

- (1) Question No. 1 is compulsory.
- (2) Attempt any four questions from Question Nos. 2 to 7.
- (3) Assume suitable data wherever necessary.
- (4) Figures to the right indicates full marks.

Design a two stage RC coupled CS amplifier using zero temperature drift point biasing to satisfy the following specifications : 20

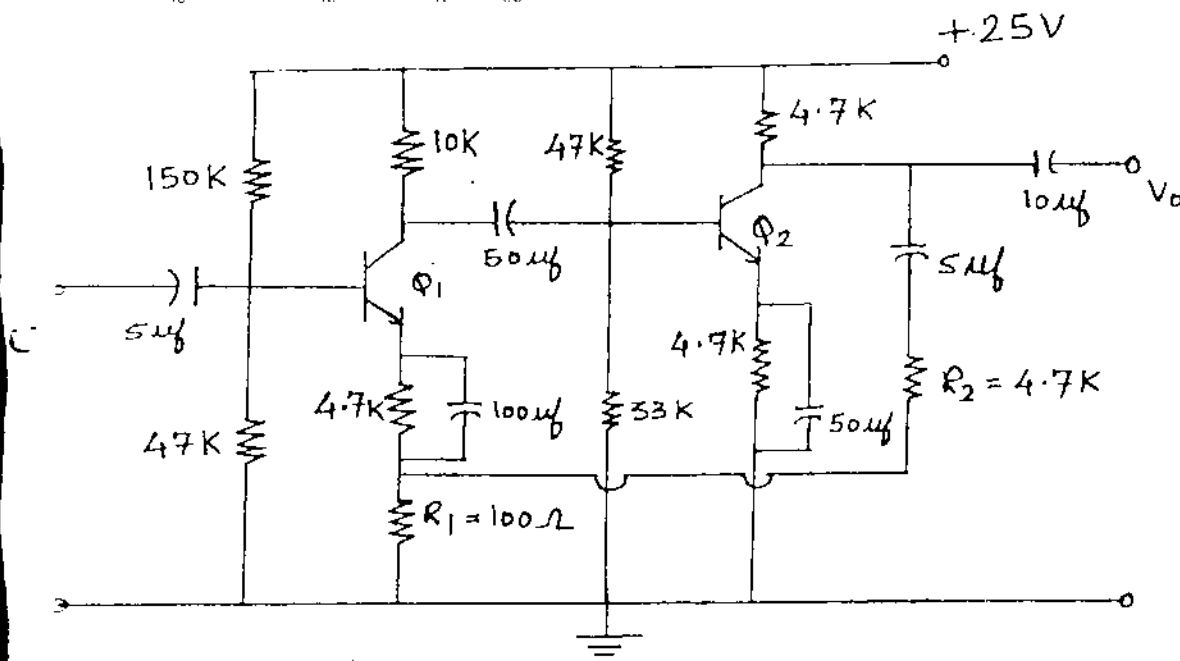
$A_v \geq 100, V_o = 2.5 \text{ V}, R_i \geq 1.2 \text{ M}\Omega.$

Use JFET BFW11. Calculate  $A_v, R_i$  and  $R_o$  for the designed circuit.

Draw typical Bode plots for one, two and three pole amplifiers and explain how stability of amplifier can be determined from Bode plot. 10

Draw the circuit diagram of RC phase shift oscillator and explain its working. Derive the necessary equations for frequency of oscillation and sustain oscillations. 10

For the circuit shown in figure below, determine  $A_{v_i}, R_o$  and  $R_i$  using negative feedback approach. Assume  $h_{ie} = 1.1 \text{ K}, h_{fe} = 50, h_{re} = h_{oe} = 0$  and identical transistors. 10



List advantages and disadvantages of negative feedback on performance of amplifier. 5  
 Which type of feedback will you use to obtain amplifier with stable transconductance? Draw one output diagram of such an amplifier. 5

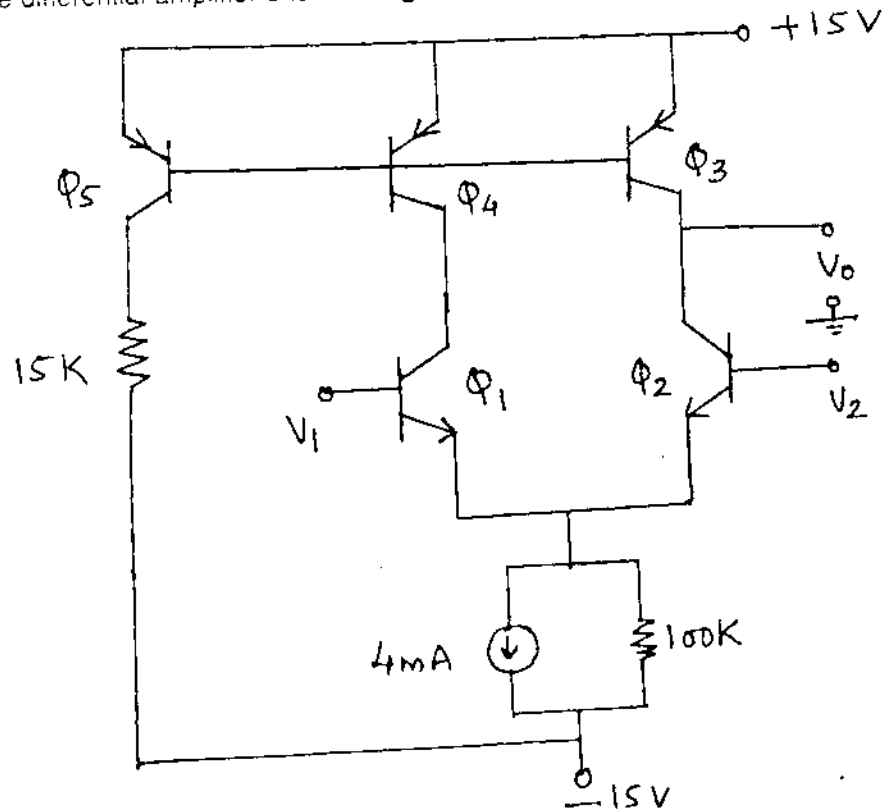
Write notes on any three :— 20  
 1. Nyquist stability criteria  
 2. Differential amplifier with active load  
 3. Darlington amplifier  
 4. Crystal oscillator.

Draw the circuit diagrams of following with values of components using OP-AMP :— 10  
 1. Inverting amplifier with gain of 10  
 2. Non-inverting amplifier with gain of 11  
 3. Buffer amplifier.

Draw the functional block diagram of an OP-AMP and explain each block. State important parameters of OP-AMP. State values of these parameters for ideal OP-AMP. 10

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6. (a) For the differential amplifier shown in figure below, determine  $A_d$ ,  $A_c$  and CMRR.



Assume :

$$V_A = 100 \text{ V for pnp,}$$

$$V_A = 150 \text{ V for npn,}$$

$$\beta_{\text{pnp}} = \beta_{\text{npn}} = 100, V_{\text{BE}} = 0.7 \text{ V.}$$

State the functions of various transistors.

- (b) Discuss "Miller Compensation" and how it can be used to stabilize amplifier having unstable characteristics.
7. (a) Design a transformer coupled class A power amplifier to provide SW output to a 8 ohm load.  
 (b) Draw the circuit diagram of class B power amplifier. Derive expression for Collector conversion efficiency. State the advantages and disadvantages of this configuration.