



Reg. No. :

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

Question Paper Code : X 67576

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2020

Seventh Semester

Electronics and Communication Engineering

EC 1402 A – MICROWAVE ENGINEERING

(Regulations 2008)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions

PART – A

(10×2=20 Marks)

1. Define a reciprocal network.
2. The impedance matrix of a certain microwave circuit is $[Z] = \begin{bmatrix} 4 & 2 \\ 2 & 4 \end{bmatrix}$. Determine the corresponding scattering matrix.
3. A 5 dB coupling factor and 20 dB directivity, coupler is having incident power 1 mw. How much power is coupled into coupled port ?
4. Differentiate Ferrite phaseshifter from PIN diode phaseshifter.
5. Compare TWTA and Klystron Amplifier.
6. A pulsed cylindrical magnetron is operated with the following parameters
Anode voltage 25 kV
Beam current 25 A
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 equivalent circuit of PIN diode and mention its applications.

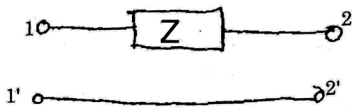


8. What is Gunn effect ? Name the materials in which Gunn effect is observed.
9. Calculate the VSWR in dB in a waveguide when the load is a 3 dB attenuator terminated by a short circuit.
10. Specify the features of a Network Analyzer.

PART – B

(5×16=80 Marks)

11. a) State and prove the unitary property of s-matrix for loss less networks. Determine the s-parameters of a series element shown below. (16)



(OR)

- b) Derive the relation between [ABCD] matrix and [S-] matrix of a two-port network. Derive smatrix for E plane tee junction. (16)
12. a) What is the need for passive components and devices ? Explain structure and function of waveguide choke flanges and coupling loops. (16)
- (OR)
- b) Derive the scattering matrix for Magic Tee and mention its applications. (16)
13. a) Compare the performance characteristics and applications of the following devices :
 - i) Klystron amplifier. (4)
 - ii) TWT amplifier. (4)
 - iii) Magnetron. (4)
 - iv) Klystron oscillator. (4)

(OR)

- b) A 250 kW pulsed cylindrical magnetron is operated with the following parameters : Anode voltage = 25 kV; peak anode current = 25 A; magnetic induction = 0.035 T; radius of cathode = 4.0 cm and radius of the anode = 8.0 cm. Calculate :
 - i) the efficiency of magnetron
 - ii) the cyclotron frequency
 - iii) the cut off magnetic field and
 - iv) the cut-off voltage.



14. a) i) Differentiate between IMPATT and TRAPATT diodes. **(8)**
ii) Explain the operation of GUNN diode along with its V-I characteristics. **(8)**
(OR)
- b) i) Describe the construction, characteristics of a PIN diode. **(8)**
ii) Explain the varactor diode operation and give its applications. **(8)**
15. a) With neat microwave bench block diagram, explain antenna radiation pattern measurement and VSWR measurement. **(16)**
(OR)
- b) Discuss the significance of following microwave measuring instruments with neat diagram.
i) Slotted Line Carriage. **(5)**
ii) VSWR meter. **(5)**
iii) Cavity Resonator. **(6)**
-