

Code No: 57036

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech IV Year I Semester Examinations, November - 2015

MICROWAVE ENGINEERING

(Electronics and Communication Engineering)

Time: 3 Hours

Max. Marks: 75

Answer any Five Questions
All Questions Carry Equal Marks

- 1.a) Calculate the phase and group velocities, and the wave impedance of the TE₁₀ mode in a rectangular waveguide filled by air with the internal dimensions a=22mm, b=10mm.the frequency is f=10GHz.
- b) Derive wave equations for TE and TM modes. [6+9]
- 2.a) What is meant by a cavity resonator? Derive the expression for the resonant frequency of the rectangular cavity resonator.
- b) Derive the expression for quality factor and coupling coefficient of cavity resonator. [7+8]
- 3. Write short notes on the following:
a) Rotary vane attenuator b) Rotary phase shifter c) Tuning screws [5+5+5]
- 4.a) Explain the working of Faraday rotation based isolator and write its applications.
- b) Write and explain the properties of the S matrix. Write the advantages of S parameters compared to Y parameters. [7+8]
- 5.a) The operating frequency of a two cavity klystron is 5GHz,for a input RF voltage of 40KV,the magnitude of the gap voltage is 100 volts and the capacity gap is 4mm.calculate the following
i) The transit time at the cavity gap
ii) The transit angle
iii) The velocity of the electrons from the gap.
- b) Explain briefly about the construction and operation of reflex klystron oscillator. [9+6]
- 6.a) A TWT operates under following parameters: beam voltage V₀=3KV,beam current I₀=20mA,characteristic impedance of helix Z₀=10, circuit length N_l=50,and frequency f=10GHz.determine (i) Gain parameter (ii)output power gain in dB
- b) Derive an expression for the Hull cut-off equation for cylindrical magnetron. [6+9]
- 7.a) Explain the construction of the GUNN diode using RWH theory.
- b) Explain about several modes of operation of GUNN diode. [7+8]
- 8.a) Discuss methods for measurement of low and high VSWR.
- b) Explain how the microwave attenuation can be measured. [8+7]