

(Following Paper ID and Roll No. to be filled in your Answer Books)

PAPER ID :

Roll No.

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B.TECH

Theory Examination (Semester-VI) 2015-16

MICROWAVE ENGINEERING

Time : 3 Hours

Max. Marks : 100

1. Attempt all parts. All parts carry **equal** marks.

(2 x 10 = 20)

- Name the properties of S-parameters.
- What are the considerations in selecting a matching network?
- Define power gain of amplifier in terms of S-parameters and reflection coefficients.
- What are waveguides?
- Differentiate between the concepts of group velocity and phase velocity as applied to wave guides.
- What are Ferrites?
- Define a microwave junction.
- What is a slow wave structure ?
- What is meant by avalanche transit time device ?
- What is a micro strip line?

SECTION-B

2. Attempt any **five** questions from this section.

(10 x 5 = 50)

- Derive the universal formula for the group velocity.
- Derive the wave equation for a TM wave and obtain all the field components in a rectangular waveguide.
- With the aid of a diagram, explain fully the operation of a two hole waveguide directional coupler, also state its uses.
- What is a micro strip line? How does its characteristic impedance change with change in width to height ratio ? Give a reason for using lower dielectric constant substrate in place of alumina at higher microwave frequencies.

- e) What is Magic Tee ? Why is it called so ? Explain the characteristics of the Tee considering various input/output conditions.
- f) Explain the properties of H-plane Tee and give reasons why it is called shunt Tee.
- g) Explain the tunnel diode characteristics with the aid of energy band diagram.
- h) Describe how can the power of a microwave generator be measured using Bolometer.

SECTION-C

Attempt any **two** questions from this section.

(15 x 2 = 30)

- 3. With the help of two-valley, explain how negative resistance can be created in Gunn diode. Mention its applications.
- 4. (i) Explain the operation mechanism of two-cavity Klystron amplifier with neat sketch.
(ii) Derive the scattering matrix relation between the input and output of a $n \times n$ junction.
- 5. With the aid of suitable sketch, discuss the materials, construction and characteristics of microwave varactor. Discuss briefly how they are used as frequency multipliers.

