Duration: 3hrs [Max Marks:80]

N.B.: (1) Question No 1 is Compulsory.
   (2) Attempt any three questions out of the remaining five.
   (3) Assume suitable data, if required and state it clearly.

Q1.   Attempt any **FOUR** [20]

     a. Write down the steps for construction root locus of a system. [5]

     b. What is a bridge circuit? Derive the generalized equation of a balanced bridge. [2+3]

     c. Define linearity, precision and resolution of an instrument. [5]

     d. Explain gain margin and phase margin in root locus. [5]

     e. Define Phase crossover frequency and Phase Margin in Bode Plot. [5]

Q2. a. Explain measurement of inductance using Maxwell bridge with proper circuit diagram. [10]

     b. Sketch the Root locus for the system having open loop transfer function, [10]

$$G(s)\,H(s) = \frac{K}{S(S+3)(S+6)}$$

Q3. a. For a unity feedback system given below, explain and sketch the Bode Plot. [10]

$$G(S) = \frac{10}{S(S+1)\,(S+5)}$$

     b. Sketch the root locus of the unity feedback control system with [10]

$G(s) = \frac{k}{s(s+5)(s+10)}$ and comment on the stability.

Q4. a. Explain Kelvin's Double Bridge and its application in very low resistance measurement [10]

     b. For the feedback control system $G(s)\,H(s) = \dfrac{1}{(S+2)\,(S+4)}$ Draw the Nyquist plot and comment on the stability of the System. [10]

Q5. a. $G(s)\,H(s) = \dfrac{10}{S\,(S+2)}$, Draw the polar plot of the system. [10]

     b. Explain the working of Wheatstone bridge for the measurement of medium resistance [10]

Q6. a. Discuss the correlation between time domain and frequency domain parameters. [7]

     b. Explain the working of Megohm Bridge. [7]

     c. Explain Hey Bridge and its applications in the measurement of inductance. [6]