KUMARAGURU college of technology
character is life

Register Number:……

M.E DEGREE EXAMINATIONS:JUNE 2017

(Regulation 2015)

Second Semester

COMMUNICATION SYSTEMS

P15COTE14: RF System Design

COURSE OUTCOMES

CO1: Describe The various passive and active components for radio frequency circuits

CO2: Analyze micro strip line filters

CO3: Analyze the biasing methods for RF amplifiers

CO4: Compare the various RF oscillators for their performance.

CO5: Design matching networks using smith charts

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Assertion (A):The transceiver is a RF system CO1 [K_4]

   Reason (R):Since it has a transmitter and receiver

   a) Both A and R are individually true and R is the correct explanation for A
   b) A is true but R is false
   c) Both A and R individually true but R is not correct explanation of A
   d) A is false but R is true

2. The frequency range of Very high frequency is CO1 [K_2]

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

3. A type of Resonant filter is CO2 [K_2]

   a) Butter worth filter
   b) Active filter
   c) Digital filter
   d) Passive filter

4. Matching list I with list II and select the correct answer using the codes given below the list CO2 [K_3]

List I	List II
A. Insertion loss IL	1 RF filter
B. Shape factor	2. elliptic filter

C. ripples in the stop and pass bands	3 $= BW^{60dB}/ BW^{3dB}$
D. Resonant filter	4 $= \log P_{in}/ P_L$

	A	B	C	D
a)	1	2	3	4
b)	3	4	1	2
c)	4	3	2	1
d)	1	4	3	2

5. Assertion (A): Varactor diode is a 2 terminal Semiconductor device CO1 [K_3]
Reason (R): Therefore it can be implemented using mesa processing technology.
a) Both A and R are individually true and R is the correct explanation for A
b) A is true but R is false
c) Both A and R individually true but R is not correct explanation of A
d) A is false but R is true

6. HEMT is a CO1 [K_3]
a) High electron mobility transistor
b) Heavier electron mobility transistor
c) High electrical mobility transistor
d) High energy mobility transistor

7. In amplifier design consideration have to be given to CO5 [K_2]
1.Stability
2. VSWR.
3. Shape of the circuit.
4. Elegance of the circuit.
Which of the following statements are correct.
a) 2,3
b) 3,4
c) 1,2
d) 1,4

8. Assertion (A): A smith chart is used to design matching network CO5 [K_3]
Reason (R): A matching network uses transistors
a) Both A and R are individually true and R is the correct explanation for A
b) A is true but R is false
c) Both A and R individually true but R is not correct explanation of A
d) A is false but R is true

9. Oscillator is used in a receiver as a COL [K_2]
a) local oscillator
b) Detector
c) amplifier
d) modulator

10. The following are various circuits from antenna to LP filter in a heterodyne receiver system incorporating a mixer. CO4 [K_2]

1. LNA , 2. Detector, 3. Combiner , 4. LP filter, 5. Antenna

The correct sequence from antenna to LP filter is

a) 1,3,5,4,2 b) 5,1,3,2,4

c) 2,4,5,3,1 d) 1,3,4,1,2

PART B (10 x 2 = 20 Marks)

11.	Select a suitable resistor for radio frequency operation from the four resistors by Stating the reasons i)carbon resistor ,ii) mica resistor, iii) ceramic resistor and iv) Chip resistor.	CO1	[K_4]
12.	Describe with a figure an RF capacitor.	CO1	[K_2]
13.	Analyze Richards transformation used for RF filter design.	CO2	[K_3]
14.	What is unit element where it is used?	CO2	[K_3]
15.	Explain the concept of matching network	CO5	[K_2]
16.	Draw and explain Metal semiconductor FET (MESFET).	CO1	[K_2]
17.	Explain a Active biasing method used in RF amplifier	CO3	[K_2]
18.	Describe any one type RF diode.	CO1	[K_2]
19.	Explain the various types of mixers used in RF.	CO4	[K_2]
20.	Select a suitable oscillator for radio frequency operation from the four oscillators stating the reasons i)RC phase shift oscillator ii) Blocking oscillator iii) dielectric resonator oscillator iv) clapps oscillator.	CO4	[K_4]

PART C (10 x 5 = 50 Marks)

21.	Explain the diagram of a RF inductor.	CO1	[K_2]
22.	Analyse and obtain normalized input impedance z_{in} equation in terms of $\Gamma_i$and Γ_r real and imaginary parts of of Reflection coefficient $\Gamma(d)$ of a transmission line as a function of distance.	CO1	[K_4]
23.	Analyze and obtain equation for High pass resonant filter transfer function.	CO2	[K_3]
24.	Analyze and obtain equation for V_e , I_e ; V_{od} ,I_{od} ; Z_{oe} , Z_{oo} ; C_{od} for a coupled filter.	CO2	[K_3]
25.	Explain cross sectional view of PIN diode and a circuit model of typical PIN diode in series connection.	CO1	[K_2]
26.	Analyze and obtain I the forward current and C_d the diffusion capacitance of PIN diode.	CO1	[K_3]
27.	Draw the block diagram of a Generic amplifier system and explain its features.	CO3	[K_2]
28.	Explain various parameters of RF amplifier.	CO3	[K_2]
29.	Draw and analyze the circuit of any RF oscillator and explain its working.	CO5	[K_3]
30.	Describe any one type mixer used in RF receivers.	CO5	[K_2]

Answer any TWO Questions

PART D (2 x 10 = 20 Marks)

31.	analyze a low pass filter and obtain H(ω) and α(ω) and draw the attenuation profile of the low pass filter.	CO2	[K_3]
32.	Describe with figures and equations High frequency resistors, High frequency capacitors and high frequency inductors.	CO1	[K_2]
33.	Describe Stability considerations and Constant gain circles concepts in RF amplifier Design	CO3	[K_2]

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