



B.E/B.TECH DEGREE EXAMINATIONS: NOV/DEC 2023

(Regulation 2018)

Seventh Semester

ELECTRONICS AND COMMUNICATION ENGINEERING

U18ECI7204: RF and Microwave Engineering

COURSE OUTCOMES

CO1: Implement and analyze various two port RF networks.

CO2: Design and analyze RF transistor amplifiers.

CO3: Measure and analyze the characteristics of active and passive microwave devices.

CO4: Analyze various microwave tubes.

CO5: Measure the parameters like VSWR, impedance, frequency, power of microwave sources and loads.

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Matching type item with multiple choice code

CO3 [K₂]

List I	List II
A. Faraday Rotation	i. Phase shifter
B. Unidirectional Device	ii. Directional Coupler
C. Four Port Device	iii. Circulator
D. Controllable phase shift	iv. Isolator

- | | A | B | C | D |
|----|-----|----|-----|----|
| a) | ii | i | iii | iv |
| b) | iii | iv | ii | i |
| c) | ii | iv | iii | i |
| d) | iii | i | ii | iv |

2. When ports i and j are isolated, then s_{ij} is _____.

CO1 [K₁]

- | | |
|--------------|-------------|
| a) 0 | b) 1 |
| c) $-\infty$ | d) ∞ |

3. In shunt stub matching, the key parameter used for matching is _____ and _____.

CO2 [K₁]

- Admittance of the line at a point
- Admittance of the load

- | | | | |
|-----|--|-----|-------------------|
| 13. | List the factors which is used for selecting a matching network. | CO2 | [K ₁] |
| 14. | Why double stub matching networks is required? | CO2 | [K ₂] |
| 15. | A directional coupler is having coupling factor of 20 dB and directivity of 40 dB. If the incident power is 100 mW, what is the coupled power? | CO3 | [K ₃] |
| 16. | Determine the conductivity of the n-type GaAs Gunn Diode having Electron density 10^{18} cm ⁻³ , electron density at lower valley 10^{10} cm ⁻³ , electron density at upper valley 10^8 cm ⁻³ at temperature 300°K. | CO3 | [K ₃] |
| 17. | Why Magnetron is called as crossed field device? | CO4 | [K ₂] |
| 18. | List the effects of high frequency in vaccum tubes. | CO4 | [K ₁] |
| 19. | What is the main purpose of slotted section with line carriage? | CO5 | [K ₂] |
| 20. | What are the errors in impedance measurement? | CO5 | [K ₁] |

**Answer any FIVE Questions:-
PART C (5 x 14 = 70 Marks)
(Answer not more than 350 words)**

- | | | | | |
|-----|--|----|-----|-------------------|
| 21. | a) State and prove the properties of S-matrix. | 7 | CO1 | [K ₂] |
| | b) Illustrate the behavior of Resistor, Inductor and Capacitor at radio frequency. | 7 | CO1 | [K ₂] |
| 22. | Explain in detail about microstrip lines with its losses and derive the expression for characteristic impedance of microstrip lines. | 14 | CO2 | [K ₂] |
| 23. | a) Explain the construction, operation and applications of TRAPATT diode. | 7 | CO3 | [K ₂] |
| | b) Describe the modes of operation of a Gunn diode. | 7 | CO3 | [K ₂] |
| 24. | Explain the working principle of Reflex Klystron. Prove that the maximum efficiency of a Reflex Klystron is 22.78%. | 14 | CO4 | [K ₂] |
| 25. | a) How a slotted line is used for the measurement of impedance of unknown load? | 7 | CO5 | [K ₂] |
| | b) Explain the wavemeter method of measuring frequency. | 7 | CO5 | [K ₂] |
| 26. | Illustrate the working of a cylindrical magnetron and derive the Hull cut-off voltage equation. | 14 | CO3 | [K ₂] |
