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Total No. of Printed Pages: 01

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B. Tech (ECE) (Semester –6th)
MICROWAVE THEORY AND TECHNIQUES
Subject Code: BECED1-611
Paper ID: [18111329]

Time: 03 Hours

Maximum Marks: 60

Instruction for candidates:

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A

(2 marks each)

Q1. Attempt the following:

- a) Which frequency band is typically used for satellite communication?
- b) Discuss one advantage of using waveguides over transmission lines in high-frequency applications.
- c) Define characteristic impedance in the context of transmission lines and waveguides
- d) What is the primary function of a directional coupler in microwave systems?
- e) Describe the key features and components of a smart antenna system.
- f) Explain how wavelength and frequency are related in electromagnetic waves.
- g) Briefly describe what the radiation pattern of an antenna represents.
- h) How does a high SWR affect the efficiency and performance of a communication system?
- i) What is the main function of a reflex klystron oscillator?
- j) Explain the principle of operation of a magnetron.

Section – B

(5 marks each)

- Q2. Define what a rectangular waveguide is and briefly explain its structure.
- Q3. Explain the concept of resonance in cavity resonators and how it is utilized in microwave engineering.
- Q4. Define TE, TM, and TEM modes in the context of waveguides.
- Q5. Compare and contrast terrestrial and satellite communication systems in terms of coverage, reliability, bandwidth, and cost.
- Q6. Differentiate between E-plane and H-plane tees in terms of their physical structure. Mention one application where each type of tee is commonly used.

Section – C

(10 marks each)

- Q7. Explain the design and operating principles of microstrip or patch antennas. Discuss the advantages of microstrip antennas.
- Q8. Explain the basic principles of radar operation and also mention its application areas.
- Q9. Conduct a comparative analysis of aperture antennas, slot antennas, microstrip or patch antennas, and smart antennas.