



(Pages : 3)

N – 6644

Reg. No. :

Name :

Eighth Semester B.Tech. Degree Examination, May 2022

(2008 Scheme)

08.825 : MICROWAVE DEVICES AND CIRCUITS (T)

Time : 3 Hours

Max. Marks : 100

Provide Smith Chart to students on their request.

PART – A

Answer **all** Questions.

1. Why we go for S-parameters at high frequencies?
2. How circuit analysis can be extended to microwave networks and list the merits and demerits.
3. What does theory of small reflection imply.
4. Draw the circuit showing RF bias of a transistor.
5. What is the avalanche zone velocity of a trappat diode if current density $=25\text{kA/Cm}^2$ and doping concentration $=1.8 \times 10^{15}/\text{cm}^3$.
6. Explain the working of TRAPPAT.
7. Explain the significance of Richard's transformation.
8. Write note on resonators.
9. Draw the even and odd mode field distributions in a microstrip coupled line.
10. List the characteristics of coupled lines.

(10 × 4 = 40 Marks)

P.T.O.



PART – B

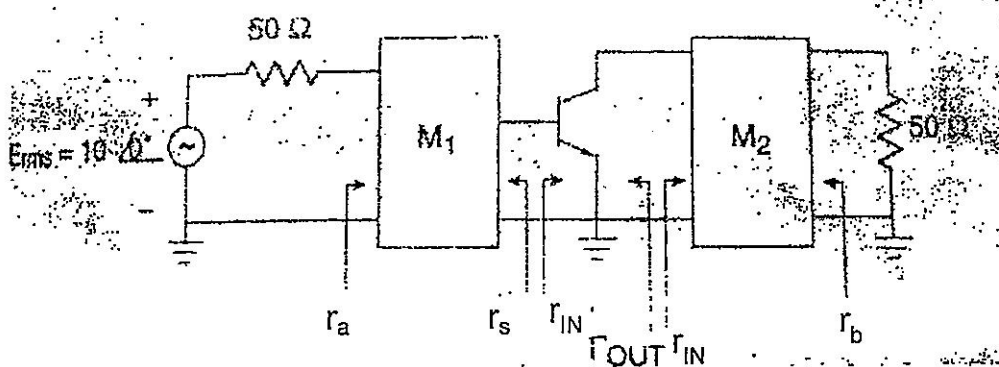
Answer any two Questions from each Module. Each Question carries 10 marks.

Module – I

11. Using Smith chart design all possible configurations of lumped 2 element matching network that match $Z_s = (50 + j25)\Omega$ to $Z_L = (25 - j50)\Omega$. Assume $Z_0 = 50\Omega$ and working frequency 2GHz.
12. Using open single series stub design a matching network that will transform $Z_L = (100 + j80)\Omega$ to a 50Ω feed line (smith Chart)
13. Design a quarter wave transformer to match 10Ω load to a 50Ω line at $f_0 = 3\text{GHz}$. Determine the percent bandwidth for which $\text{SWR} \leq 1.5$

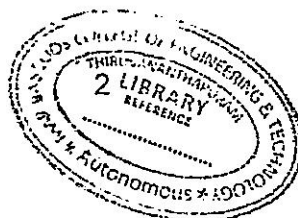
Module – II

14. Explain the mechanism of oscillation of IMPATT diode and its operating principle.
List the features and application of IMPATT.
15. Given amplifier



$$r_s = 0.5 \angle 120^\circ; r_L = 0.4 \angle 90^\circ$$

$$S_{11} = 0.6 \angle -160^\circ; S_{12} = 0.045 \angle 16^\circ; S_{21} = 2.5 \angle 30^\circ \text{ and } S_{22} = 0.5 \angle -90^\circ.$$



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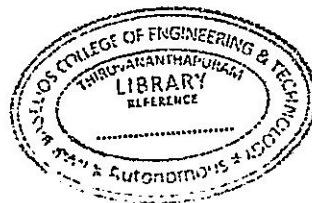


- (a) Determine G_T , G_A and G_P
 - (b) Power levels P_L , P_{IN} , P_{AVS} & P_{AVN}
 - (c) Mismatch loss at input and output of transistor
 - (d) input and output reflection coefficient
 - (e) $VSWR_{IN}$ & $VSWR_{OUT}$
16. Using lumped element network design broad band amplifier in the range 300-700MHz with a transducer power gain of 10dB. (Use Smith chart)

Freq.	S_{11}	S_{12}	S_{21}	S_{22}
300	$0.3 \angle -45^\circ$	0	$4.47 \angle 40^\circ$	$0.86 \angle -5^\circ$
450	$0.27 \angle -70^\circ$	0	$3.16 \angle 35^\circ$	$0.855 \angle -14^\circ$
700	$0.2 \angle -95^\circ$	0	$2 \angle 30^\circ$	$0.85 \angle -22^\circ$

Module – III

17. Design a low pas filter for fabrication using microstrip lines. Specifications are cut off freq. 4GHz, 3rd order, impedance 50Ω and a 3dB equal ripple characteristic.
18. Write notes on terminations; attenuators and capacitors.
19. Write notes on switches and limiters.



(6 × 10 = 60 Marks)

