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Question Paper Code : 80463

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2021.

Seventh Semester

Electronics and Communication Engineering

EC 2403/EC 73/10144 EC 703 – RF AND MICROWAVE ENGINEERING

(Regulations 2008/2010)

(Common to PTEC 2403 – RF and Microwave Engineering for B.E. (Part-Time)
Sixth Semester Electronics and Communication Engineering – Regulations 2009)

Time : Three hours

Maximum : 100 marks

Smith chart is to be provided.

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Mention any four differences between low frequency and high frequency microwave circuits.
2. Draw the high frequency equivalent circuit of the resistor and inductor.
3. Why impedance matching is required? What are other constraints required?
4. Draw typical output stability circle and input stability circle.
5. Draw the diagram of H-plane Tee junction.
6. 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?
7. What is a step recovery diode?
8. Mention the ideal characteristics of dielectric material in MMIC.
9. What are the limitations of conventional tubes at microwave frequency?
10. What are the methods used to measure the attenuation at microwave frequency?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Derive Z and Y matrix formulations of multi port network. (8)
- (ii) State and prove the symmetry of S matrix for a reciprocal network. (8)
- Or
- (b) Explain the scattering matrix for lossless junction. (16)
12. (a) Derive the transducer power gain for a transistor amplifier. Design LC network to match source impedance $Z_s=(50+j25)\Omega$ to the load $Z_L=(25-j50)\Omega$. Assume $Z_0=50\Omega$, $f=2\text{GHz}$. Use smith chart. (16)
- Or
- (b) Discuss the smith chart approach to design the L-section and T-section matching networks. (16)
13. (a) (i) Explain how directional coupler can be used to measure reflected power. (8)
- (ii) Explain the properties of H-plane Tee and give reasons why it is called shunt Tee. (8)
- Or
- (b) (i) Derive the equation for the scattering matrix of magic Tee. (8)
- (ii) Differentiate between circulators and isolators. (8)
14. (a) (i) Explain the tunnelling action in a tunnel diode. (8)
- (ii) Draw the construction and explain the working of IMPATT diode. (8)
- Or
- (b) With the help of two-valley, explain how negative resistance can be created in Gunn diode. Mention its applications. (16)
15. (a) Explain the working principle of Travelling Wave Tube Amplifier (TWTA). (16)
- Or
- (b) Explain the working principle of reflex klystron oscillator and derive the expression for power and efficiency. (16)