Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
Manipal University

SEVENTH SEMESTER B.TECH (E & C) DEGREE END SEMESTER EXAMINATION - NOV/DEC 2016
SUBJECT: MICROWAVE INTEGRATED CIRCUITS (ECE - 441)

TIME: 3 HOURS **MAX. MARKS: 50**

Instructions to candidates
- Answer **ANY FIVE** full questions.
- Missing data may be suitably assumed.

1A. Design a rectangular microstrip antenna using a substrate with dielectric constant $\varepsilon_r = 3.2$, substrate height $h = 1.6cm$, so as to resonate at 1.5GHz. Compare the Physical and effective length of patch antenna.

1B. What is Isolator? What are the applications of it? How the modes of waves are changes in it?

1C. What is gyromagnetic resonance? and its resonance frequency.

(5+3+2)

2A. Explain the fabrication, V-I characteristics and its different mode of switching configuration of PIN Diode.

2B. How the frequencies are up and down converted in the microwave mixer? Explain mathematically.

2C. A transmission line has the following parameters: R=2 ohm/m, G = 0.5 mili mho/m, f = 1GHz, L = 8 nH/m, C = 0.23pf, Calculate (a) the characteristics Impedance; (b) the propagation constant.

(5+3+2)

3A. Determine the characteristics impedance and the effective dielectric constants for a microstrip transmission line fabricated in an alumina substrate (e_r = 9.7) if the ratio w/h is (i) 0.5 (ii) 5. Also find the velocity of propagation in each case.

3B. What is frequency multiplier? Explain diode frequency multiplier.

3C. For a certain transmission line, the return loss for a load is observed to be equal to 18 dB. Calculate the reflection coefficient and SWR

(5+3+2)

4A. Calculate the width and length of a microstrip line for a 50Ω characteristic impedance and a 90^0 phase shift at 0.75 GHz, the substrate thickness h= 1.6mm, with $\varepsilon_r = 4.7$

4B. Write three each relative advantages and Disadvantages of MMIC over hybrid MIC

4C. What are types of coupler? Explain its even and odd mode analysis.

(5+3+2)

5A. An X-band waveguide filled with Teflon ($\varepsilon_r = 2.08$) is operating at 9.5 GHz. Calculate the speed of light in this material and the phase and group velocities in the waveguide.

5B. Explain with diagram
i) Reciprocal and Non Reciprocal Phase Shifters.
ii) Electrical length of Microstrip

5C. Explain the following: (a) Image frequency (b) Conversion Loss

(5+3+2)

6A. Explain the fabrication Method of Schottky Barrier Diode (SBD) and working principle of SBD.

6B. What are types of losses in transmission line? Explain any three with mathematical equations.

6C. Explain (a) Critical coupling (b) Aperture coupled cavity

(5+3+2)