



Code: 15A04804

B.Tech IV Year II Semester (R15) Advanced Supplementary Examinations July 2019

RF INTEGRATED CIRCUITS

(Electronics & Communication Engineering)

Time: 3 hours

Max. Marks: 70

PART – A

(Compulsory Question)

- 1 Answer the following: (10 X 02 = 20 Marks)
- (a) Calculate the resonant frequency of a parallel RLC tank, given $L = 1 \text{ nH}$, $C = 1 \text{ pF}$.
 - (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, $F = \text{SNR}_i / \text{SNR}_o$, 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_{cont} , 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?

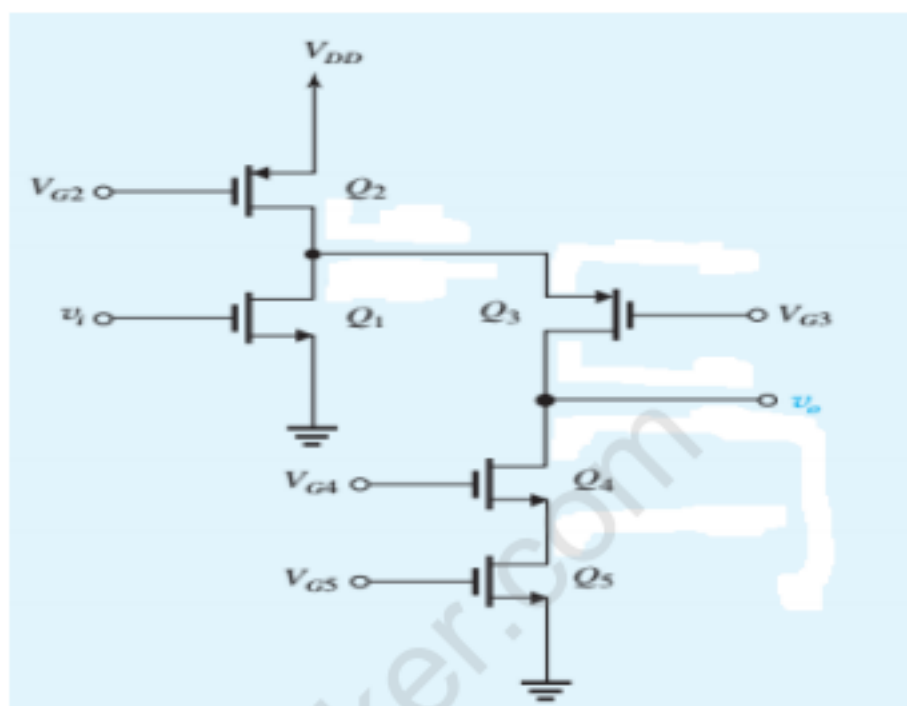
OR

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- 5 In the folded cascade circuit shown in figure below, all transistors have the same $\mu C_{ox}(W/L)$, the same λ and $I_{D2} = 2I_{D1}$. Find the gain and the output resistance of the amplifier (in terms of g_{m1} and r_{o1} only).



UNIT - III

- 6 Lay out an LNA and connect its input to a pad through a metal line with the length of $200\mu\text{m}$ and width of $0.5\mu\text{m}$. By assuming a noise figure of 2dB for the LNA and a sheet resistance of about $40\text{ m}\Omega$ 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 $f_{LO} = (2/3)f_{RF}$.

OR

- 11 Explain in detail about GSM radio architectures and list out its advantages and disadvantages.
