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

Question Paper Code : 40971

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2018

Seventh Semester

Electronics and Communication Engineering

EC 6701 – RF AND MICROWAVE ENGINEERING

(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

Smith Chart should be provided

Answer ALL questions

PART – A (10×2=20 Marks)

1. State the applications of RF circuit.
2. What are the reasons that low frequency parameters cannot be measured in microwaves ?
3. Define matching network.
4. What is the need of Rollett factor, K ? Write its expressions.
5. State Faraday's rotation law.
6. State the two parameters that describe a directional coupler ? Define them.
7. What is velocity modulation ?
8. What is the purpose of slow wave structures in TWT ? Name them.
9. What is the significance of VSWR measurement ?
10. List any two methods of measuring microwave power.

PART – B (5×16=80 Marks)

11. a) Derive the properties of scattering matrix. (16)

(OR)

b) i) How microwave junction can be described by scattering matrix ? Derive the scattering matrix relation between the input and output of n × n junction. (10)

ii) Describe the losses in microwave devices. (6)

12. a) Derive the expressions for various types of power gain of RF amplifier. (16)

(OR)

b) i) Explain microstrip line matching networks. (10)

ii) Explain in detail noise figure in an amplifier. (6)

13. a) Derive the S matrix for a directional coupler and also verifying the properties of it. (16)

(OR)

b) i) Derive the S matrix H plane TEE. (8)

ii) Explain the mode of oscillation of gunn diode. (8)

14. a) i) Draw a neat sketch showing the constructional features of a cavity magnetron and explain why magnetron is called as crossed field device. (8)

ii) Derive an expression for cut off magnetic field for a cylindrical magnetron. (8)

(OR)

b) A reflex klystron is operated at 8 GHz with dc beam voltage of 600 V for 1.75 mode, repeller space length of 1 mm, and dc beam current of 9 mA. The beam coupling coefficient is assumed to be 1. Calculate the repeller voltage, electronic efficiency and output power. (16)

$V_0 = 600$ V, L = 1 mm, $I_0 = 9$ mA

$\beta_0 = 1$, f = 8 GHz, n = 2 or 1 ¾ mode

15. a) i) Draw the block diagram for the slotted line method of VSWR measurement and explain. (8)

ii) Explain a method for high power measurement. (8)

(OR)

b) i) Draw the experimental set-up for the measurement of impedance of a discontinuity and explain. (8)

ii) Draw the experimental set-up for S-parameter measurement of Magic Tee and explain. (8)
