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M.TECH
(SEM I) THEORY EXAMINATION 2022-23
RF CIRCUIT DESIGN

Time: 3 Hours | *Total Marks: 70*

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. **2 x 7 = 14**

(a) What is SOC
(b) What are mm range of frequency
(c) What is insertion loss in RF circuit
(d) What is SWR
(e) What is condition for sustained oscillation
(f) What is low noise amplifier
(g) What is coupling and isolation

SECTION B

2. Attempt any *three* of the following: **7 x 3 = 21**

(a) Explain sensitivity and dynamic range with respect to RF receiver
(b) What is significance of Scattering parameters
(c) Explain Multistage large signal amplifier design
(d) Explain one diode mixer? Illustrate with an example
(e) How impedance matching is achieved through Quarter Wave transformer λ/4

SECTION C

3. Attempt any *one* part of the following: **7 x 1 = 7**

(a) Explain tunned resonant circuit?
(b) Find the high frequency impedance behavior of a 500Ω with 2.5cm copper wire connection of AWG 26 and a stray capacitances C_a=5pF

4. Attempt any *one* part of the following: **7 x 1 = 7**

(a) Design of a 18dB single stage MESFET amplifier operated at 5.7GHZ
(b) Explain how signal distortion can be overcome through amplifier design

5. Attempt any *one* part of the following: **7 x 1 = 7**

(a) For a 200Mhz a Colpitts BJT oscillator in CE configuration. For the bias point of V_{CE}=3V and I_C=3mA, C_{BC}=0.1fF, r_{BE}=2k, r_{CE}=10kΩ, C_{BE}=100 fF. Inductance should not exceed 50nH. Find the value of capacitance in feedback loop
(b) Explain Dielectric Resonant oscillator?

6. Attempt any *one* part of the following: **7 x 1 = 7**

(a) What is mixer in RF networks? Design a mixer for conversion loss for SSB mixers
(b) What is smith chart? What is its practical implementation in RF design

7. Attempt any *one* part of the following: **7 x 1 = 7**

(a) Explain design rules for a matching using L networks? Why matching is so important in RF circuit design
(b) Explain what is four port network? What is a circulator