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

Q6 **10 Marks each**

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

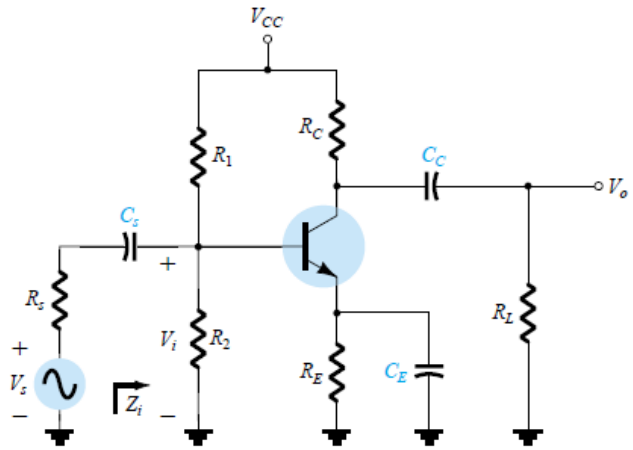

Fig. 1

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

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

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

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

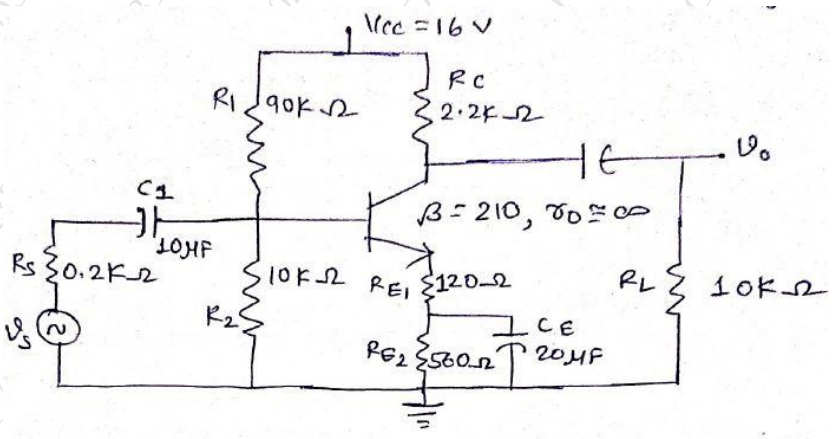

Fig. 2