

EASTERN UNIVERSITY, SRI LANKA

SECOND YEAR EXAMINATION IN SCIENCE – 1994/95 & 95/96
(August/September 1997) – REPEAT

PH 202 – ELECTRONICS

Time: 02 hours.

Answer Four questions only.

A regulated power supply is required to supply a current of 150 mA at a voltage of about 5 V. A 250 mW, 5.1 V zener diode is available. The unregulated source to be used is a battery having an open circuit voltage of 12 V, and an output resistance of 5 Ω .

- (a) Making suitable assumptions, find a suitable value of R_z .
- (b) What are the maximum and minimum currents that can be supplied? What happens at the limiting currents?
- (c) What voltage will be measured at the battery terminals when the design current is being drawn?

3. Describe the operation of transistor as an amplifier in Common-Emitter configuration.

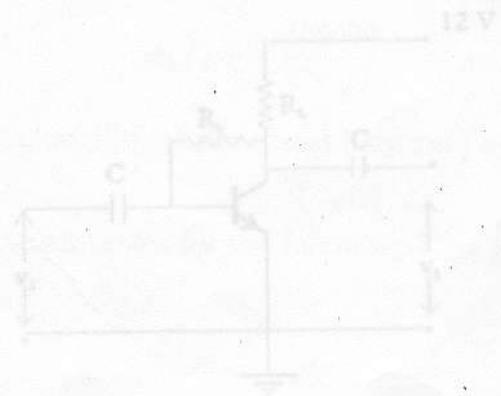


Figure shows a modified form of the simple Common-Emitter amplifier, where the base bias is supplied from the collector instead of the positive power supply terminal. The transistor has $\beta = 100$, and it is required to set the operating point such that $V_{ce} = 6$ volt, and $I_c = 1$ mA.

1. Explain the mechanism of current flow in

- (a) *N*-type semi-conductor
- (b) *P*-type semi-conductor

State what do you understand by barrier potential across a *P-N* junction.

A crystal diode having a forward resistance of $100\ \Omega$ is used as half wave rectifier. Find the *r.m.s.* value of voltage fed to it so as to act 100 V of d.c. across the load resistance of $2000\ \Omega$.

In what respect is an LED different from an ordinary *P-N* junction diode?

2. Explain the operation of zener diode.

A regulated power supply is required to supply a current of 150 mA at a voltage of about 5 V. A 250 mW, 5.1 V zener diode is available. The unregulated source to be used is a battery having an open circuit voltage of 12 V, and an output resistance of $5\ \Omega$.

- (a) Making suitable assumptions, find a suitable value of R_z .
- (b) What are the maximum and minimum currents that can be supplied? What happens at the limiting currents?
- (c) What voltage will be measured at the battery terminals when the design current is being drawn?

3. Describe the operation of transistor as an amplifier in Common-Emitter configuration.

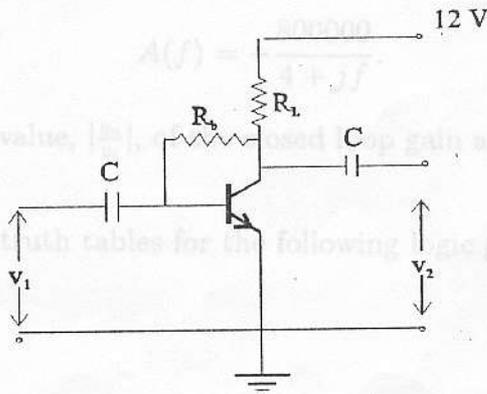


Figure shows a modified form of the simple Common-Emitter amplifier, where the base bias is supplied from the collector instead of the positive power supply terminal. The transistor has $\beta = 100$, and it is required to set the operating point such that $V_{ce} = 6$ volt, and $I_c = 1$ mA.

(a) Find the values of R_b and R_L required.

(b) The transistor is now replaced with another having $\beta = 150$. What is the new operating point? Hence comment on the desirable feature of the biasing configuration.

4. What do you mean by feedback?

Explain the effects of negative feedback on the gain, bandwidth, input impedance and output impedance of an amplifier.

An amplifier has a nominal gain of -500 , distortion 10% and a normal input of 1 volt. If 5% of the output voltage is fed back to input. Calculate

(a) the gain with feedback,

(b) distortion with feedback,

(c) input voltage required to give the same output as without feedback.

5. What characteristics should an ideal operational amplifier possess?

Discuss briefly the difference between a non-inverting amplifier and an inverting amplifier constructed using an operational amplifier.

The operational amplifier in a simple inverting amplifier circuit with input resistance $5 \text{ k}\Omega$ and feedback resistance $100 \text{ k}\Omega$ has open loop gain at frequency f given by

$$A(f) = -\frac{800000}{4 + jf}$$

Calculate the absolute value, $|\frac{v_o}{v_i}|$, of the closed loop gain at $f = 10 \text{ kHz}$ and 1 MHz .

6. Draw the symbols and truth tables for the following logic gates.

(a) AND

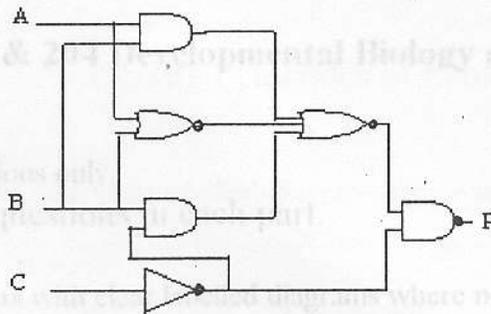
(b) OR

(c) NAND

(d) NOR

(e) exclusive OR

Write the truth table for the logic circuit below.



In a chemical process, an alarm buzzer sounds (P) if the temperature rises above a specified level (A), the pressure rises above a specified level (B) or the supply of raw materials is not above a specified minimum (C). Write down the truth table and a Boolean expression for the required conditions.

02. Write short notes on any Two of the following:
- The role of hormones in the menstrual cycle of human.
 - Birth defects.
 - Regeneration.
03. Describe the inductive mechanisms in the following process.
- Neutralisation in Amphibia
 - Eye development in Amphibia.

Part B

04. a) Describe the life cycle of the *Trypanosoma* spp. you have studied.
 b) Give the methods that are used for the control of diseases that are caused by *Trypanosoma* species.
05. Describe briefly about immunity of hosts for pathogenic / parasitic infections.
06. Write short notes on any Three of the following:
- Parasitism
 - White-Spot disease
 - Acquired immunity
 - Lymphocytes and Antigens
 - Fibrinosis