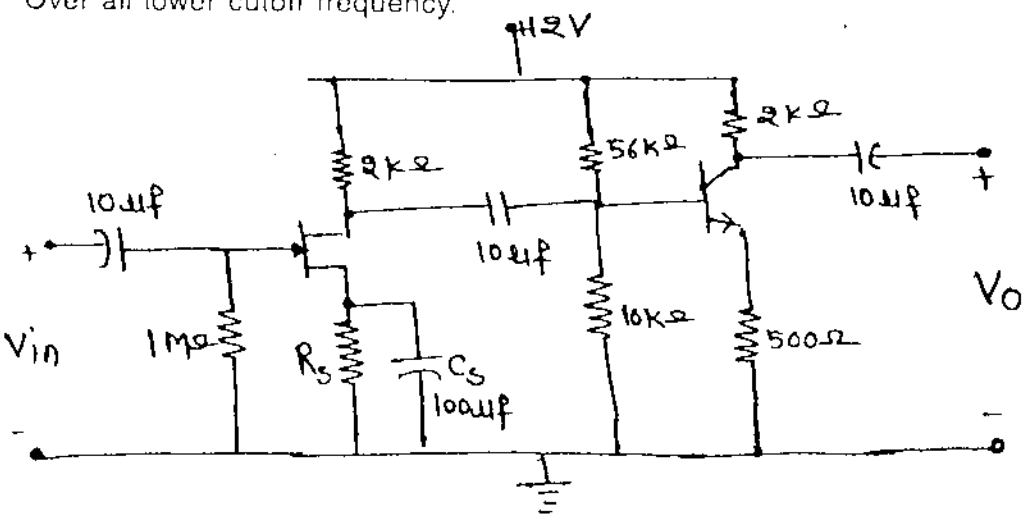
SE (Elex / Biomed) (Sem IV) (R) Dec 08
Sub: Electronic Circuit Anq. & Design – II

n. 5034-08. **RC-6095**

(3 Hours) **[Total Marks : 100**

(1) Question No. 1 is **compulsory**.
(2) Attempt any **four** questions from question Nos. **2** to **7**.
(3) Assume **suitable** data wherever **necessary** with **proper** justification.
(4) **Figures** to the **right** indicate **full** marks.

For the circuit shown in **figure** determine the following parameters 20
(a) Value of R_s
(b) DC bias for both stages (Q — points)
Assume $V_{GSQ} = -1$ volt $I_{DSS} = 8$ mA $V_p = -4V$ for JFET and $h_{ie} = 1\ k\Omega$, $h_{ie} = \beta = 100$, $V_{BE} = 0{\cdot}6$ Volt for BJT.
(c) Mid frequency voltage gain (A_v) for the complete amplifier with and without C_s.
(d) Over all lower cutoff frequency.



Design a two stage R-C coupled BJT amplifier using BJT BC 147A for the following requirement 20
$A_v \geq 1500$
$S \leq 8$
f_l better than 10 Hz
$V_0 = 3\ V_{peak}$.

a) Draw the circuit diagram of a transformer coupled push-pull class B amplifier and explain its working with load line and waveforms. What is the maximum efficiency possible (Derive) ? 10

b) For a power MOSFET the thermal resistance parameters are as follows : 10
$\theta_{dev\text{-}case} = 1{\cdot}75°C/W$
$\theta_{case\text{-}sink} = 1°C/W$
$\theta_{sink\text{-}amb} = 5°C/W$
$\theta_{case\text{-}amb} = 50°C/W$
The ambient temperature is 30 °C. The maximum junction or device temperature is 120°C. Draw the electrical equivalent circuit for heat flow from device to ambience. Determine the maximum power dissipation in the transistor when
(i) No heat sink is used.
(ii) A heat sink is used.

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4. (a) The circuit in the figure has the following parameters.

$R_{c_1} = 3\ k\ \Omega$ $R_{c_2} = 500\ \Omega$ $R_{E_2} = 50\ \Omega$

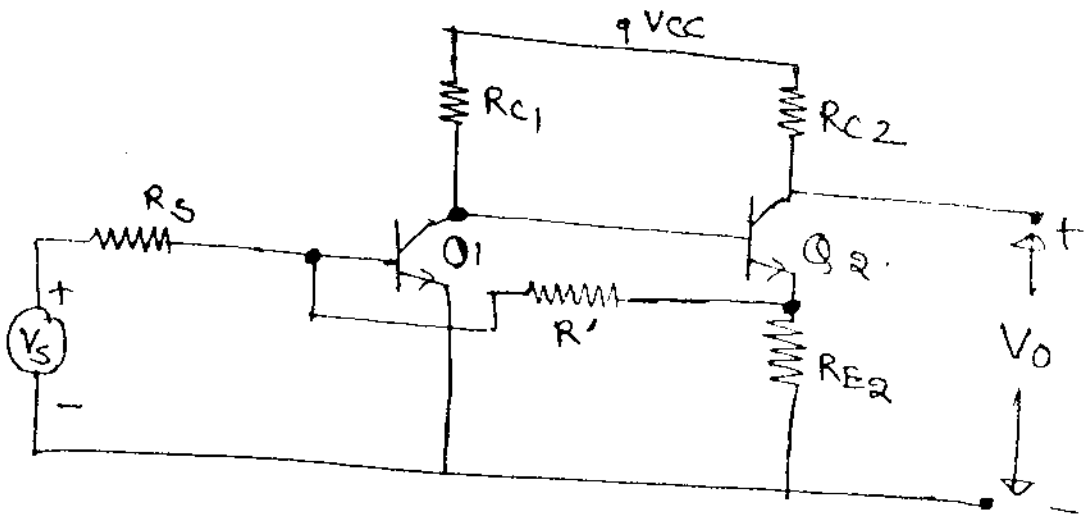
$R' = R_s = 1{\cdot}2\ k\Omega$ $h_{fe} = 50$ $h_{ie} = 1{\cdot}1\ k\Omega$

(i) Identify the type of feedback

(ii) Find Avf

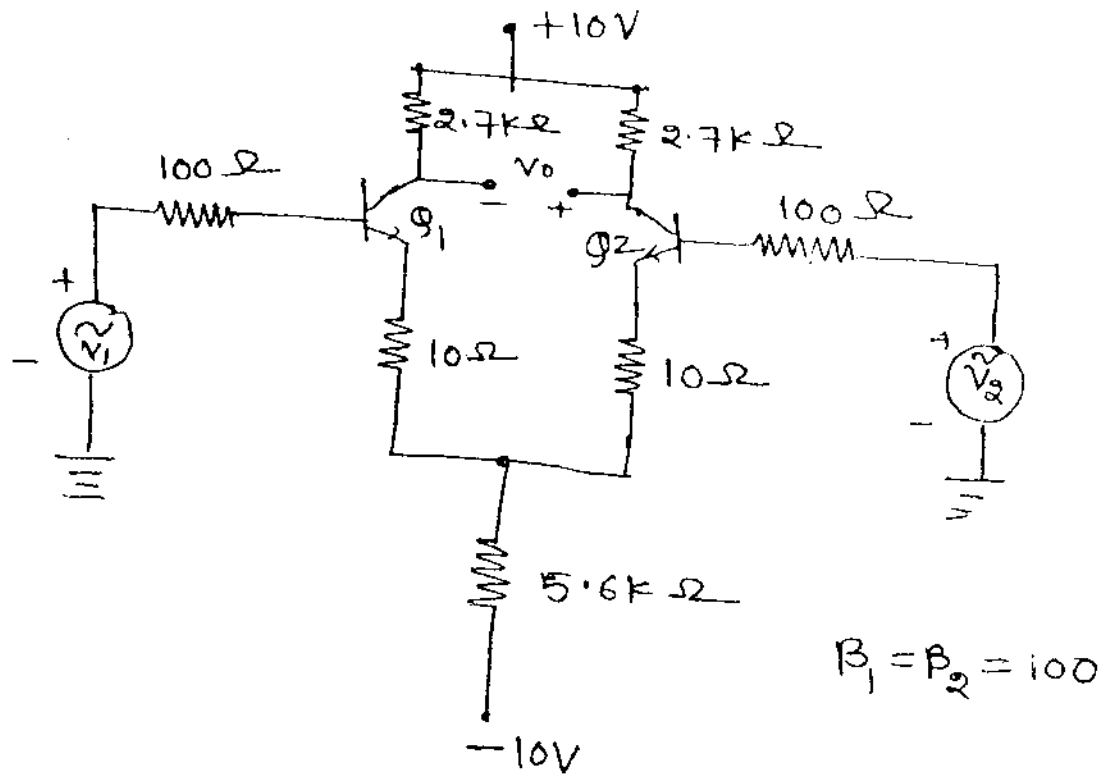
(iii) Find the resistance seen by the voltage source

(iv) Find the output resistance.



(b) Draw a feedback amplifier in block diagram form. Identify each block and state its function

5. (a) Analyse the following circuit diagram to obtain the expressions for the differential voltage gain, common mode gain and differential input resistance. Hence find their values.



(b) What is a power MOSFET ? Explain its construction equivalent circuit and characteristics

(a) Give the circuit diagram of colpitts oscillator. Derive expression for frequency of output signal. Determine condition to be satisfied for sustained oscillations. **10**

(b) Draw the circuit diagrams of following with values of components using op-amp. **10**

(i) Inverting amplifier with gain of 10

(ii) Non inverting amplifier with gain of 11

(iii) RC phase shift oscillator with frequency of oscillation as 1 KHz.

Write short notes on the following (any **two**) :— **20**

(a) Darlington amplifier

(b) Cascode amplifier

(c) Nyquist stability criteria.

(Refer Page No.4 for Data Sheet)