Duration: 3hrs   **[Max Marks:80]**

N.B. : (1) Question No 1 is Compulsory.
           (2) Attempt any three questions out of the remaining five.
           (3) All questions carry equal marks.
           (4) Assume suitable data, if required and state it clearly.

1   Attempt any FOUR   [20]

   a   What are the advantages & disadvantages of negative feedback?

   b   Draw block diagram of oscillator. State and explain Barkhausens criteria

   c   Write a short note on current mirror circuit

   d   Derive efficiency of Class A transformer coupled power amplifier

   e   Compare voltage amplifier and power amplifier

2   a   Determine the lower cut off frequency due to the effect of coupling and bypass   [10]
        capacitors for an amplifier in figure 1 with the following specifications:

        $Vcc = 20V$, $R1 = 40K\Omega$, $R2 = 10K\Omega$, $Rc = 4K\Omega$, $RE = 2K\Omega$, $RL = 2.2K\Omega$
        $CC1 = 10\mu F$, $CC2 = 1\mu F$, $CE = 20\mu F$, Assume $ro = \infty$ and $\beta = 100$
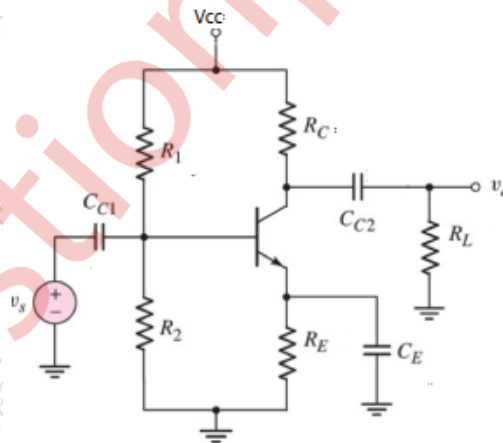

Figure. 1

   b   Write a short note on FET Cascode amplifier (CS-CG).   [10]

3   a   Explain voltage series negative feedback amplifier with help of block diagram   [10]
        and derive expression for Rif, Rof and Af.

   b   Explain the Hartley oscillator with neat labelled diagram. Describe its   [10]
        advantages, disadvantages and applications.

4 a Explain in brief MOSFET differential amplifier with active load and small signal   [10]
       analysis of MOSFET active load circuit

   b Explain Class-B power amplifier and crossover distortion. Drive expression for   [10]
       its efficiency.

5 a Explain the Low frequency response of CS amplifier with proper equations.   [10]

   b Write a short note on types of coupling used in multistage amplifiers   [10]

6 a For the differential amplifier in Figure 2, the parameters are: [10]
       $V^+ = 5\,V, V^- = -5\,V, R_1 = 80k\Omega,$ and $R_D = 40k\Omega$. The transistor
       parameters are $\lambda = 0$ and $V_{TN} = 0.8\,V$ for all transistors, and $K_{n3} =$
       $K_{n4} = 100\mu A/V^2$ and $K_{n1} = K_{n2} = 50\mu A/V^2$. Determine the range of
       the common-mode input voltage.
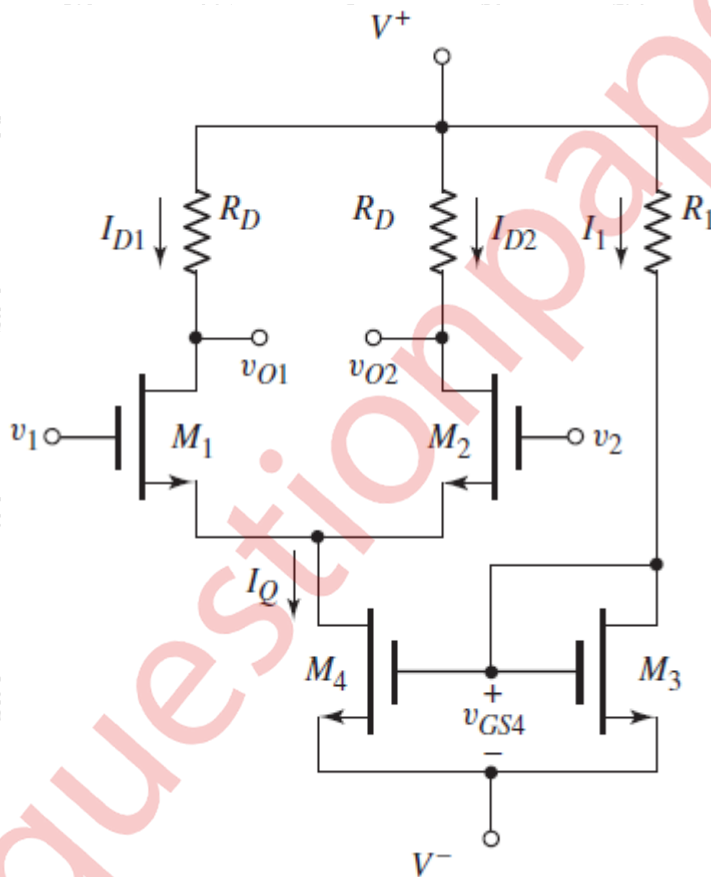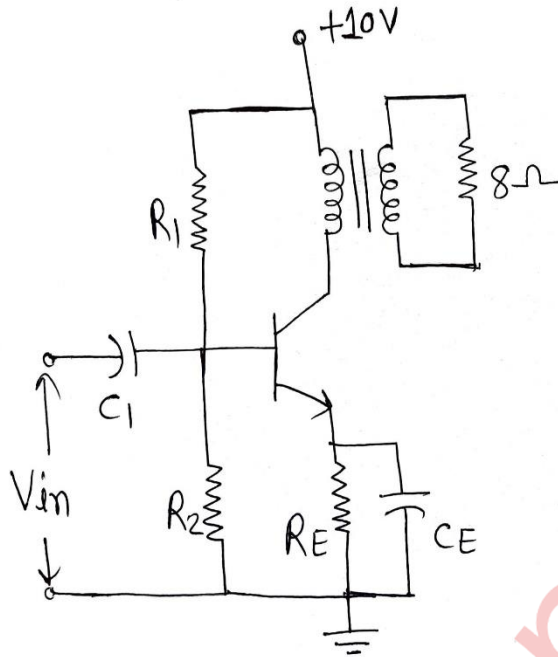

Figure 2.

b   Calculate AC Power delivered to the 8Ω speaker, DC input power, power   [10]
    dissipated by the transistor and efficiency of the circuit shown in figure 3.

$V_{CEQ} = 10V$

$I_{CEQ} = 140 \text{ mA}$

$V_{CEmin} = 1.7 V$

$V_{CEmax} = 18.3 V$

$I_{Cmin} = 25 \text{ mA}$

$I_{Cmax} = 255 \text{ mA}$

Figure 3.

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