

Seat No. **MAR_APR 2025 SUMMER EXAMINATION****11731 Bachelor of Technology (NEP-2.0)****Sub. Name: Antenna and Wave Propagation****Sub. Code: 66314/81859/81649****Day and Date: MAY ,21-05-2025****Total Marks: 70****Time: 02:30 PM To 05:00 PM**

- Instructions:**
- 1. All questions are compulsory**
 - 2. Assume suitable data wherever necessary and mention it boldly**
 - 3. Figures to the right indicate full marks**
 - 4. Use of Scientific calculator is allowed**

Q1) Solve following MCQ.**[14]**

- i.** Which antennas are renowned as patch antennas especially adopted for spacecraft applications?
 - A. Aperture
 - B. Microstrip
 - C. Array
 - D. Lens
- ii.** Which mode of propagation is adopted in HF antennas?
 - A. Ionospheric
 - B. Ground wave
 - C. Tropospheric
 - D. All of the above
- iii.** Ground wave propagation is suitable for.
 - A. Log distance communication
 - B. Line of sight communication
 - C. Overseas communication
 - D. non-line-of-sight communication
- iv.** What is the lowest layer of the ionosphere?
 - A. E
 - B. D
 - C. F1
 - D. F2
- v.** Ground wave is always _____ polarized.
 - A. Vertically
 - B. Horizontally
 - C. Either vertical or horizontal
 - D. Neither vertical nor horizontal

- vi. The shape of the patch in rectangular Microstrip antenna is _____
- Rectangular
 - Circular
 - Cylindrical
 - Elliptical
- vii. Steradian is a measurement unit of
- Point angle
 - Linear angle
 - Plane angle
 - Solid angle

Q2) Answer any two [14]

- With diagram explain [7]
 - Radiation pattern
 - Beam area
- Explain radio communication link. Derive Friis transmission formula. [7]
- With the neat diagram explain elliptical polarisation and derive the equation for pointing vector for elliptically polarised wave. [7]

Q3) Answer any two [14]

- With neat diagram explain different feeding methods of microstrip antenna. [7]
- Two spacecraft are separated by 100 Mm. Each has an antenna with $D=1000$ operating at 2.5 GHz. If craft A's receiver requires 20dB over 1pW, what transmitter power is required on craft B to achieve this signal level. [7]
- With the help of figure, explain three field regions of antenna. [7]

Q4) Answer any two [14]

- Explain Plane earth reflection in ground wave propagation. [7]
- A low power, short range radar is having overall noise figure of 4.77dB. If antenna diameter is 1 m , the IF bandwidth is 500 KHz, the operating frequency is 8 GHz and radar set is capable of detecting Targets of 5m² cross sectional area at a maximum distance of 12 KM. Calculate peak transmitted pulse power. [7]
- Explain the following terms: Ray path, critical frequency, MUF, OF, Virtual Height and Skip distance. [7]

Q5) Answer any two [14]

- a. Explain in detail the wave tilt of ground waves. [7]
- b. Explain MTI System with subtractor diagram [7]
- c. Calculate the skip distance for flat earth with MUF of 10 MHz if the wave is reflected from a height of 300km where the maximum value of n is 0.9. [7]

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

- 1] (101) Bachelor of Engineering (81859) Antenna and Wave Propagation Part 3 SEM 6
- 2] (1154) B.Tech. CBCS (81649) Antenna and Wave Propagation Part 3 SEM 6
- 3] (101) Bachelor of Engineering (66314) Antenna and Wave Propagation Part 3 SEM 5