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

  Q1 is compulsory. Attempt any three from Q2 to Q6.

Q1   **5 marks each**
A   What is a short note on Multistage Amplifiers?
B   Explain Miller's capacitance theorem.
C   Differentiate between voltage amplifier and power amplifier.
D   Draw and explain E-MOSFET as a differential amplifier.

Q2   **10 marks each**
A   Draw and explain a transformer coupled class A power amplifier with the help of neat diagram and waveforms and derive the expression of power efficiency.
B   Draw a small signal equivalent circuit of an E-MOSFET CS amplifier with voltage divider bias and R_s bypassed. Derive the expression for voltage gain, input resistance and output resistance.

Q3   **10 marks each**
A   Derive the equation of CMRR for the MOS differential pair amplifier.
B   Draw and explain high frequency model for BJT in CE configuration.

Q4   **10 Marks each**
A   Derive the expression for voltage gain, input impedance and output impedance for a CE amplifier with emitter bias and un-bypassed R_E.
B   Explain the operation of a MOS differential amplifier with common mode input signal

Q5   **10 Marks each**
A   Explain the operation of a MOS differential amplifier with differential mode input signal
B   Classify class A, class B and class AB power amplifiers

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Q6 **10 Marks each**

A Calculate low cutoff frequencies due to coupling and bypass capacitors of the circuit given in fig. 1
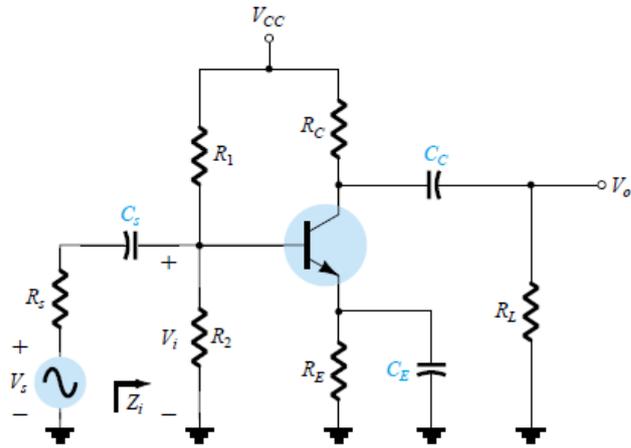
Fig. 1

$C_s = 10 \ \mu F,$ $C_E = 20 \ \mu F,$ $C_C = 1 \ \mu F$

$R_s = 1 \ k\Omega,$ $R_1 = 40 \ k\Omega,$ $R_2 = 10 \ k\Omega,$ $R_E = 2 \ k\Omega,$ $R_C = 4 \ k\Omega,$
$R_L = 2.2 \ k\Omega$

$\beta = 100,$ $r_o = \infty \ \Omega,$ $V_{CC} = 20 \ V$

B Determine the input impedance, output impedance, voltage gain and current gain for the given circuit. Refer fig. 2
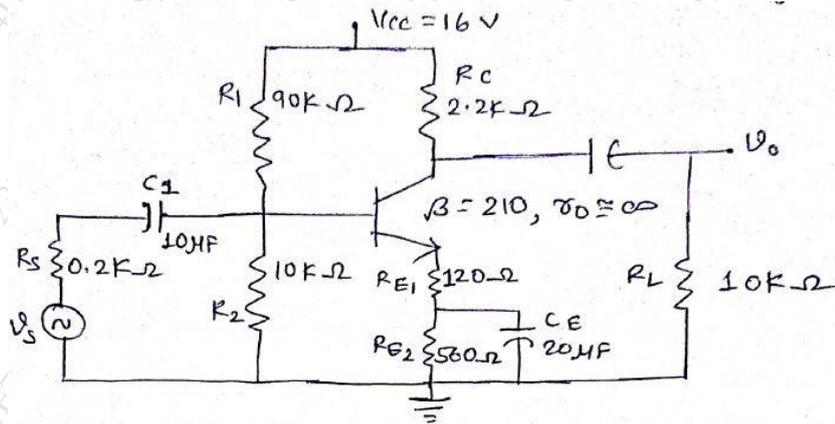

Fig. 2

1D2A1F748CAB23F082E24D300B242452