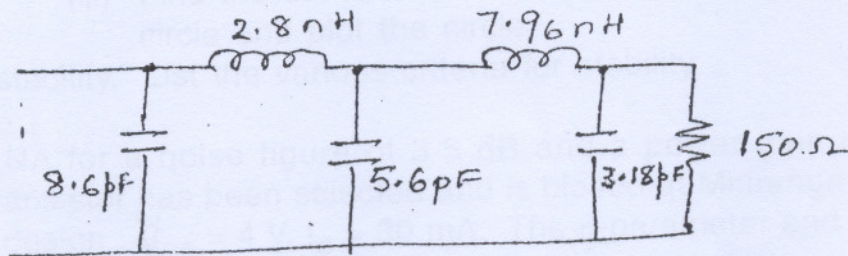


(REVISED COURSE)

(3 Hours)

[Total Marks : 100

- N.B (1) Question No. 1 is compulsory.
 (2) Attempt any four questions of the remaining questions.
 (3) Use of Smith Chart is compulsory.
 (4) Assume suitable data wherever required but justify the same.
 (5) Illustrate answers with sketches.
1. The s-parameters of a BJT measured at $V_{CE} = 10$ V, $I_c = 30$ mA and $f = 1$ GHz in a 50Ω system are : 20
- $$S_{11} = 0.73 \angle 175^\circ ; \quad S_{12} = 0 ;$$
- $$S_{21} = 4.45 \angle 65^\circ ; \quad S_{22} = 0.21 \angle -80^\circ .$$
- (i) Calculate the optimum terminations
 (ii) Calculate G_{smax} , G_{Lmax} and G_{Tmax} in dBs.
 (iii) Draw constant gain circles 2, 1, 0, -1 dB.
2. (a) A wideband amplifier (2-4 GHz) has gain of 10dB, an output power of 10dBm and a noise figure 10
 of 4 dB at room temperature. Find the output noise power in dBm.
 (b) Derive the expression for noise figure for multistage amplifier. 10
3. (a) In the circuit shown in figure, determine input impedance at frequency 1 GHz using the 15
 Smith Chart.



- (b) What are the essential criteria for oscillations. 5
4. (a) A GaAs MESFET has the following S parameters : 16
- $$V_{DS} = 4 \text{ V}, \quad I_{DS} = 0.9 I_{DSS} \text{ for } 9 \text{ GHz.}$$
- $$S_{11} = 0.55 \angle -150^\circ \quad S_{21} = 2.82 \angle 180^\circ$$
- $$S_{12} = 0.04 \angle 20^\circ \quad S_{22} = 0.45 \angle -30^\circ$$
- Design the input and output matching network for maximum power gain.
- (b) Define 1dB compression point and dynamic range. 4
5. (a) Find the input impedance, the reflection coefficient and the VSWR in a transmission line 10
 having an electrical length of 90° with $Z_0 = 50 \Omega$ and terminated in the load
 $Z_L = 50 + j100 \Omega$
 (Use Smith Chart)
 (b) Analyse a one port NR oscillator and explain Kurokawa's criteria. 10
6. (a) Explain how noise in oscillators can be determined. 8
 (b) Write a note on PIN diode. 8
 (c) Explain dielectric resonator oscillator in detail. 4
7. Explain the following in detail :— 20
- (a) Microwave phase shifters
 (b) Double Balanced Mixers
 (c) Varactor diodes
 (d) Switching Configuration.