

TEC-505

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ODD SEMESTER EXAMINATION 2019-20

B.TECH (ECE, SEMESTER V)

ANTENNA AND WAVE PROPAGATION

Time: 3 Hours

Total Marks: 100

Total no. of printed pages: 1

Note: All questions are compulsory.

Q. 1. Attempt any four questions

4*5=20

- Derive Friis transmission formula.
- A pulse of a given frequency transmitted vertically upward is received back after a period of 2ms. Find the virtual height of the reflection layer.
- State Huygen's principle.
- State Pattern multiplication.
- Write a difference between slot antenna and its complementary dipole antenna.

Q. 2. Attempt any four questions

4*5=20

- Discuss briefly on the types of fading?
- Describe the structure of the atmosphere and specify the factors affecting the radio propagation.
- Derive the field equation for an oscillating dipole starting from Maxwell's equation.
- Comparison between Yagi-Uda antenna and Microstrip antenna?
- The diameter of a parabolic reflector is 2m. For operation at 6GHz, find the beam width between first nulls and the gain?

Q. 3. Attempt any two questions

2*10=20

- Obtain the expression for power radiated and the radiated resistance of half wave dipole.
- Explain the principles of operation of horn antenna and discuss the various forms of Horn antenna. Obtain the design equations of Horn antenna.
- Explain the measurement procedure for the measurement of gain and VSWR.

Q. 4. Attempt any two questions

2*10=20

- Design a broadside Dolph-Tschebyscheff array of 10 elements with spacing 'd' between the elements and with a major-to-minor lobe ratio of 26 dB. Find the excitation and form the array factor?
- Explain the radiation mechanism of a microstrip antenna with suitable illustrations. With suitable figures explain the various feed techniques.
- Derive the expression for the array factor of a linear array of four isotropic elements spaced $\lambda/2$ apart fed with signals of equal amplitude and phase. Obtain the directions of maxima and minima.

Q. 5. Attempt any two questions

2*10=20

- Obtain an expression for the refractive index of an ionospheric layer.
- Design a 50 to 200 MHz log periodic dipole antenna for gain corresponds to scale factor 0.8 and space factor 0.15. Assume the gap spacing at the smallest dipole is 3.6mm.
- With a neat block diagram, explain the radiation pattern and gain of an antenna can be measured.