



KUMARAGURU
college of technology
character is life

B.E DEGREE EXAMINATIONS: DEC 2022

(Regulation 2018)

Seventh Semester

ELECTRONICS AND COMMUNICATION ENGINEERING

U18ECI7204:RF and Microwave Engineering

COURSE OUTCOMES

- CO1:** Implement and analyze various two port RF networks (K4, S3)
CO2: Design and analyze RF transistor amplifiers (K4, S3)
CO3: Measure and analyze the characteristics of active and passive microwave devices (K3,S3)
CO4: Analyze various Microwave tubes (K4)
CO5: Measure the parameters like VSWR, impedance, frequency, power of microwave sources and loads (K3,S3)

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 2 = 20 Marks)

(Answer not more than 40 words)

- | | | |
|---------------------------------------------------------------------------------------------------------|-----|-------------------|
| 1. Recall the frequency range of the following IEEE microwave bands:
L band, S band, C band & X band | CO1 | [K ₂] |
| 2. Examine the passive chip components in terms of their sizes and electric characteristics. | CO1 | [K ₃] |
| 3. Identify the factors to be considered in the selection of a particular matching network. | CO2 | [K ₂] |
| 4. What is the need for impedance matching networks? | CO2 | [K ₃] |
| 5. Point out the differences between Isolator and Circulator. | CO3 | [K ₂] |
| 6. Outline the key concepts of Microwave Integrated Circuits. | CO3 | [K ₂] |
| 7. Compare TWT amplifier and Klystron amplifier. | CO4 | [K ₂] |
| 8. Justify the purpose of slow wave structures used in TWT Amplifiers. | CO4 | [K ₃] |
| 9. Summarize the principle of spectrum analyzer. | CO5 | [K ₂] |
| 10. List any two methods to measure impedance and frequency at microwave range. | CO5 | [K ₂] |

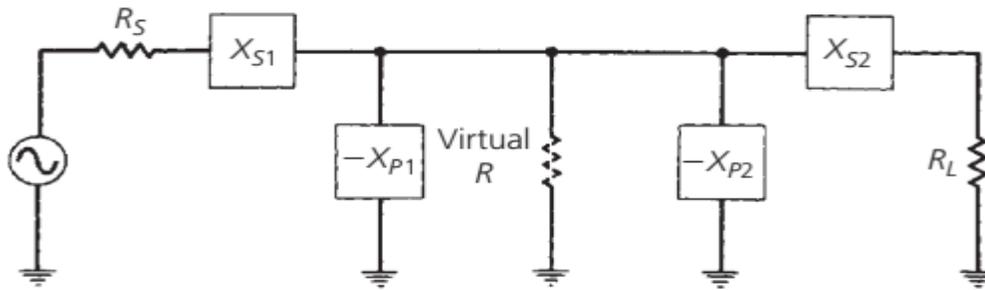
Answer any FIVE Questions:-

PART B (5 x 16 = 80 Marks)

(Answer not more than 400 words)

- | | | | |
|---------------------------------------------------------------------|---|-----|-------------------|
| 11. a) State and prove any two properties of [S] matrix. | 8 | CO1 | [K ₃] |
| b) Discuss the RF behaviour of Resistors, Capacitors and Inductors. | 6 | CO1 | [K ₂] |

12. a) Design four different networks to match a 10-ohm source to a 50-ohm load using the below diagram as a reference. Each network is to have a loaded Q of 10., 10 CO2 [K4]



- b) Distinguish between single stub impedance matching and double stub impedance matching. 6 CO2 [K2]
13. a) From the first principle, derive the scattering matrix parameters of a directional coupler. Define the two parameters that describe directional coupler. 8 CO3 [K3]
- b) Analyze and compare the characteristics of GUNN, IMPATT, TRAPATT and BARITT diodes. 8 [K3]
14. a) Elaborate the principle of operation of Reflex klystron tube with neat sketch. Analyze Reflex klystron performance in terms of velocity modulation, Power output and efficiency with relevant equations and diagrams. 10 CO4 [K3]
- b) Explain the mechanism of oscillations of a cylindrical Magnetron with neat sketch. 6 CO4 [K2]
15. a) Illustrate the working principle of Network Analyzer with neat block diagram. 8 CO5 [K2]
- b) Demonstrate the measurement of VSWR through slotted line method with neat diagram. 8 CO5 [K2]
16. a) Elaborate any two methods of microwave power measurement in detail. 8 CO5 [K2]
- b) Discuss the following: PIN diode switch and Attenuator. 8 CO3 [K2]
