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Question Paper Code : 81366

M.E. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2013.

Second Semester

Communication Systems

CU 9223/CU 923/10244 CM 203 — MICROWAVE INTEGRATED CIRCUITS

(Regulation 2009/2010)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Mention the advantages of microwave integrated circuits over traditional circuits using printed circuit technology.

2. Classify microwave integrated circuits.

3. Why is micro machining essential for passive components?

4. Why are ideal filter characteristics not realised in practise?

5. State the conditions for stability.

6. Express transducer power gain interms of S parameters.

7. Draw the Leeson's model for oscillator phase noise.

8. Draw the equivalent circuit of a dielectric resonator oscillator.

9. What is the need for probe station?

10. What are band gap antennas?

PART B — (5 × 16 = 80 marks)

11. (a) Discuss in detail the various MIC materials used.

Or

(b) (i) What is multichip module technology? (7)

(ii) Explain active device technologies applicable to MICs. (9)

12. (a) Design a bandpass filter having a 0.5 dB equal-ripple response with N = 3. The center frequency is 1 GHz, the band width is 10% and the impedance is 50 Ω.

Or

(b) A single pole switch is to be constructed using a PIN diode with the following parameters $C_j = 0.1\ pF$, $R_r = 1\Omega$, $R_f = 5\Omega$, $L_i = 0.4\,nH$. If the operating frequency is 5 GHz and $z_0 = 50\ \Omega$, what circuit (series or shunt) should be used to obtain the greatest ratio of OFF to ON attenuation.

13. (a) A microwave transistor has the following S-parameters at 10 GHz, with a 50 Ω impedance. $S_{11} = 0.45\angle 150^\circ$, $S_{12} = 0.01\angle -10^\circ$, $S_{21} = 2.05\angle 10^\circ$, $S_{22} = 0.40\angle -150^\circ$. The source impedance is $z_S = 20\ \Omega$, $z_L = 30\Omega$. Compute the power gain and available gain.

Or

(b) Explain in detail the steps involved in designing a low noise amplifier.

14. (a) Analyse an image reject mixer using small signal approximation.

Or

(b) A one-port oscillator uses a negative resistance diode having $\Gamma in = 1.25\angle 40^\circ$ at its desired operating point for $f = 6$GHz. Design a load matching network for a 50 Ω load impedance.

15. (a) What is micro machining? Why is micro machining essential for antennas? How do you select integrated antennas?

Or

(b) (i) How can you carryout a thermal and cryogenic measurement? (8)

(ii) How can a passive component be tested using a RF probe station? (8)
