

www.FirstRanker.com

www.FirstRanker.com

### Code: 15A04804

Ranker.com R15

B.Tech IV Year II Semester (R15) Advanced Supplementary Examinations July 2019 **RF INTEGRATED CIRCUITS** 

(Electronics & Communication Engineering)

Time: 3 hours

1

Max. Marks: 70

PART – A

(Compulsory Question)

\*\*\*\*\*

Answer the following: (10 X 02 = 20 Marks)

- (a) Calculate the resonant frequency of a parallel RLC tank, given L = 1 nH, C = 1 pF.
- (b) State skin effect.
- (c) Write the wave equation in one space dimension.
- (d) In an open-circuit time constant if  $R_1 = R_2 = 10 \text{ k}\Omega$  and  $C_1 = C_2 = 100 \text{ pF}$ , what are the pole frequencies?
- (e) Having the noise factor,  $F = SNR_i / SNR_o$  give the expression to find noise figure.
- (f) Differentiate between power match and noise match.
- (g) In a VCO if CM change at X and Y is indistinguishable from a change in V<sub>cont</sub>, then what will be the change in the oscillation frequency?
- (h) While constructing a charge-pump PLL using PFD/CP, the loop ideally forces the input phase error to zero. Justify your answer.
- (i) Define fractional frequency.
- (j) List out some advantages of GSM radio architectures.

## PART – B

(Answer all five units, 5 X 10 = 50 Marks)

# UNIT - I

2 Draw the phasor diagram for a parallel RLC circuit. And derive the expression for impedance and current triangle of the circuit.

OR

### 3 (a) Differentiate between Pi match and T match.

(b) Why does the skin effect occur? Mention the factors affecting skin effect in a conductor carrying a.c current.

### UNIT – II

4 An air-filled 50Ω coaxial line has a loaded VSWR of 3.3 at a frequency of 3 GHz. Replacing the load with a short cause the voltage minimum to move 1.0 cm towards the generator. What is the normalized load impedance?

OR

Contd. in page 2



www.FirstRanker.com

www.FirstRanker.com

### Code: 15A04804

5 In the folded cascade circuit shown in figure below, all transistors have the same  $\mu C_{ox}(W/L)$ , the same  $\lambda$  and  $I_{D2} = 2I_{D1}$ . Find the gain and the output resistance of the amplifier (in terms of  $g_{m1}$  and  $r_{01}$  only).



6 Lay out an LNA and connect its input to a pad through a metal line with the length of 200µm and width of 0.5µm. By assuming a noise figure of 2dB for the LNA and a sheet resistance of about 40 mΩ for the metal line determine the overall noise figure. Neglect the input-referred noise current of the LNA.

#### OR

7 Which device is used to convert baseband signal or IF frequency to a higher IF or RF frequency for efficient transmission in transmitters? Explain its operation in detail.

### UNIT – IV

8 Which amplifier operates linearly across the full input and output range while the transistors remain ON? Explain in detail with necessary equations.

#### OR

- 9 (a) Write a brief note on resonators.
  - (b) If the input frequency changes by  $\Delta \omega$ , how much is the change in the phase error? Assume the loop remains lock.

#### UNIT – V

- 10 (a) During synthesizer settling, the power amplifier in a transmitter is turned OFF. Explain why?
  - (b) Compute the required reference frequency and range of divide ratios for an integer-N synthesizer designed for a Bluetooth receiver for direct conversion and sliding-IF down conversion with f<sub>LO</sub>=(2/3) f<sub>RF</sub>.
    OR
- 11 Explain in detail about GSM radio architectures and list out its advantages and disadvantages.

\*\*\*\*\*