S.E. (EXTC) Sem III (R)   14/12/09

Con. 5250–09.   (REVISED COURSE)   SP–7847

(Lib)   Electronic Devices & Circuits –II

(3 Hours)   [Total Marks : 100]

N.B. : (1) Question Nos. **1** and **2** are **compulsory**. Answer any **three** questions from the remaining.

2·30 to 5·30

   (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**

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

   Find $(V_0)_{max}$, R_{in}, R_o and total current drawn from the supply.

   Given :— $h_{ie} = 2·7\,K\Omega$, $h_{oe} = 18\mu\mho$, $h_{fe} = 200$, $h_{re} = 1·5 \times 10^{-4}$.

   Draw the diagram with their designed valves.

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 $C_{be} = 35\,pF$,
      $C_{bc} = 5\,pF$, $C_{ce} = 1\,pF$, $C_{wi} = 5\,pF$, $C_{wo} = 8\,pF$, $r_o = \infty$.

   (b) Design a class B power Amplifier with the following specifications.   **8**
      Output power = 10 watts. $R_L = 8\,\Omega$, $V_{cc} = 12$ V. Calculate the overall efficiency
   at the full load.
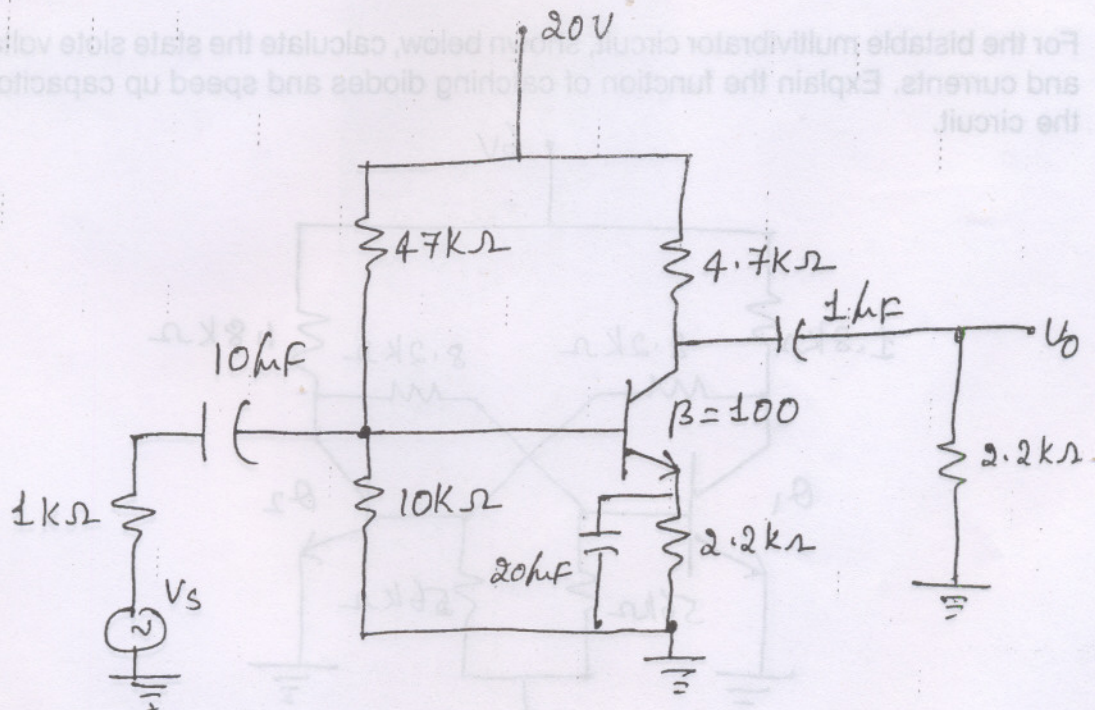
3. (a) With neat diagrams explain the various kinds of feedbacks and find their R_i, R_o,   **12**
      A_v and A_i.

   (b) Design a RC phase shift oscillator using FET, having gm = $8000/\mu\mho$. $r_d = 40\,K\Omega$ **8**
   to generate a signal of 1·5 KHz.

3. (a) With neat diagrams explain the various kinds of feedbacks and find their R_i, R_o, **12** A_v and A_i.

   (b) Design a RC phase shift oscillator using FET, having gm = 8000/$\mu \mho$. r_d = 40 KΩ **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.

16V

2.2kΩ

470Ω

0.5µF

$hfe = 120$

$hie = 1kΩ$

Vs

10mv rms

510Ω
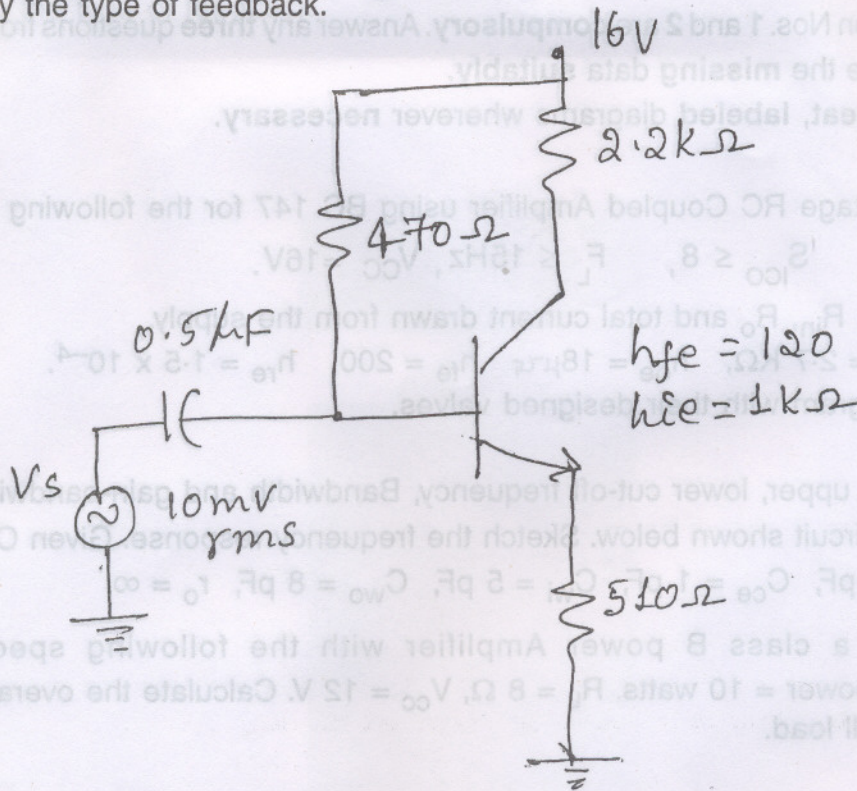
5. (a) For the bistable multivibrator circuit, shown below, calculate the state slote voltages **12**
and currents. Explain the function of catching diodes and speed up capacitors in
the circuit.

6V

1.8kΩ   8.2kΩ   8.2kΩ   1.8kΩ

Q₁   Q₂

56kΩ   56kΩ

−6V
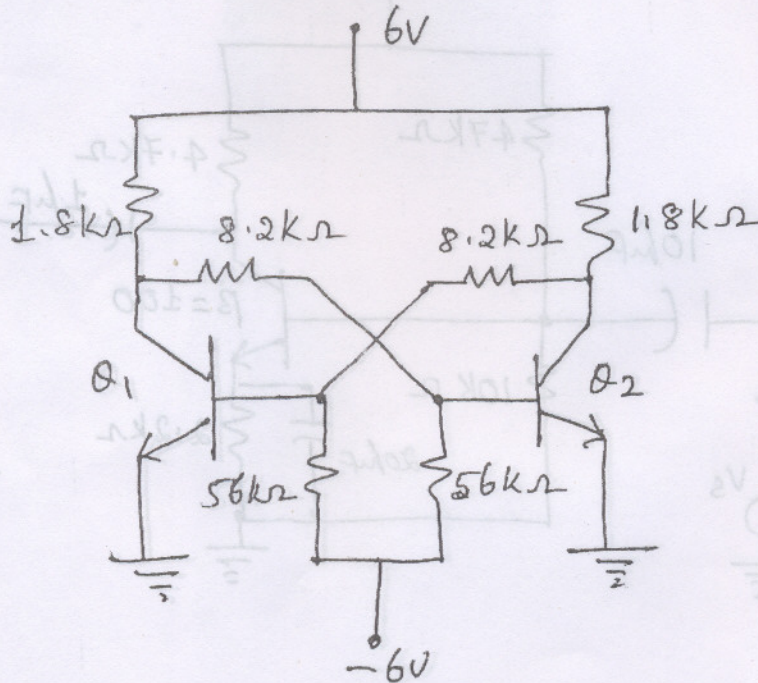
(b) What is a heat sink ? Why is it required for power amplifiers ? Show the relationship **8**
between thermal and electrical analogy with a neat sketch.

6. (a) Derive an expression for the frequency of oscillation of a RC phase shift oscillator **8**
using FET.

(b) Explain harmonic distorsion and crossover distorrion in power Amplifier. How are **12**
they overcome ?

7. Write short notes on :–   **20**

    (a) Class C amplifier

    (b) Darlington pair

    (c) Clapp oscillator

    (d) Merits and demerits of negative feedback amplifier.

————————————