405 : 1stHf07

Con. 2354-07.   ND-7970

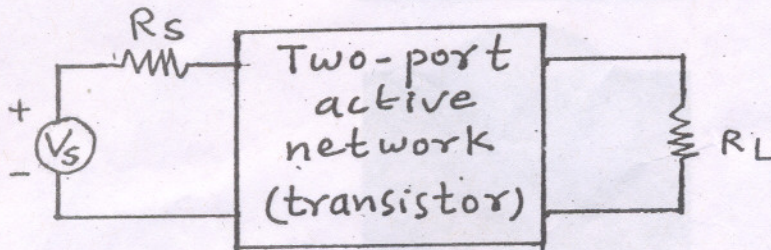(3 Hours)   [Total Marks : 100

N.B. (1) Question No. **1** is **compulsory**. Solve any **four** questions from the remaining.
    (2) Assume **suitable** data if **necessary**.

1. The transistor is connected as a common emitter amplifier as shown in **figure**. Using small signal analysis   **20**
    find out, A_I, R_i, A_V, A_{Vs}, A_{Is}, Z_o and A_p.
        $h_{ie} = 1100\ \Omega$, $h_{re} = 2.5 \times 10^{-4}$
        $h_{fe} = 50$, $h_{oe} = 25\ \mu A/V$
        $R_L = R_S = 1000\ \Omega$.

2. (a) Explain differential amplifier with constant current source using voltage divider network and current   **10**
        mirror.
    (b) Determine the value of constant current and output resistance for the circuit of **figure**.   **10**
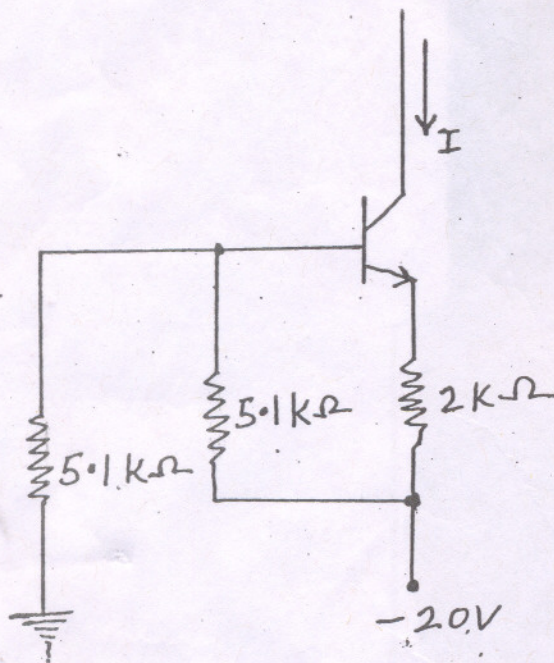
$h_{fe} = 100$

$\dfrac{1}{h_{oe}} = 100\ K\Omega$

$h_{ie} = 500\ \Omega$

3. (a) What is a function of a regulator ? What is the difference between load regulation and line regulation ?   **8**
    (b) Using LM 723, design a continuously adjustable 2 V to 5 V supply with current limit of 1.0 A.   **12**

4. (a) Explain voltage controlled oscillator. How does it differ from a fixed frequency oscillator ? Explain   **10**
        any one application of VCO.
    (b) Explain the operation of the Wien bridge oscillator. Explain two ways to make the output frequency   **10**
        user adjustable.

5. (a) Determine the component values for a 2 KHz square wave generator with an 80% duty cycle using IC 555.   **10**
    (b) Detail the differences between Flash Conversion and Successive Approximation Technique. What   **10**
        would each type be used ? What are their limitations ?

6. (a) Explain second order Butterworth active filter using OP-AMP. Give its frequency response curve. Give practical application of this filter. **10**

   (b) Draw the circuit diagram of practical differentiator using OP-AMP. Give the disadvantages of basic differentiator. **10**

7. Write short notes on any **two** :— **20**
   - (a) PWM IC voltage regulator
   - (b) Instrumentation amplifier using OP-AMP
   - (c) FET differential amplifier
   - (d) OP-AMP as Schmitt trigger and comparator.