

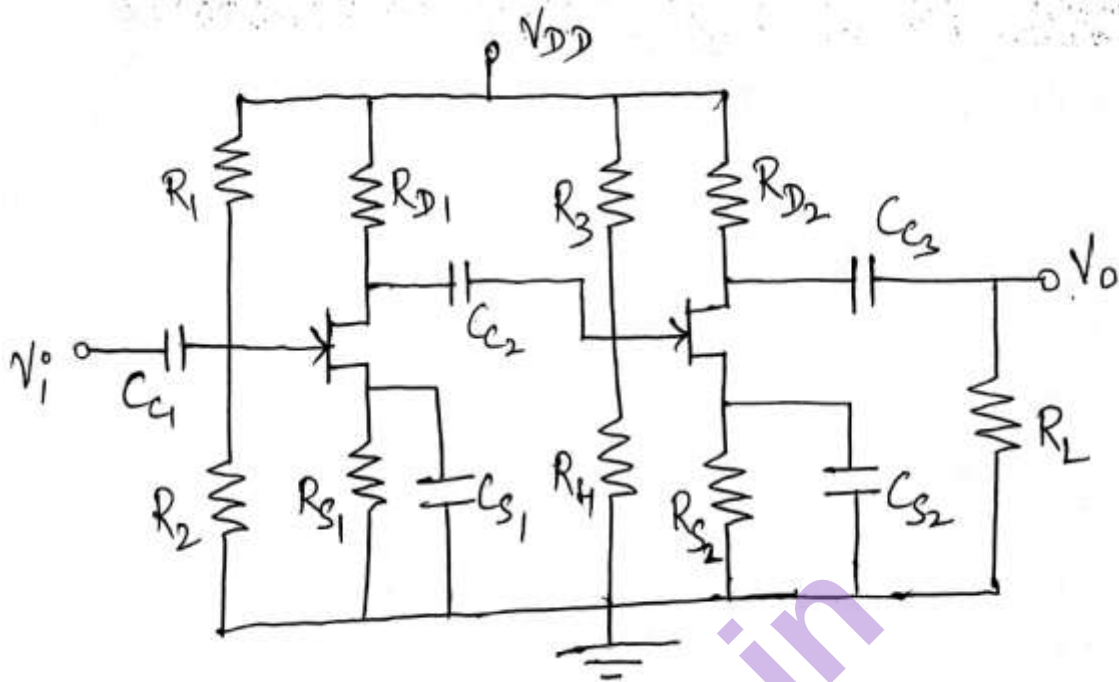
(Time: 3 Hours)

[Total Marks: 80]

- N.B. (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.
1. (a) Draw a neat labelled diagram of Enhancement Type MOSFET and explain its operation. **20**
 (b) Explain RC Coupled Amplifier.
 (c) What is a Oscillator? Explain Basic Principle of an Oscillator.
 (d) Differentiate Class A, Class B and Class C Power Amplifiers.
 2. (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: $\beta_{\text{typ}} = 290$, $h_{ie} = 4.5 \text{ k}\Omega$, $g_{m0} = 5000 \mu\text{S}$, $I_{DSS} = 7 \text{ mA}$,
 $r_d = 50 \text{ k}\Omega$, $V_p = -4 \text{ V}$.
 (b) For a 'n' stage cascaded amplifier, show that overall lower 3 dB cut – off frequency is **05**

$$f_{LT} = \frac{f_L}{\sqrt{2^{1/n} - 1}}$$
 3. (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**
 4. (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: **10**



- (b) Draw circuit diagram of Cascode Amplifier and explain in detail. **10**
6. (a) State and Explain different types of Biasing techniques for Depletion Type MOSFET. **08**
- (b) Explain the concept of Heat Sink in detail required for Power Amplifiers. **07**
 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°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°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 $C = 0.2 \mu\text{F}$. **05**