(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**
$A_v \geq 500,\ S \leq 8,\ R_i \geq 1\ M\Omega,\ V_{cc} = 6\ V.$
Assume the following data: $\beta_{typ} = 290,\ h_{ie} = 4.5k\Omega,\ g_{mo} = 5000\mu\mho,\ I_{DSS} = 7mA,$ $r_d = 50k\Omega,\ V_P = -4V.$

(b) For a 'n' stage cascaded amplifier, show that overall lower 3 dB cut – off frequency is **05**
$f_{LT} = \frac{f_L}{\sqrt{2^{1/n}-1}}$

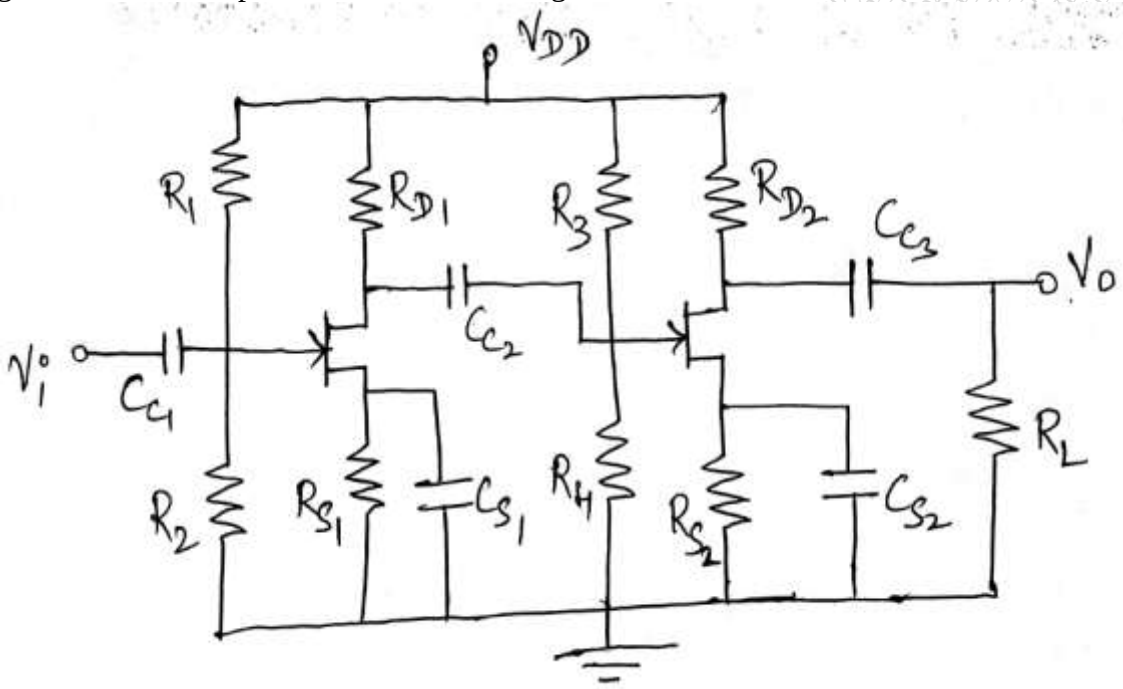
3. (a) With the help of neat block diagram, derive expression for R_{IF}, R_{OF}, G_{mF} for Voltage Series Negative Feedback Amplifier. Give significance of the above mentioned parameters. **10**

(b) Write Short Note on: Darlington Pair Amplifier. **10**

4. (a) Find the necessary condition for oscillations to occur and frequency of oscillations of Colpitts Oscillator. Also, explain its working. **10**

(b) Draw a neat diagram of Direct Coupled Class A Amplifier and explain its working. Hence, find its efficiency. **10**

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° C/W. The transistor is rated for 120 W at 25° C and has Q_{JC} = 0.5° C/W. The mounting insulation has Q_{CS} = 0.5° C/W. What maximum power can be dissipated if the ambient temperature is 40° C and $T_{J(max)}$ = 200° C

(c) Calculate frequency of Oscillation for Hartley Oscillator if $L_1 = L_2$ = 1mH and C = 0.2 µF. **05**

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