## 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 $1 \frac{3}{4}$ 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)**