Roll No. | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (Electronics & Communication Engineering) (Sem–6)

# MICROWAVE AND ANTENNA ENGINEERING

Subject Code : BTEC-603-18

M.Code : 79376

Date of Examination : 27-06-2023

Time : 3 Hrs. Max. Marks : 60

**INSTRUCTIONS TO CANDIDATES :**

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

## SECTION-A

**1. Write briefly :**

a) Define Travelling Wave Tube (TWT).

b) What is backward wave oscillator?

c) What is transferred electron device?

d) What is directional coupler?

e) What is the difference between isolator and circulator?

f) Define Standing Wave Ratio (SWR).

g) Define antenna efficiency and temperature.

h) Define End fire antenna array.

i) Define aperture antenna.

j) List the applications of IMPATT diode.

## SECTION-B

2. With the help of a suitable diagram, explain the working principle of phase shifter.

3. What is cavity resonator? Derive the equation for resonant frequency in rectangular cavity resonator.

4. Explain the operation of a two cavity klystron amplifier. Derive expressions for bunched beam current.

5. What are slow wave structures? Explain how a helical TWT achieve amplification?

6. What is Babinet's principle? Explain slot antenna and its radiation mechanism.

## SECTION-C

7. For a broad side antenna array of n elements, derive the expression of direction of pattern maxima, pattern minima and beam width of major lobe. Assume the distance between each element is 'd' and each antenna element carries current of equal amplitude and phase.

8. Derive an expression for the far field component of a half wave dipole of an antenna. With the help of proper mathematical expressions, explain how single wire antenna radiates?

9. Derive the S-matrix for directional coupler. Using the properties of scattering matrix of a lossless reciprocal microwave junction, prove that for a four port network if all the four ports are matched, the device shall be a directional coupler.

**NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student**.