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Reg. No : .....

Name : .....

Eighth Semester B.Tech. Degree Examination, November 2019

08.825 : MICROWAVE DEVICES AND CIRCUITS (T)

(2008 Scheme)

Time : 3 Hours Max. Marks : 100

PART – A

Answer **all** questions :

1. Explain the significance of shift in reference plane in microwave systems.

2. What are the features of signal flow graph and its advantages.

3. Show that it is impossible to construct a 3 port network i.e lossless, reciprocal and matched at all ports.

4. Draw the circuit diagram showing biasing of RF FET structure.

5. S-parameters for the HPHFET at 2GHz with bias voltage $V_{gs} = 0$ are ($Z_0 = 50\Omega$) $S_{11} = 0.894<-60.6^o$; $S_{12} = 0.020<62.4^o$; $S_{21} = 3.122 < 123.6^o$ and $S_{22} = 0.781<-27.6^o$. Determine the stability using K-Δ and μ-test.

6. Find the frequency of Gunn oscillator of length 12μm. Drift velocity is 2×10^8 m/s.

7. The drift length in a Gunn is 2.5μm .Determine the min. voltage needed to operate the Gunn.

8. Discuss the effect of strip thickness in microstrip lines.

P.T.O.

9. Write note on circulators.

10. At high frequencies why we prefer distributed elements instead of discrete elements.

(10 × 4 = 40 Marks)

PART – B

Answer **any two** questions from **each** Module each question carries **10** marks.

Module – I

11. Find the ABCD parameter of a transmission line of length l and propagation factor β.

12. For a load impedance Z_L= 60-j80Ω design two single stubs (short circuit) shunt tuning networks to match to a 50Ω line at 2GHz.

13. Design a double stub tuner to match Z_L= 60-j80Ω to a 50Ω line at 2GHz .Stubs are open circuit and are $\lambda/8$ apart.

Module – II

14. Explain why cavities are required for sustained oscillation of-ve one port devices.

15. Design for 18dB single stage MESFET amplifier operating at 5.7GHz with S-parameters S_{11} = 0.5<-60°; S_{12} = 0.02<0° S_{21} = 6.5<115° and S_{22} = 0.6<-35°

    (i) Determine if circuit is unconditionally stable

    (ii) Find max. power gain under optimal choice of reflection coefficients assuming S_{12} = 0.

    (iii) Adjust Γ_L such that desired gain is realized using the concept of constant gain circles.

16. Design a LNA with 8dB gain and a noise figure less than 1.6dB. Assume transistor has

    Fmin = 1.5dB; Rn=4Ω & Γopt=0.5<45°. Also I_C = 10mA V_{CE} = 6V operated at 2.4GHz S-parameters are S_{11} = 0.3<30°; S_{12} = 0.2<-60°; S_{21} = 2.5<-80° & S_{22} = 0.2 <-15°.

Module – III

17. Write note on coupled strip lines.

18. Write note on inductors and BPF.

19. Explain how to analyze microstrip coupled lines employing even & odd modes.

(6 × 10 = 60 Marks)