

Course: B. Tech.

Branch: Electronics

Semester: VII

Subject Code & Name: BTEXC701 (Antennas and Wave Propagation)

Max Marks: 60

Date: 27/01/2023

Duration: 3 Hr.

Instructions to the Students:

1. All the questions are compulsory.
2. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question.
3. Use of non-programmable scientific calculators is allowed.
4. Assume suitable data wherever necessary and mention it clearly.

(Level/CO) Marks

Q. 1 Solve Any Two of the following.

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|---|---------|---|
| A) Define uniform plane waves. Give the relation between E and H in a uniform plane wave. | Level 1 | 6 |
| B) Discuss the propagation of plane wave in perfect dielectric medium. | Level 2 | 6 |
| C) Derive an expression for reflection and transmission coefficients under the case of wave reflection with normal incidence. | Level 3 | 6 |

Q.2 Solve Any Two of the following.

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|--|---------|---|
| A) Discuss radio wave propagation through free space. Also, derive the relation between transmitter power and average received power. | Level 1 | 6 |
| B) What is Ionosphere? Discuss long-distance transmission of radio signal through Ionospheric region. | Level 2 | 6 |
| C) In a Microwave communication link, two identical antennae operating at 10GHz are used with power gain of 40dB. If the transmitter power is 1W, find the received power, if the range of the link is 30km. | Level 3 | 6 |

Q. 3 Solve Any One of the following.

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|---|---------|---|
| A) What is polarization? Discuss its type and their applications. | Level 1 | 6 |
| B) Define antenna effective aperture? Give the relation between effective aperture, gain and directivity. | Level 2 | 6 |
| C) Explain antenna far field radiation mechanism | Level 3 | 6 |

Q.4 Solve Any Two of the following.

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|--|----------------|----------|
| A) Compare dipole antennas with loop antennas | Level 1 | 6 |
| B) What is half wave dipole? Derive an expression for its radiation resistance, directivity and effective aperture | Level 2 | |
| C) A thin dipole is $\lambda/15$ long. If it has a loss resistance of 1.5ohm, find (a)Directivity (b)gain (c) effective aperture | Level 3 | 6 |

Q. 5 Solve Any Two of the following.

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|--|----------------|----------|
| A) Define antenna array? Discuss the design and working of end fire array with a neat diagram. | Level 2 | 6 |
| B) What is Horn antenna? Discuss its advantages and disadvantages over other antennas. | Level 2 | 6 |
| C) What is Microstrip patch antenna? Discuss the design and analysis of it using transmission line model theory | Level 3 | 6 |

***** End *****