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 Wilkinson compensated power divider at $f = 1.33GHz$, the substrate height $h = 0.635mm$, dielectric constant $\varepsilon_r = 10.2$ and k = 0.1.

1B. What is Isolator? What are the applications of it? How the modes of waves 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. Design a three pole microstrip low pass filter in chebyshev response for the given parameters ,dielectric Constant $\varepsilon_r = 10.2$, substrate height $h = 1.27mm$, cut off frequency $f_c = 1GHz$. the prototype constant for a pass band ripple =0.1db are $g_0 = g_4 = 1, g_1 = g_3 = 1.0000, g_2 = 2.000.$

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. Design a microstrip high pass filter by using ditributed short circuited stubs for the given parameters n=4, $f_c = 1.5GHz, \varepsilon_r = 2.2, h = 1.57mm$, the admittance are
$y_1 = 0.32300, y_{1,2} = 1.07842, y_2 = 0.39443, y_{2,3} = 1.06488.$

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

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

(5+3+2)

5A. Design a 20dB single section coupled line coupler in strip line with a ground plane spacing of 1.6 mm, a dielectric constant of 4.7, a characteristics impedance of 50 ohm, a centre frequency of 1GHz.

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 the types of losses in transmission line? Explain any three with mathematical equations.

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

(5+3+2)