Time: **3 hour**   Max. Marks: **80**

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Q1 is compulsory.

Attempt any three from **Q2** to **Q6**.

Q1   **Solve any Five**   **4 Marks each**

A   Compare BJT and JFET.

B   Explain characteristics of Zener diode in Forward and Reverser bias. Comment on use of Zener diode as voltage regulator.

C   Differentiate between Small Signal amplifier and Large Signal amplifier.

D   Name the configurations of differential amplifiers. Draw any one. Also define parameters of differential amplifiers.

E   State and explain Millers Theorem.

F   What is thermal runway? Comment on ideas to avoid it.

G   Explain construction and working of E-MOSFET. Also draw its drain and transfer characteristics.

Q2   **10 Marks each**

A   Draw a circuit diagram CE amplifier employing NPN transistor, RC coupling with emitter register completely bypassed, an appropriate load register R_L. Derive expression for its input impedance, output impedance, voltage gain and current gain.

B   Determine Quiescent magnitudes of I_C and V_{CE} for the given network.
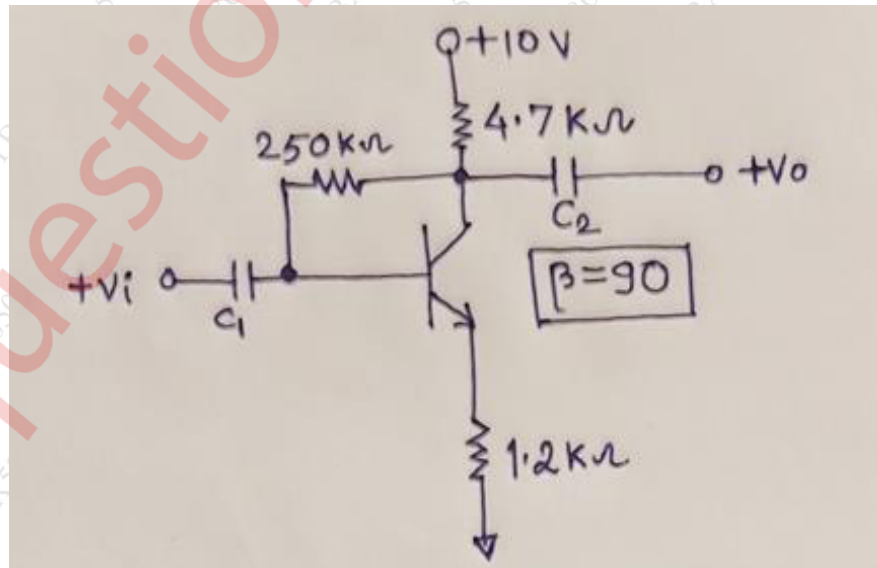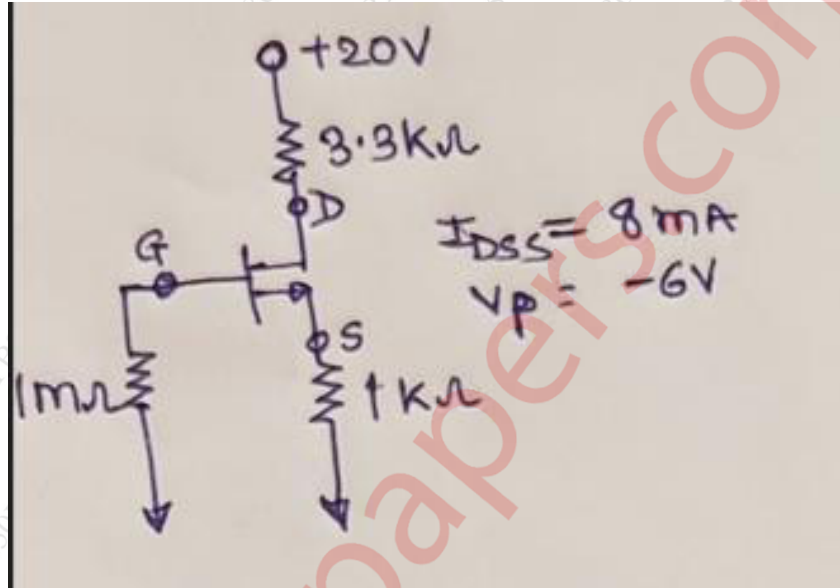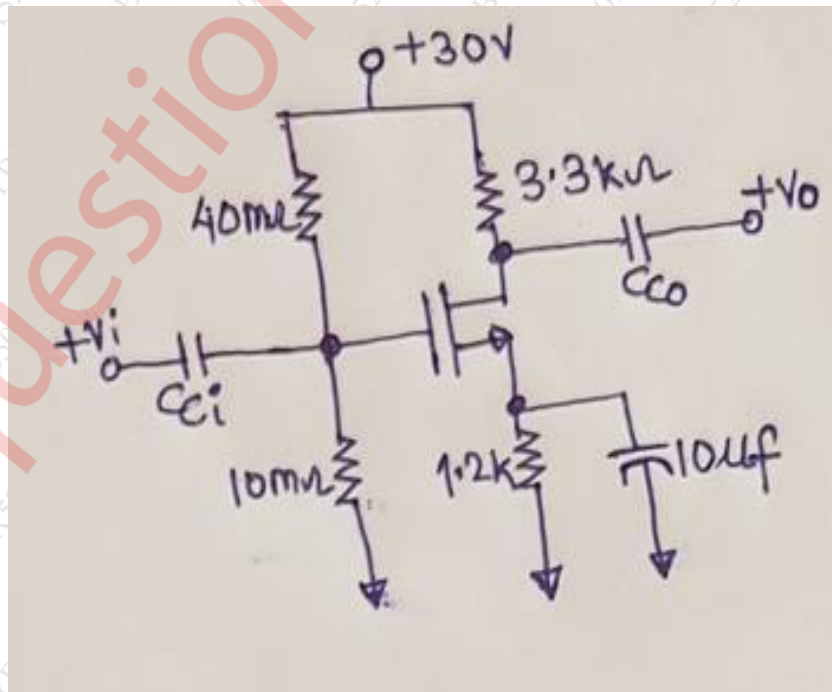
Q3

10 Marks each

A   Determine the following for the network shown
i) V_{GSQ} ii) I_{DQ} iii) V_{DSQ} & iv) V_D.

B   **Find |Av|, Zi and Zo For the given circuit.**

V_{GS} (Th) = V_{TN} = 3V, K = K_n = 0.4 mA/V^2 and r_o = r_d = 40 KΩ

Q4   **10 Marks each**

A   Explain the concepts of heat sink in detail. Also mention equations for design considerations of heat sinks in power amplifiers.

B   State brief classification of power amplifiers. Derive equation for efficiency of a transformer coupled class- A power amplifier.

Q5   **10 Marks each**

A   Determine input impedance (Z_i); output impedance (Z_o); voltage gain $(|A_V|)$ and current gain $(|A_I|)$ for network shown.
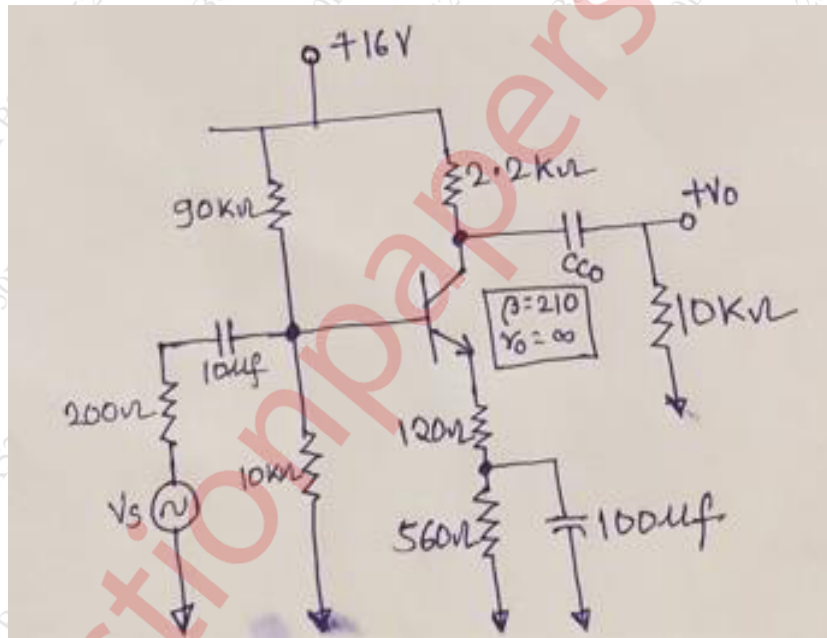
B   Draw a neat diagram of a MOS differential pair. Derive equation for CMRR for the same.

Q6   **Write short note on: [Any four]**   **5 marks each**

A   Compare in details DMOSFET and EMOSFET.

B   Explain concept of multistage amplifiers. State its advantages and disadvantages.

C   What do you understand by current mirror? Draw a two transistor (EMOSFET) current source and explain its operation.

D   What do you mean by crossover distortion in Class B power amplifiers? Can it be avoided? How?

E   Draw frequency response of Single Stage, RC coupled CS amplifier and comment on the effect of various external and internal capacitors.

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