TWO MARKS

UNIT -1

1. State why lumped parameters cannot be used at high frequencies.

2. State the limitations of low frequency parameters.

3. List the characteristics of microwaves

4. Define scattering matrix

5.List the properties of S-parameters

6.Define the S Matrix of a Two Port Network

7.Define Reflection co-efficient and Transmission co-efficient

8.Define skin effect

9.State the need for S Parameters in High frequency circuit analysis

10.Differentiate Low frequency and High Frequency microwave circuits

11.List the applications for inductors being used at high frequencies.

12. State the condition for an S-matrix of a two port network for lossless condition

13. List the different types of high frequency resistors

14. Analyze the inductor at radio frequency from its equivalent circuit

15. Analyze the capacitor at radio frequency from its equivalent circuit.

16. Problems based on property of s-parameters.

UNIT – 2

17. Mention the sub bands of microwave frequency spectrum.

18. List some applications of microwaves.

19. List the different types of tee junctions.

20. List some applications of magic tee

21. State Faraday's rotation law

22. Draw the neat diagram of waveguide Bends and twists

23. State the conditions to be followed for construction for a loss less waveguide bends and corners.

24. Define circulators.

25. Define the principle of operation of isolator.

26. Write the S-matrix of 3 port circulator.

27. List any two microwave devices using faraday rotation principles

28. Sketch the two hole direction coupler

27. Differentiate between isolator and circulator

28. State the purpose of microwave terminators

29. State the need of ferrites in Isolators.

30.Isolator is called as Uniline – Justify

31. State the principle of working of attenuator.

32. List the different types of attenuators.

UNIT – 3

33. Define microwave transistor

34. Define microwave FET.

35. List the different types of microwave FET.

36. Define high mobility electron transistor

37. Define negative resistance effect

38.List the applications of microwave solid state devices

39.Classify the microwave solid state devices

40. List the applications of Gunn Diode

41.Draw the physical structure of microwave transistors

42.Identify the different operating modes of microwave bipolar transistor depending on the voltage polarities across the two junctions

Descriptive questions

UNIT-1

1. Describe in detail about the various types of low frequency parameters and discuss the need for high frequency parameters by comparing it with the low frequency circuits.
2. State and prove the various properties of S Parameters
3. Explain the formulation of S-matrix for an N-port network
4. Explain in detail about the RF passive components –Capacitors and Inductors
5. Describe in detail about the various types of high frequency resistors with suitable diagrams
6. Explain the formulation of S-matrix for a 2-port network and explain the losses in Microwave Networks
7. Explain the characteristics and advantages of Microwaves with suitable diagrams.

UNIT – 2

8. Describe in detail about Microwave Power dividers
9. Explain the working of directional coupler and List its types and derive the S matrix for two hole directional coupler
10. Explain the working of Magic Tee with neat sketch and derive its Scattering Matrix
11. Describe the construction and operating characteristics of 4 port circulator with neat sketch and derive its S Matrix
12. Explain microwave phase shifters with suitable diagram
13. Describe in detail about Microwave bends, twists corners and matched terminations with suitable diagrams
14. Derive the S-matrix for E-plane Tee and explain its working principle with neat sketch
15. Derive the S-matrix for H-plane Tee and explain its working principle with neat sketch
16. Describe in detail about Microwave isolator with suitable diagrams
17. Explain the application of Microwaves in real time with its Microwave frequency ranges

18. Describe the properties of reciprocal and non-reciprocal networks
19. Explain the working of attenuator with neat diagram and also explain precision type variable attenuator

UNIT -3

20. Interpret various modes of operation of gunn diode and its IV characteristics with necessary diagram.
21. Describe in detail about the different operating modes of microwave bipolar transistor
22. Apply two valley theory to explain the negative resistance property of a Gunn diode
23. Explain in detail about the High Electron Mobility Transistors (HEMT) with suitable diagrams
24. Explain the construction and operation of FETs

RF and Microwave Engineering

Unit 3

Question	Mark
Define impact ionization	2
Define avalanche transit time devices	2
Define MMIC's.	2
List the different steps involved in RF MEMS fabrication process	2
State the advantages of parametric amplifiers	2
List few applications of RF MEMS technology	2
State how varactor diode amplifies the input signal in parametric amlifier.	2
State manley rowe relation for power gain	2
Explain the working of parametric amplifiers with neat block diagram.	15
Analyze the materials and fabrication techniques used in monolithic microwave integrated circuits.	15
Describe the construction and working of impact diode with required diagram	8
Explain the various steps involved in RF MEMS fabrication process	8
Describe the various materials used in MMIC fabrication process.	7
Draw the equivalent circuit of parametric amplifiers and explain why pump circuit is used.	7

Unit 4

Question	Mark
State any two limitations of conventional tubes at high frequencies	2
Define velocity modulation	2
Explain the working principle of reflex klystron	2
List few applications of TWT.	2
Define bunching process	2
Compare two cavity klystron and reflex klystron	2
State the significance of VSWR measurement	2
List any two methods of measuring microwave power	2
List any two methods of measuring microwave impedance measurements	2
State the working principle of magnetron	2
State the purpose of slow wave structures used in TWT amplifiers	2
Compare mode jumping and strapping in a Magnetron	2
State the expression for phase velocity in TWT.	2
What is the principle by which high power measurements could be done by calorimetric method?	2

A helix travelling wave tube operates at 4 GHz under a beam voltage of 10 kV and beams current of 500 mA. If the helix is 25 ohms and interaction length is 20 cm, find the gain parameter.	2
Draw and explain the construction and working operation of two – cavity klystron amplifier.	15
What are slow wave structures? Explain how a helix Travelling Wave Tube achieve amplification.	15
Explain the construction ,principle and working of the reflex klystron with neat sketch	15
Derive the expressions for hull cutoff voltage and efficiency for magnetron with neat sketch.	15
Explain in detail about measurement of attenuation	8
Analyze and explain any one method of measurement of VSWR with block diagram	8
Explain impedance measurement using reflectometer	8
A Two cavity klystron amplifier has the following specifications: beam voltage = 900 V, beam current = 30 mA, frequency = 8 GHz, gap spacing in either cavity = 1mm, spacing between center of cavities = 4 mm, effective shunt capacitance = 49 Kohm. Determine electron velocity and DC transit time of electrons and voltage gain	8
State how microwave measurements differ from low frequency measurements?	7
Differentiate linear beam tubes cross field tubes	7
Compare klystron with travelling wave tube based on construction and working principle	7
A travelling wave tube operates with beam voltage = 3 KV, beam current I = 30 mA, characteristic impedance = 10 ohm, circuit length N = 50 m and frequency f = 10 GHz. Determine gain parameters and output power gain	7

Unit V

Question	Mark
Define Noise figure	2
State the various key parameters used to evaluate the performance of a microwave amplifier?	2
List the advantages of T and Pi impedance matching networks	2
State and explain the power gain of an amplifier?	2
List the types of impedance matching networks	2
Give the expression for maximum power gain of a single stage ampifier	2
Define impedance matching in microwave netwroks.	2
List the needs for stabilization in microwave amplifier	2
Give the condition for stability circles	2
Define Unilateral Power Gain	2

Define Available Power Gain	2
Define stability circles	2
Draw the typical output stability and input stability circles of microwave amplifier	2
State Why impedance matching is required?	2
Distinguish between conditional and unconditional stability in microwave amplifiers.	2
Analyze the various stability considerations and stabilization techniques used in microwave amplifier design	15
Derive the equations for power gain, available gain and transducer gain of HF amplifier	15
Describe about the design of T and Pi impedance matching networks	15
Analyze the design of single stage transistor amplifier and explain how to achieve maximum gain	15
Analyze the various microstrip line impedance matching networks.	8
Analyze the principle for maximum gain in single stage amplifier	8
Write a note on strip line and microstrip line matching	8
A microwave transistor has the following S parameters at 10 GHz, with 50Ω reference impedance. S11 =0.45 ∠150° S22 = 0.01 ∠-10° S12 = 2.05 ∠10° S21 = 0.40 ∠-150° The source impedance is ZS = 20 Ω and load impedance is ZL = 30 Ω, compute the power gain, available gain and the transducer power gain	8
Explain the need for impedance matching and categorize various methods of impedance matching networks	7
Define stabilization and explain various stabilization methods	7
Define and explain noise figure of a single stage transistor amplifier	7
Derive the transducer power gain for a transistor amplifier	7