Reg. No. : | | | | | | | | | | |

Question Paper Code: 52223

M.E. DEGREE EXAMINATION, JUNE 2016

Second Semester

Communication Systems

15PCM203 – MICROWAVE INTEGRATED CIRCUITS

(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. The _____ has been a major driving force behind MMIC technology.

   (a) military and space (b) civil
   (c) medical systems (d) smart cards

2. In the _____ process, the material to be deposited on the substrate is subjected to heavy bombardment by the ions of a heavy inert gas.

   (a) vacuum evaporation (b) gas plating
   (c) sputtering (d) silk screening

3. For very precise control in doping profile and chemical composition, _____ is used.

   (a) molecular beam epitaxy (b) liquid phase epitaxy
   (c) vapour phase epitaxy (d) gas phase epitaxy

4. The major source of loss in microstrip lines with GaAs substrate is

   (a) substrate dielectric loss (b) conduction loss
   (c) radiation loss (d) insertion loss

5. Nonlinearity of the device is the basic principle of

   (a) frequency synthesizer circuit (b) matching circuit
   (c) resistor circuit (d) mixer circuit

PART B - (5 x 3 = 15 Marks)

6. What is the need for multichip module technology?

7. Mention the merits of thin film technology.

8. List the important characteristics required for a ideal substrate material.

9. Give the requirements to be considered for the design of inductors in MMICs.

10. Mention the criterion used to define the stability of microwave oscillator circuits.

PART C - (5 x 16 = 80 Marks)

11. (a) Compare the advantages and disadvantages of MMIC technology and mention its application in phased array antennas. (16)

Or

(b) Describe the active device technologies and design approaches followed in MMIC technology. (16)

12. (a) Describe the different thick film materials and processes involved in building a multi- layer thick film hybrid circuit. (16)

Or

(b) Describe the various packages used for encapsulation and mounting of devices. (16)

13. (a) Explain in detail the processes involved in the diffusion and ion implantation stages of MMIC fabrication. (16)

Or

(b) (i) Explain the photolithographic process in Monolithic MIC fabrication. (8)

(ii) Describe the different components of an electron beam lithography system. (8)

14. (a) With schematic diagram, explain the fabrication geometry of a generic resistor, Metal-Insulator-Metal capacitor and Interdigitated capacitor. Draw the lumped element equivalent circuit for each. (16)

Or

(b) Describe the use of multilayer and micromachining techniques to fabricate passive components. (16)

15. (a) Explain with circuit diagram, the varactor diode modelling and principle of working of MMIC voltage controlled oscillator. (16)

Or

(b) (i) Explain the use of matching techniques for impedance transformation. (8)

(ii) Explain with diagram, the design of a reactively matched amplifier, assuming suitable values for the design. (8)

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