



R17 Regulation

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous, Accredited by NAAC with 'A' Grade)

Subject code: 1P7DA

B.Tech IV Year I Semester Regular Examinations, February 2021

MICROWAVE ENGINEERING
(Electronics and Communication Engineering)

Maximum Marks: 70

Date: 20.02.2021 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.
 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 Define dominant and degenerative modes of waveguide.
- 2 List the typical applications of microwaves.
- 3 What is Q Factor?
- 4 What is a post and mention any applications of it.
- 5 Mention the limitations of conventional tubes at microwave frequencies.
- 6 Define velocity modulation.
- 7 Explain the negative resistance property with an example.
- 8 What are TEDs?
- 9 Draw the Microwave bench set up?
- 10 Justify why Z and Y parameters cannot be used at microwave frequencies.

Part-B

Answer All the following questions.

(10M X 5=50Marks)

- 11 A. Show that TM₀₁ and TM₁₀ modes does not exist in a rectangular waveguide. (5M)
B. A rectangular wave guide with dimension of 8×4 cm operates in the TM₁₁ mode at 10GHz. Determine the characteristic wave impedance. (5M)
OR
- 12 Derive the field equations for Rectangular Waveguide in TE mode starting from Maxwell's equations. (10M)
- 13 A. Why Matched loads are needed in Microwave circuits? Explain its working with neat diagrams. (5M)
B. Explain the working of a Faradays Rotation Isolator. (5M)
OR
- 14 A. What are the different types of Waveguide Attenuators? Explain their working with a neat diagram. (5M)
B. Draw and explain the working of an E plane Tee. (5M)

- 15 With the help of the Applegate diagram, explain the process of velocity modulation in a two cavity klystron. (10M)
- OR
- 16 A. Explain the significance of slow wave structure in the amplification process. List out the major differences between TWT and klystron. (5M)
B. Explain how amplification takes place in Helix TWT? (5M)
- 17 Explain the electron bunching process in Cylindrical Magnetron with neat diagrams and derive the Hartree condition. (10M)
- OR
- 18 Explain Gunn Effect using two-valley theory. Also explain several modes of operation and applications of Gunn diodes. (10M)
- 19 Derive the S-matrix representation of a magic tee and explain its significance. (10M)
- OR
- 20 With a neat block diagram, explain how to measure the VSWR of a given load at microwave frequencies. (10M)