

b) The output stage of a power amplifier shown in fig.(3) with Vcc = 15V and $R_L = 1k\Omega$ is required to deliver an output voltage of 5V peak sinusoid, determine the following neglecting cross-over distortion

i) Power delivered by the power supply,

ii) maximum power dissipated in T_1 and

iii) Efficiency. **(8)**

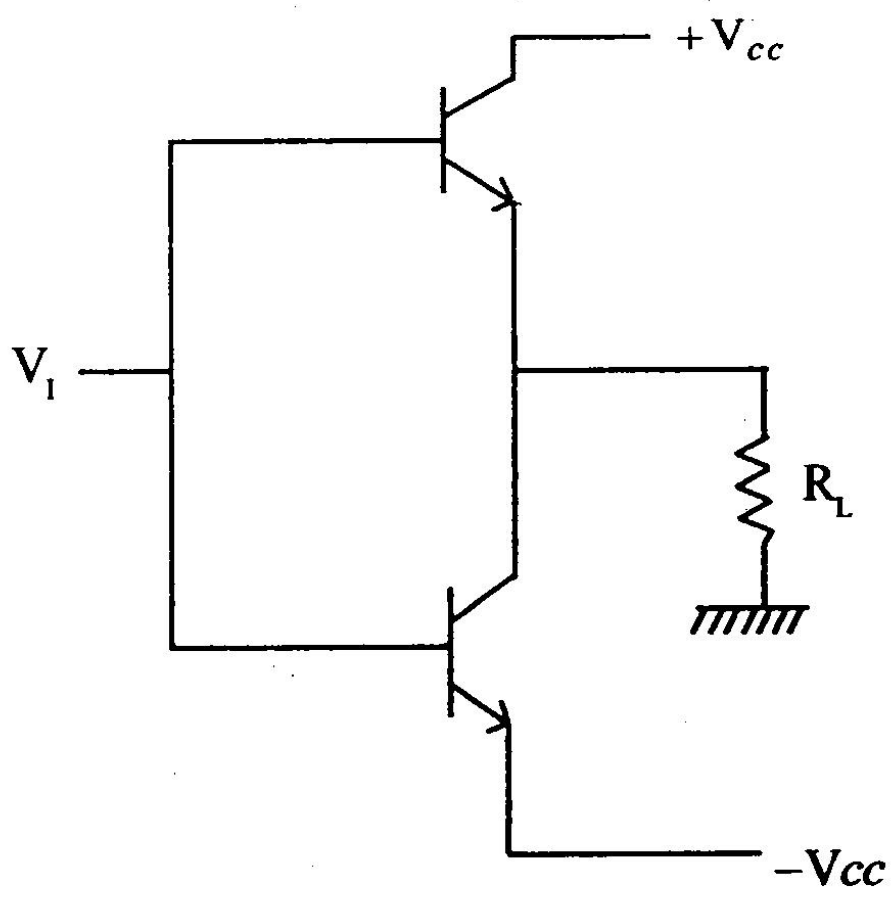

Fig. (3)