Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 91461

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2019

Seventh Semester

Electronics and Communication Engineering

EC 6701 – RF AND MICROWAVE ENGINEERING

(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A **(10×2=20 Marks)**

1. State the limitations of measuring Z, Y and ABCD parameters at Microwave frequencies.
2. Draw the equivalent circuit of a practical capacitor.
3. Define Noise figure.
4. List the factors to be considered for the selection matching network.
5. Mention the application of quarter wave transformer.
6. What is negative resistance ? Give example for NDR device.
7. State the reason for not using conventional signal sources at frequencies above 1GHz.
8. List the effects of high frequency in vaccum tubes.
9. Define Q-factor.
10. A 50Ω lossless line connects a matched signal of 100 KHz to a load of 100Ω. Determine the voltage standing wave ratio of the load.

PART – B (5×13=65 Marks)

11. a) i) Prove that it is impossible to construct a perfectly matched lossless, reciprocal three port junction. (7)

ii) Discuss the importance of s parameter and give the relation between s and Z parameter. (6)

(OR)

b) i) What are the properties of S matrix ? Explain. (7)

ii) Discuss the RF behavior of resistors, capacitors and inductors. (6)

12. a) i) Derive the amplifier power relations. (6)

ii) Discuss on broadband amplifiers and derive the necessary equations. (7)

(OR)

b) i) Explain the significance of impedance matching and tuning. (6)

ii) What are the design issues in T and Pi matching network and explain. (7)

13. a) i) Explain the structure and working of circulator. (6)

ii) What is a directional coupler ? Derive the s matrix of direction coupler. (7)

(OR)

b) i) Explain with diagram the Schottkey diode detector. (6)

ii) Define Gunn effect. Explain the working of Gunn diode oscillator. (7)

14. a) Explain the working of two cavity klystron amplifier and derive velocity modulated wave equation.

(OR)

b) What is cross field device ? Explain the working of cylindrical magnetron and compare its characteristics with two cavity klystron device.

15. a) Explain the principle operation of (i) VSWR meter (ii) Power meter.

(OR)

b) Explain in detail the impedance and frequency measurement using microwave devices.

PART – C (1×15=15 Marks)

16. a) Analyse the stability considerations and stabilization methods of RF amplifier. A silicon bipolar junction transistor has the following scattering parameters at 1.0 GHz, with a 50Ω reference impedance.

S11 = 0.38 ∠158°

S12 = 0.11 ∠54°

S21 = 3.50 ∠80°

S22 = 0.40 ∠43°. The source impedance is ZS = 25Ω and the load impedance is ZL = 40Ω. Compute the power gain, the available power gain and the transducer power gain.

(OR)

b) i) Explain the working of magic tee and its application as duplexer. **(12)**

ii) A lossless T-junction power divider has a source impedance of 50 output characteristic impedances so that the input power is divided in a 2:1 ratio. Compute the reflection coefficients seen looking into the output ports. **(3)**