

- N.B. : (1) Question Nos. 1 and 2 are **compulsory**. Answer any **three** questions from the remaining.
 (2) Assume the **missing data suitably**.
 (3) Draw **neat, labeled** diagrams wherever **necessary**.

1. Design a 2 stage RC Coupled Amplifier using BC 147 for the following data :- **20**

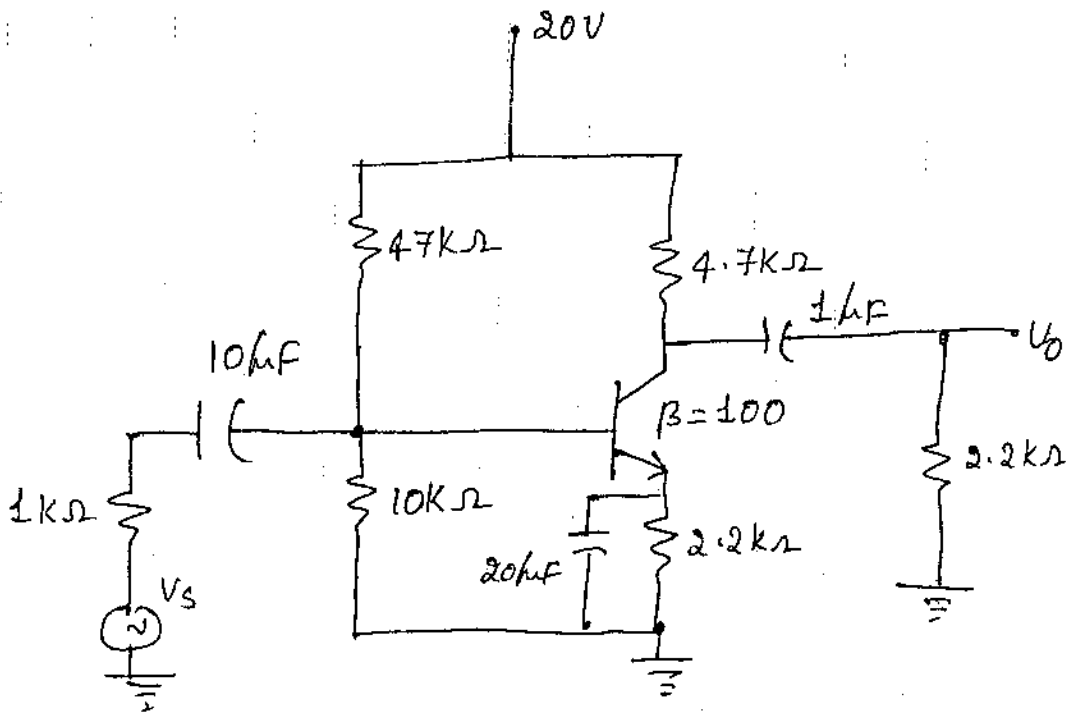
$A_V = 1000, S_{ICO} \leq 8, F_L \leq 15\text{Hz}, V_{CC} = 16\text{V}.$

Find $(V_O)_{max}, R_{in}, R_O$ and total current drawn from the supply.

Given :- $h_{ie} = 2.7\text{K}\Omega, h_{oe} = 18\mu\Omega, h_{fe} = 200, h_{re} = 1.5 \times 10^{-4}.$

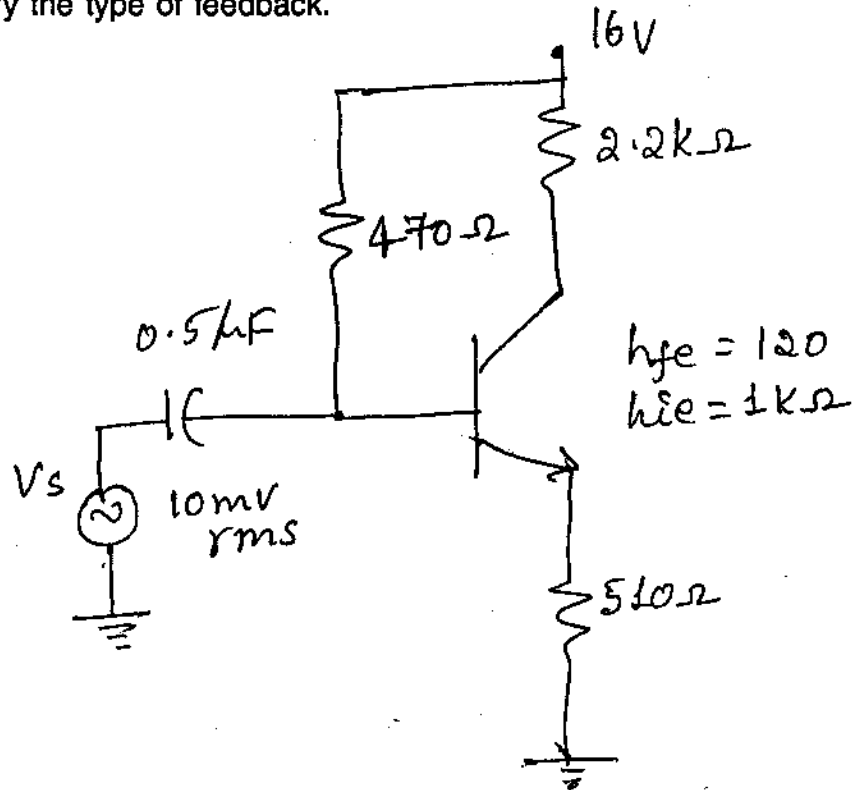
Draw the diagram with their designed values.

2. (a) Find the upper, lower cut-off frequency, Bandwidth and gain-bandwidth product **12**
 for the circuit shown below. Sketch the frequency response. Given $C_{be} = 35\text{pF},$
 $C_{bc} = 5\text{pF}, C_{ce} = 1\text{pF}, C_{wi} = 5\text{pF}, C_{wo} = 8\text{pF}, r_o = \infty.$
 (b) Design a class B power Amplifier with the following specifications. **8**
 Output power = 10 watts. $R_L = 8\Omega, V_{CC} = 12\text{V}.$ Calculate the overall efficiency
 at the full load.

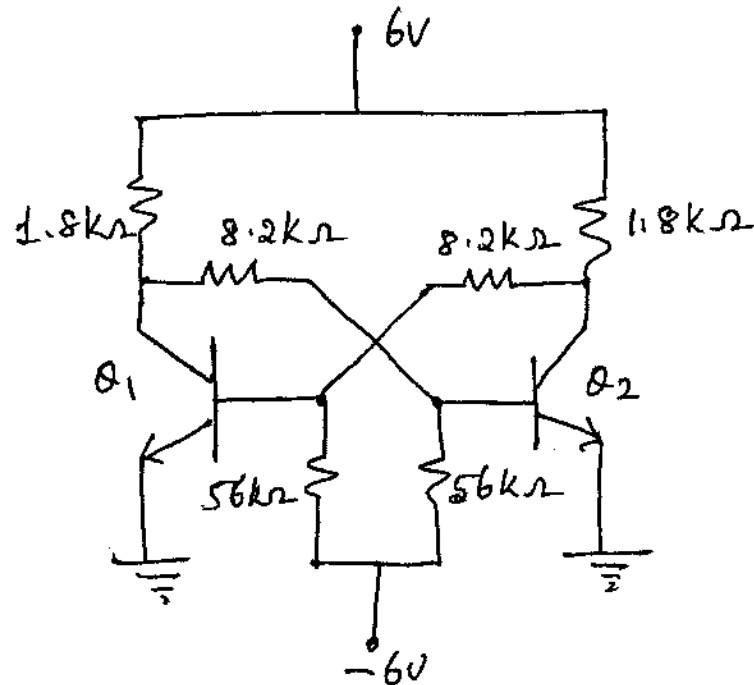


3. (a) With neat diagrams explain the various kinds of feedbacks and find their R_i, R_O, A_v and A_{if} . **12**
 (b) Design a RC phase shift oscillator using FET, having $g_m = 8000/\mu\text{S}, r_d = 40\text{K}\Omega$ **8**
 to generate a signal of 1.5 KHz.
 4. (a) Derive an expression for the small signal voltage gain of a dual input, single output **12**
 differential amplifier with neat relevant diagrams.

- (b) Calculate the voltage gain of the following circuit with and without feedback. 8
Identify the type of feedback.



5. (a) For the bistable multivibrator circuit, shown below, calculate the state voltages and currents. Explain the function of catching diodes and speed up capacitors in the circuit. 12



- (b) What is a heat sink? Why is it required for power amplifiers? Show the relationship between thermal and electrical analogy with a neat sketch. 8
6. (a) Derive an expression for the frequency of oscillation of a RC phase shift oscillator using FET. 8
(b) Explain harmonic distortion and crossover distortion in power Amplifier. How are they overcome? 12
7. Write short notes on :- 20
- Class C amplifier
 - Darlington pair
 - Clapp oscillator
 - Merits and demerits of negative feedback amplifier.