



M.E DEGREE EXAMINATIONS: JUNE 2015

(Regulation 2014)

Second Semester

COMMUNICATION SYSTEMS

P14COTE41: RF System Design

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Match list I with list II and select the correct answer using the codes given below the list [K₂]

List I	List II
A. Capacitive Reactance X_c	i. $(\pi f \mu \sigma_{\text{cond}})^{-1/2}$
B. Skin depth δ	ii. ωL
C. DC resistance R_{DC}	iii. $l / \pi a^2 \sigma_{\text{cond}}$
D. Inductive reactance X_L	iv. $1/\omega C$

A B C D

- a) i ii iii iv
b) ii i iv iii
c) iv i iii ii
d) iii iv ii i

2. The frequency range of high frequency is [K₂]

- a) 300-3000 MHz b) 3000-30000 MHz
b) 30-300 MHz d) 3-30MHz

3. RF filter Design uses [K₄]

- a) Kuroda s identity b) Kuroka s identity
c) Karoda s identity d) Kuruku s identity

4. The transformation used in RF filter design is [K₄]

- a) Laplace transformation b) Z transformation
c) Richard transformation d) Wavelet transformation

15. Compare MESFET and HEMT [K₂]
16. Stating the various reasons [K₅]
i) $\lambda/4$, ii) $\lambda/8$, iii) $\lambda/6$, and iv) $\lambda/2$,
17. Compare the stability and noise features of RF amplifiers. [K₂]
18. Summarize the parameters of RF amplifiers [K₂]
19. Distinguish between RF oscillator and low frequency oscillator [K₄]
20. Select a suitable oscillator for radio frequency operation from the four oscillators by [K₅]
Stating the reasons
i) Hartley oscillator, ii) YIG oscillator, iii) Colpitts oscillator and iv) Wein bridge oscillator

PART C (10 x 5 = 50 Marks)

21. Illustrate the impedance response of metal film resistors. [K₂]
22. Explain with simplified circuit diagram of the first stage of a 2 GHz power amplifier for a cellular phone. [K₂]
23. Explain the frequency response for 3 dB Chebyshev filter design. [K₂]
24. Analyze and obtain Kuroda's four identities and summarize it in a table. [K₄]
25. Summarize the generic hetero structure of a depletion mode HEMT. [K₂]
26. Obtain equation for I_D the drain current and V_{GS} the gate source Voltage for a MESFET. [K₄]
27. Using operating and available power gain circles explain RF amplifier Design. [K₂]
28. Explain constant VSWR circles in RF amplifier design. [K₄]
29. Explain with equations the design of YIG tuned oscillator. [K₂]
30. Using equations explain basic concepts of Mixer. [K₂]

PART D (2 x 10 = 20 Marks)

31. i) Use design equations and explain how RF capacitor and inductor are made. (5) [K₂]
ii) Explain how Smith chart is obtained from first principle with necessary equations (5)
32. Design a low pass filter whose input and output are matched to a 50 ohm impedance and that meets the following specifications: cut off frequency 3 GHz; equi ripple of 0.5 dB; and rejection of at least 40 dB at approximately twice the Cut off frequency. Assume a dielectric material that results in a phase velocity 60% of the speed of light. Analyze. [K₄]
