



Reg. No. :

--	--	--	--	--	--	--	--	--	--	--

Question Paper Code : X 60465

B.E./B.Tech. DEGREE EXAMINATIONS, NOV./DEC. 2020

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

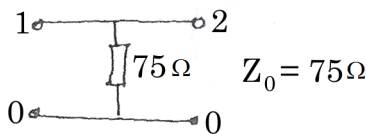
Smith Chart is to be provided

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 transducer power gain.
4. Give the expression that relates nodal quality factor (Q_n) with loaded quality factor (Q_L).
5. Give the significance of Rat-race junctions.
6. Power at the input port is 900 mw. If this power is incident on 20 dB coupler with directivity 40 dB, what is the coupled power and transmitted power ?
7. Draw the equivalent circuit of varactor diode.
8. What is the need for matching network ?
9. Enumerate the significance of slow wave structures in TWTs.
10. List a few sensors used for microwave power measurement.



11. a) i) Explain the properties of S-matrix and hence S-matrix representation of n-port network. (8)
- ii) If the impedance matrix of a simple device is $\begin{bmatrix} 4 & 2 \\ 2 & 4 \end{bmatrix}$, find its scattering matrix. (8)
- (OR)
- b) i) Derive the S-matrices of linear lossless microwave devices. (8)
- ii) What are transmission matrices? Explain them and obtain their relationship with S-matrix. (8)
12. a) i) Write the mathematical analysis of amplifier stability. (8)
- ii) Design a microwave amplifier for maximum transducer power gain. (8)
- (OR)
- b) Using the Smith chart design any two possible configuration of discrete two element matching networks to match the source impedance $Z_s = (50 + j25)\Omega$ to the load $Z_L = (25 - j50)\Omega$. Assume the characteristic impedance of $Z_0 = 50\Omega$ and operating frequency of 2 GHz. (16)
13. a) Describe the following with neat sketch
- i) Magic Tee. (8)
- ii) Directional coupler. (8)
- (OR)
- b) Explain the operation of following microwave passive devices.
- i) Circulator. (8)
- ii) Isolator. (8)
14. a) With the aid of suitable sketch discuss construction, materials, characteristics and working of IMPATT diode.
- (OR)
- b) With the help of two-valley theory, explain how negative resistance is created in Gunn diodes.
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)
-