

Reg. No. :

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

Question Paper Code : 31232

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2012.

Seventh Semester

Electronics and Communication Engineering

EC 1402 A — MICROWAVE ENGINEERING

(Regulation 2008)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State the significance of Scattering matrix representation.
2. Write the relation between S-matrix and ABCD parameters.
3. Mention the applications of circulator.
4. List the ideal characteristics of matched load.
5. Compare TWTA and Klystron Amplifier.
6. A pulsed cylindrical magnetron is operated with the following parameters
Anode voltage 25 kV
Beam current 25A
Magnetic flux density 0.34 Wb/m²
Radius of anode cylinder 10 cm
Radius of cathode cylinder 5 cm.
Calculate angular frequency.
7. Draw the Gunn diode characteristics.
8. What are the uses of parametric amplifier?
9. List the scales on a VSWR meter.
10. Enumerate the significance of Tunable detector.

PART B — (5 × 16 = 80 marks)

11. (a) Discuss the properties of Scattering matrix. The scattering matrix of a two port device is $\begin{bmatrix} 0.1 & 0.7 \\ 0.7 & 0.1 \end{bmatrix}$. The incident power to port 1 is $P_1 = 50 \text{ mW}$ and $P_2 = 0 \text{ mW}$.
- (i) Calculate a_1 and a_2
 - (ii) Using the scattering matrix, find b_1 and b_2
 - (iii) Determine the reflected power at each of the ports.

Or

- (b) (i) Given $[Y] = \begin{bmatrix} 3.2 & 1 \\ 1 & 3.2 \end{bmatrix}$ find $[S]$. (8)
- (ii) Find the S matrix of a section of a transmission line whose characteristic impedance is Z_0 and propagation constant β . Find Z matrix. (8)

12. (a) What is the need for passive components and devices? Explain structure and function of waveguide choke flanges and coupling loops.

Or

- (b) Derive the scattering matrix for Magic Tee and mention its applications.

13. (a) What are the high frequency limitations of conventional tubes? Explain the structure and working of Traveling wavetube amplifier.

Or

- (b) A Two cavity klystron operates at 5 GHz with a dc beam voltage of 10 KV and a 2 mm cavity gap. For a given RF voltage, the magnitude of the gap voltage is 100 volts. Calculate the transit time at the cavity gap, the transit angle and the velocity of the electrons leaving the gap.

14. (a) Explain the structure and mechanism of operation of Tunnel diode and Varactor diode.

Or

- (b) (i) Discuss the modes of operation of Gunn diode. (8)
- (ii) Explain the working of two-diode and four-diode PIN switches. (8)

15. (a) How are microwave measurements different from Low frequency measurements? Explain the double minimum methods of measuring VSWR.

Or

- (b) With neat block diagram, explain power and impedance measurements in a microwave system.
-