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BIELE-004

B.Tech. – VIEP – ELECTRONICS AND COMMUNICATION ENGINEERING (BTECVI)

Term-End Examination

December, 2015

BIELE-004 : RF CIRCUITS

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any **seven** questions. All questions carry equal marks. Missing data may be suitably assumed.*

1. (a) Draw the equivalent circuits of transmission lines.

(b) Derive the input impedance equation of a transmission line of length '*l*'. *2×5=10*

2. (a) Derive an expression for the 'Noise Figure' of cascaded networks.

(b) Explain the characteristics of passive IC components at RF frequencies. *2×5=10*

3. Show that the ideal Class A amplifier has an efficiency of 50% and the ideal Class B amplifier has an efficiency of $\pi/4$ or 78·5%. *10*

4. (a) The parameters of a transmission line are R = 2 Ω/m, G = 0·5 ms/m, L = 8 nH/m and C = 0·23 pf/m. If the signal frequency is 1 GHz, calculate its characteristic impendence (Z_0) and the propagation constant (γ). *6*

(b) A signal propagating through a 50 Ω distortionless transmission line attenuates at a rate of 0·01 dB per metre. If this line has a capacitance of 100 PF per metre, find (i) R, (ii) L, (iii) G, and (iv) v_p. *4*

5. (a) Derive the expression for a two-port network to be unconditionally stable.

(b) Explain two-port stability criterion. *2×5=10*

6. (a) Explain different types of RF power amplifiers. Briefly explain each with its application point of view.

(b) Explain the linearity consideration of RF power amplifiers. *2×5=10*

7. (a) What is noise ? Describe the noise models for active and passive components.

(b) Explain the operation of diode-ring mixers. *2×5=10*

8. (a) Explain the basic building blocks design of a Low noise amplifier. Write the LNA topologies.

(b) What is the difference between neutralization and unilateralization of high frequency amplifier design ? *2×5=10*

9. (a) Discuss about multiplier-based mixers and subsampling mixers.

(b) Explain the operation principle of an RF oscillator by drawing its suitable diagram.

(c) What is negative resistance oscillator ? Explain its principle. *4+4+2=10*

10. Write short notes on any ***two*** of the following : *2×5=10*

(a) Synthesizer

(b) Shunt-Series Amplifier

(c) S-parameters