Reg. No. ☐☐☐☐☐☐☐☐☐☐☐☐

Question Paper Code	12279

B.E./B.Tech - DEGREE EXAMINATIONS, NOV / DEC 2023
Seventh Semester
Electronics and Communication Engineering
20ECPC701 - RF AND MICROWAVE ENGINEERING
(Regulations 2020)

Duration: 3 Hours　　　　　　　　　　　　　　　　　　Max. Marks: 100

PART - A (10 × 2 = 20 Marks)
Answer ALL Questions

Marks,
K-Level, CO

1. What are the applications of Magic Tee?　　　　　　　　　*2,K1,CO2*
2. Give the differences between Isolator and Circulator.　　　　*2,K1,CO2*
3. Show that the Power gain, power output and efficiency of two cavity Klystron amplifier.　　　　　　　　　　　　　　　*2,K2,CO3*
4. What is the purpose of slow wave structures used in TWT amplifiers?　*2,K2,CO3*
5. What are the basic design considerations for the proper operation of a spectrum Analyser?　　　　　　　　　　　　　　*2,K1,CO4*
6. State the need of scattering co-efficient.　　　　　　　　*2,K1,CO4*
7. Define Gunn effect. Name the materials that exhibit Gunn effect.　*2,K1,CO5*
8. What are the factors reducing efficiency of IMPATT diode?　　*2,K2,CO5*
9. Show the VSWR circle for reflection coefficient 1.　　　　　*2,K2,CO6*
10. Sketch the typical output stability circle and input stability circle.　*2,K2,CO6*

PART - B (5 × 13 = 65 Marks)
Answer ALL Questions

11. a) Discuss the structure and principle of operation of:
　　(i) Isolator.　　　　　　　　　　　　　　　　　　*6,K2,CO2*
　　(ii) Circulator.　　　　　　　　　　　　　　　　　*7,K2,CO2*
OR
　b) (i) Explain the properties of E- H Plane Tee.　　　　　*6,K2,CO2*
　　(ii) Derive the expression of scattering matrix for directional coupler.　*7,K2,CO2*

12. a) (i) Write the operation of two cavity Klystron amplifier.　*7,K2,CO3*
　　(ii) Find the comparison between two cavity Klystron amplifiers with travelling wave tube.　　　　　　　　　　　　　*6,K2,CO3*
OR
　b) (i) Describe the Pi mode of oscillations of magnetron　　*9,K2,CO3*
　　(ii) What is meant by strapping in magnetron and why it is done?　*4,K2,CO3*

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create　　**12279**

13. a) (i) Describe the principle to measure the microwave power. *7,K3,CO4*

(ii) How to measure the VSWR using slotted line method? *6,K3,CO4*

OR

b) (i) Examine Spectrum Analyzer with suitable diagrams. *7,K3,CO4*

(ii) Analyze RF substitution method for Attenuation measurements. *6,K3,CO4*

14. a) (i) What are the avalanche transit time devices? *4,K2,CO5*

(ii) Explain the operation and construction of IMPATT diode. *9,K2,CO5*

OR

b) (i) With the help of two-valley theory, Identify how negative resistance is created in Gunn diodes. *8,K2,CO5*

(ii) Explain the characteristics and working of tunnel diode. *5,K2,CO5*

15. a) Evaluate stability considerations for RF amplifier design with stabilization methods. *13,K4,CO6*

OR

b) Derive the derivations for power gain, available gain and transducer gain of a microwave amplifier using S-parameters. *13,K4,CO6*

PART - C (1 × 15 = 15 Marks)

16. a) (i) Explain the transmission matrix for a cascade connection of two-port networks. *7,K2,CO1*

(ii) Draw the high frequency equivalent circuit of resistor inductor and capacitor and explain. *8,K2,CO1*

OR

b) The s parameters of a two port network are given by $S_{11}=0.2 \angle 90°$, $S_{22}=0.2 \angle 90°$, $S_{12}=0.5 \angle 90°$ & $S_{21}=0.5 \angle 0°$.

(i) Show whether the network is lossy or not. *7,K2,CO1*

(ii) Is the network symmetrical and reciprocal. Find the insertion loss of the network. *8,K2,CO1*