



R18 Regulation

Subject code: 2P7DA

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A' Grade)

B.Tech VII Semester Supplementary Examinations, July 2022

MICROWAVE ENGINEERING

(Electronics and Communication Engineering)

Maximum Marks: 70

Date:02.07.2022 Duration: 3 hours

- Note:
1. This question paper contains two parts A and B.
 2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
 3. Part B consists of 5 Units. Answer any one full question from each unit which carries 10M.
 4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks

(10x2M=20 Marks)

- 1 Write the equation of Q factor of Microstrip line.
- 2 Define dominant and degenerative modes of waveguide.
- 3 What is Q of a Cavity Resonator?
- 4 What is post and what is the application of it?
- 5 What are the limitations of conventional vacuum tubes at microwave frequencies?
- 6 Compare 'O' type and 'M' type tubes.
- 7 How pi-mode is separated in Magnetron?
- 8 How LSA mode of Gunn diode is used to produce oscillations?
- 9 Why the S-parameters are used in microwaves?
- 10 Why an Isolator is needed in Microwave bench?

Part-B

Answer All the following questions.

(10MX 5=50Marks)

- 11 Derive the field equations for Rectangular Waveguide in TE mode starting from Maxwell's equations. [10M]

OR

- 12 A. Discuss the significance and advantage of dominant mode in rectangular waveguide. [5M]
B. A wave of frequency 6GHz is propagated in a parallel plane waveguide separated by 3cm. Calculate i) the cut-off wavelength for the dominant mode. ii) Wavelength in the waveguide. iii) the group and phase velocities. iv) Characteristic wave impedance. [5M]
- 13 A. With a neat block diagram, explain the method of measurement of Cavity Q by Transmission Method. [5M]
B. Draw the structure of Magic tee and write its characteristics and also derive its S-matrix. [5M]

OR

- 14 A. Explain the need for Cavity Resonators at microwave frequencies, identifying their characteristic parameters, merits and limitations. [5M]
B. Explain the working of a two-hole directional coupler with a neat diagram and derive the expression for the coupling and directivity of a two-hole directional coupler. [5M]

- 15 A. Explain how velocity modulation is converted into current modulation with Applegate diagram and also derive the equation for output power efficiency. [5M]
- B. The parameters of a two-cavity klystron are given by $V_b = 900$ V, $f = 3.2$ GHz, and $d = 10^{-3}$ m. Determine electron velocity, transit angle, and beam coupling coefficient. [5M]
- OR
- 16 Explain the principle of working of Helix Travelling Wave Tube. [10M]
- 17 A. Derive the Hartree anode Voltage equation for linear magnetron. [5M]
- B. Explain how Gunn diode is used in waveguide oscillator. [5M]
- OR
- 18 Explain how 8-cavity cylindrical Magnetron is used to produce oscillations. [10M]
- 19 A. Explain the S-matrix representation of a multiport microwave network and its significance. [5M]
- B. Describe the blocks of microwave bench and their features. [5M]
- OR
- 20 Explain the measurement of low and high VSWR [10M]