B.E. Electronics & Telecommunication / Communication Engineering / Electronics Engineering
Sem-VIII

EC8055 - Elective-II : Radio Frequency Circuit Design

P. Pages : 2 **GUG/S/19/2036**

Time : Three Hours * 1 5 1 2 * Max. Marks : 80

Notes : 1. All questions carry marks as indicated.
2. Assume suitable data wherever necessary.
3. Illustrate your answers wherever necessary with the help of neat sketches.

1. a) Explain parallel RLC tank circuit with respect to following term. **8**
i) Q
ii) Branch current at resonance.
iii) Bandwidth and Q.

b) Explain tapped capacitor Resonator as an impedance matching network. **8**

OR

2. a) Derive the expression for L_1 and L_2 of tapped inductor resonator network. **8**

b) Prove that **8**
$\delta = \sqrt{\frac{2}{\omega\mu\sigma}}$.

3. a) Explain operation of MESFETS with its construction and V-I characteristics. Also state its application. **8**

b) Explain TUNNEL diode with its V-I characteristics and energy level diagram. **8**

OR

4. a) What are the applications of Gunn diode. **4**

b) Explain IMPATT diode with its construction and V-I characteristics. Also state its application. **8**

c) An IMPATT diode has a drift length of $2\mu m$. Determine. **4**
i) The drift time of the carrier.

ii) The operating frequency of the diode.
Take $Vd = 10^5 cm/sec$.

5. b) Explain LNA topologies and design in details. **8**

b) Explain linearity and large signal performance in LNA. **8**

OR

6.	a)	Explain the operation of 1.5 GHz, 8mW single-ended LNA.	**8**
	b)	What is LNA. Explain differential LNA with neat diagram.	**8**
7.	a)	Explain the design of class 'A' power amplifier.	**8**
	b)	Show that the maximum drain efficiency of a class B RF power amplifier is 0.785.	**8**

OR

8.	a)	Explain the polar feedback technique to improve the linearity of RF power amplifier.	**8**
	b)	Draw the design class E RF power amplifier using CMOS to supply 1W power to 50Ω load with 3.3V DC supply. Assume Q = 10.	**8**
9.	a)	Explain the design of dielectric resonator oscillator.	**8**
	b)	Derive the expression of conversion gain of square law MOSFET mixer and also show that its transconductance independent of bias.	**8**

OR

10.	a)	What is fixed frequency oscillator. Hence explain fixed frequency lumped element oscillator.	**8**
	b)	Explain single balanced mixer.	**4**
	c)	Explain characteristics of mixer.	**4**

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