

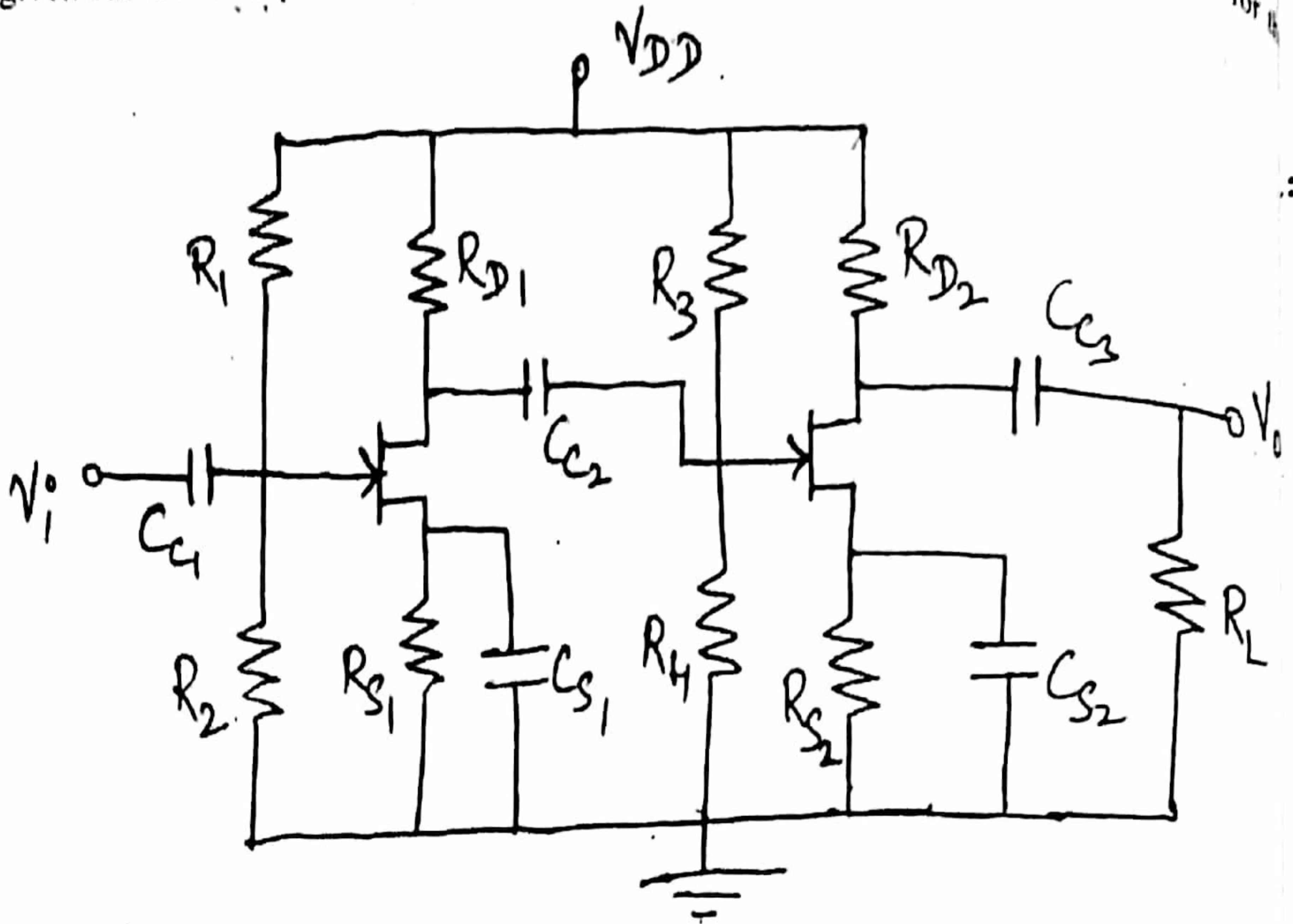
(Time: 3 Hours)

[Total Marks: 80]

- (1) Question No. 1 is compulsory.  
 (2) Solve any three questions from remaining five questions.  
 (3) Figures to the right indicate full marks.  
 (4) Assume suitable data if necessary and mention the same in answer sheet.
- a) Draw a neat labelled diagram of Enhancement Type MOSFET and explain its operation. 20  
 b) Explain RC Coupled Amplifier.  
 c) What is an Oscillator? Explain Basic Principle of an Oscillator.  
 d) Differentiate Class A, Class B and Class C Power Amplifiers.
- a) Design a two stage RC coupled CS – CE Amplifier to meet following specifications: 15  
 $A_v \geq 500$ ,  $S \leq 8$ ,  $R_i \geq 1 \text{ M}\Omega$ ,  $V_{cc} = 6 \text{ V}$ .  
 Assume the following data:  $\beta_{typ} = 290$ ,  $h_{ie} = 4.5 \text{ k}\Omega$ ,  $g_{m0} = 5000 \mu\text{S}$ ,  $I_{DSS} = 7 \text{ mA}$ ,  
 $r_d = 50 \text{ k}\Omega$ ,  $V_p = -4 \text{ V}$ .
- b) For a 'n' stage cascaded amplifier, show that overall lower 3 dB cut – off frequency is 05  

$$f_{LT} = \frac{f_L}{\sqrt{2^{1/n} - 1}}$$
- a) With the help of neat block diagram, derive expression for  $R_{IF}$ ,  $R_{OF}$ ,  $G_{mF}$  for Voltage 10  
 Series Negative Feedback Amplifier. Give significance of the above mentioned parameters.
- b) Write Short Note on: Darlington Pair Amplifier. 10
- a) Find the necessary condition for oscillations to occur and frequency of oscillations of 10  
 Colpitts Oscillator. Also, explain its working.
- b) Draw a neat diagram of Direct Coupled Class A Amplifier and explain its working. 10  
 Hence, find its efficiency.

5. (a) Determine input impedance, output impedance, voltage gain and current gain for the given cascaded amplifier as shown in the figure below:



- (b) Draw circuit diagram of Cascode Amplifier and explain in detail.
6. (a) State and Explain different types of Biasing techniques for Depletion Type MOSFET.
- (b) Explain the concept of Heat Sink in detail required for Power Amplifiers. A Silicon Power Transistor is operated with a heat sink with  $Q_{SA} = 1.2^\circ \text{C/W}$ . The transistor is rated for 120 W at  $25^\circ \text{C}$  and has  $Q_{JC} = 0.5^\circ \text{C/W}$ . The mounting insulation has  $Q_{CS} = 0.5^\circ \text{C/W}$ . What maximum power can be dissipated if the ambient temperature is  $40^\circ \text{C}$  and  $T_{J(\text{max})} = 200^\circ \text{C}$ .
- (c) Calculate frequency of Oscillation for Hartley Oscillator if  $L_1 = L_2 = 1 \text{ mH}$  and  $C = 0.1 \mu\text{F}$ .