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

Question Paper Code : 21469

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2015.

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)

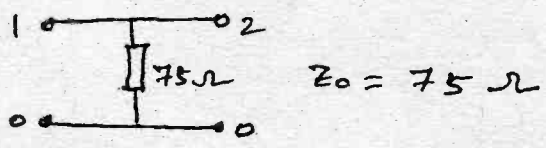
Time : Three hours Maximum : 100 marks

Smith Chart is to be provided.

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Find the 'S' parameters for the following network.



2. Identify the type of component with S parameters of $S_{11} = S_{12} = 0$, $S_{21} \neq S_{22}$.

3. Define maximum available gain.

4. What are the advantages of microstrip line matching networks?

5. What are the applications of Magic Tee?

6. What are the S parameters of the rotary type attenuator with rotation angle of 30°?

7. What is the working principle of varactor diode?

8. State Gunn effect.

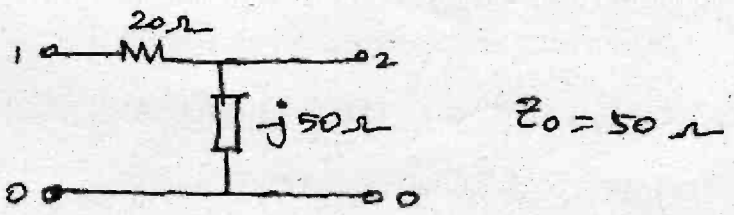
9. What are the limitations of conventional tubes at microwave frequency?

10. What are the methods used to measure the attenuation at microwave frequency?

PART B — (5 × 16 = 80 marks)

11. (a) (i) State and verify the symmetry property of the reciprocal networks. (8)

(ii) Find the S parameters for the following circuit. (8)



Or

(b) (i) Draw the high frequency equivalent of wire, resistor, inductor and capacitor and explain. (8)

(ii) Evaluate the S parameters from the Z parameters. (8)

$$[Z]=\begin{bmatrix} 2+3j & 5j \\ 3j & -j \end{bmatrix},\ Z_0 = 50\Omega.$$

12. (a) Design all the possible configurations of discrete two element matching network that match the source impedance $Z_S = (50 + j\ 25)\Omega$ to the load $Z_L = (25 - j15)\,\Omega$. Assume the characteristic impedance of 75 Ω at operating frequency 2 GHz. (16)

Or

(b) Draw the 8 dB gain circle of the transistor with following S parameters at 1 GHz. $S_{11} = 0.46 < -97°$, $S_{12} = 0.06 < -22°$, $S_{21} = 7.1 < 112°$ and $S_{22} = 0.57 < -48°$. (16)

13. (a) (i) Explain the working principle of E plane Tee and derive its S parameters. (8)

(ii) Explain the working of phase shifter with neat diagram. (8)

Or

(b) (i) Explain the working of circulator and explain its applications. (10)

(ii) Explain the working principle of isolator. (6)

14. (a) Explain the working principle of Gunn diode oscillator and its modes. (16)

Or

(b) Explain the working principle of IMPATT diode with neat diagram. (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)
