

GANPAT UNIVERSITY

M. Tech. Semester -I (EC) Regular Examination, F - - JAN 2013

Elective (Microwave Engineering) (3EC 105)

Max. Time: 3 Hrs.]

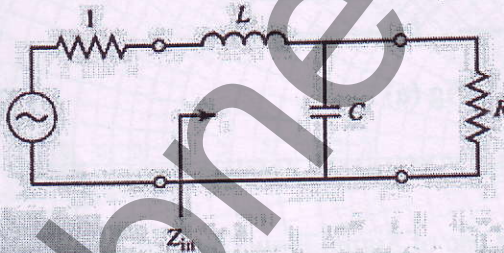
[Max. Marks: 70

Instructions:

1. Attempt **all** questions.
2. Answers to the **two** sections must be written in **separate** answer books.
3. Figures to the **right** indicate full marks.
4. **Assume** suitable data, if necessary.

SECTION -I

- 1 (A) As shown in following circuit For $N=2$, maximally flat low-pass filter prototype prove that $L=C=\sqrt{2}$. 6



- (B) Discuss in detail about Wilkinson power divider. 6

OR

- 1 (A) Derive equation and prove that the total reflection is dominated by the reflection from the initial discontinuity between Z_1 and Z_2 , and first reflection from the discontinuity between Z_2 and Z_L . 6

- (B) Discuss about insertion loss method to design microwave filter. Why amplitude and frequency scaling is required in it? 6

- 2 (A) What are the application fields of microwave resonators? Derive the required equations for parallel resonant circuit which works basically as microwave resonator circuit. 6

- (B) Prove that 3 port lossless and nonreciprocal network can be utilized as circulator device. 6

OR

- 2 (A) A lossless T junction has source impedance $Z_0 = 50$ Ohm. Find output characteristic impedance so that power is divided in 2:1 ratio. Also calculate reflection coefficients while looking in to output ports. 6

- (B) With help of suitable equations discuss insertion loss ratio. Discuss the same for maximally flat, equal ripple, elliptic and linear phase functions. 6

- 3 (A) Write short note Directional couplers. 4

- (B) Discuss the Bode-Fano criterion for designing a network for impedance matching purpose. 4

- (C) Discuss about MEMS technology in brief. 3

SECTION-II

- 4 A Find ABCD parameter values for following two port networks shown in fig (a) and fig (b). 6

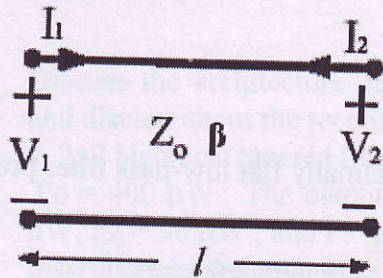


Fig (a)

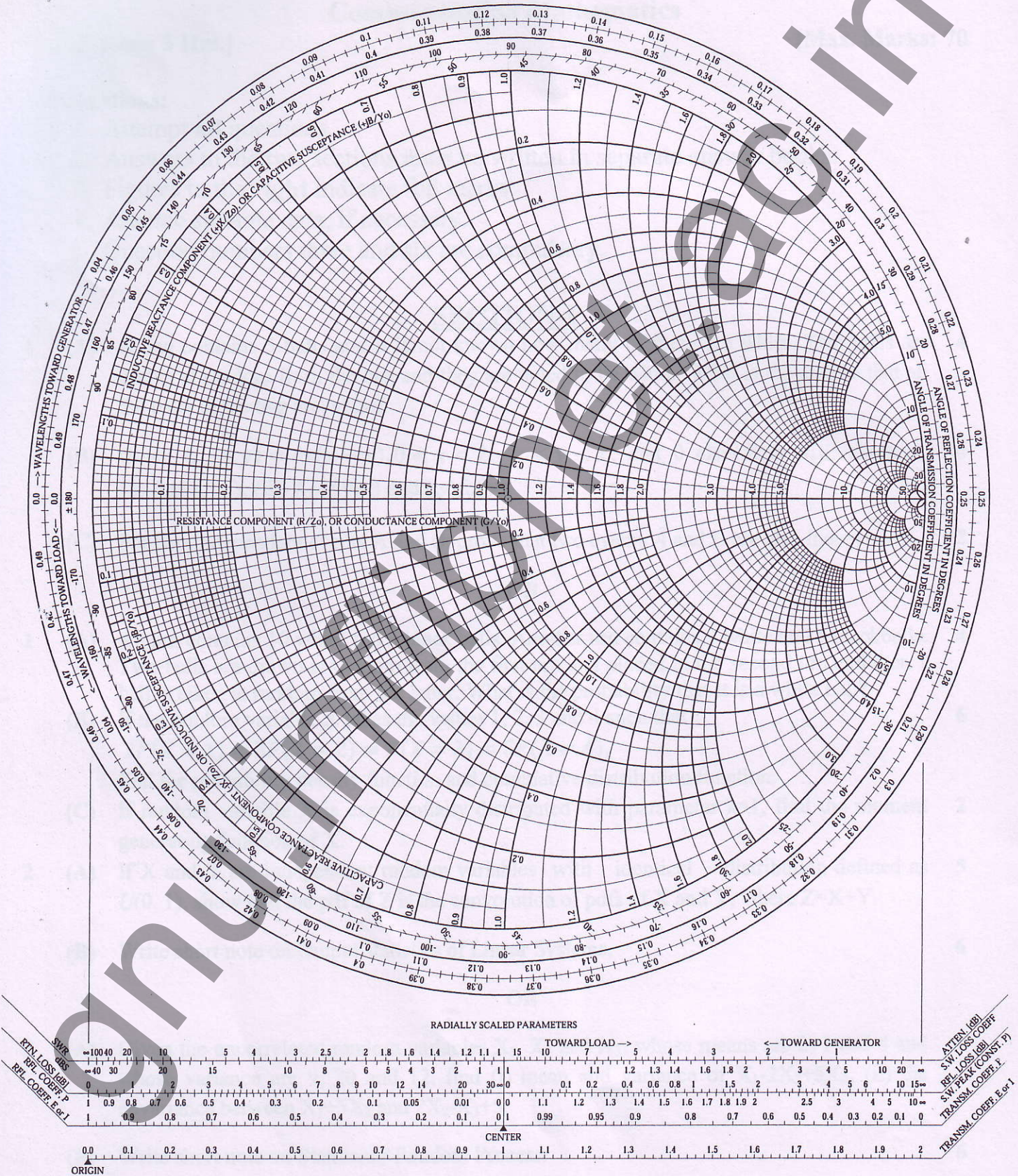


Fig (b)

- B What are Z and Y Matrices? Explain them in detail. 5
- 5 A Discuss about use of Signal Flow Graph for microwave network analysis process. 6
- B For two port network analysis, prove that if they are reciprocal then $AD-BC=1$. 6
- OR**
- 5 A Prove that for given N port network, a shift in reference plane will result in $S'_{mn} = e^{-2j\theta_n} S_{mn}$. 6
- B Discuss about Chebyshev multisession matching transformers. 6
- 6 A A load impedance $Z_L = 100 + j80 \Omega$ is to be matched to a 50Ω line using a single series open circuit tuner. Find two possible solutions of length and distance for the same. 6
- B What are the selection criteria of Binomial multi-section transformers? Explain the design of Binomial multi section transformer for impedance matching purpose. 6
- OR**
- 6 A Design a single section quarter wave matching transformer to match 10Ω load to 50Ω line at $f_0 = 3\text{GHz}$. Calculate fractional bandwidth in percentage for which $\text{SWR} \leq 1.3$. 6
- B Discuss the roll of single and double stubs for impedance matching process. 6

The Complete Smith Chart

Black Magic Design



ORIGIN

CENTER

ATTEN. (dB)
S.W. LOSS COEFF
RFL. LOSS (dB)
S.W. PWR. COEFF. F
TRANSM. COEFF. F