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06EC64

Sixth Semester B.E. Degree Examination, Dec.2017/Jan.2018
Antennas and Propagation

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Explain the following terms with proper expression:
i) Directivity ii) Field pattern iii) Directive gain **(09 Marks)**

b. Explain the different types of aperture. **(06 Marks)**

c. The normalized field pattern $E_n = \sin\theta$, where θ = zenith angle, ϕ = Azimuth angle. θ and ϕ range between 0 and π. Find: (i) exact directivity, (ii) Difference in dB. **(05 Marks)**

2 a. Explain the field and phase pattern. **(05 Marks)**

b. State and explain power theorem. **(05 Marks)**

c. Complete the field pattern and find BWFM and HPBW for linear uniform array of 6 isotropic point source spaced $\lambda/2$ distance apart. The power is applied with equal amplitude and in phase. **(10 Marks)**

3 a. Show that total BWFN for an ordinary and fire array is $2\sqrt{BWFN}$ of broadside array. **(10 Marks)**

b. Show that radiation resistance for $\lambda/2$ dipole is 73 ohms. **(10 Marks)**

4 a. Obtain the field components for small loop antenna. **(10 Marks)**

b. Two point sources are spaced one and a half wavelength to form an array calculate half power beam width of major to be of array when it is fed with.
i) Equal and in phase current
ii) Equal with phase difference of 540° between the two current. **(10 Marks)**

PART – B

5 a. State and explain Babinet's principle. **(06 Marks)**

b. Explain microstrip antennas with neat sketches and mention its advantages. **(08 Marks)**

c. Write a note on pyramidal horn antenna with design equation. **(06 Marks)**

6 Write short notes on:
a. Log periodic antenna b. Yagi-Uda antenna
c. Embedded antenna d. Antenna for ground penetrating radar. **(20 Marks)**

7 a. Derive an expression for tilt angle (α). **(08 Marks)**

b. Explain the Duct propagation. **(06 Marks)**

c. Write a note on Troposcatter propagation. **(06 Marks)**

8 a. Define the following terms as related to ionospheric propagation: (i) MUF, (ii) Critical frequency, (iii) Virtual height. **(06 Marks)**

b. Explain skip distance and derive the expression for skip distance for flat earth surface. **(08 Marks)**

c. A transmitter radiates 100 Watts of power at frequency of 50 MHz so that a space wave propagation takes places. The transmitting antenna has a gain of 5 and its height is 50 m. The receiving antenna height is 2m. It is estimated that a field strength of 100 μv/m is required to give a satisfactory signal at receiving point. Calculate the distance between transmitter and receiver. **(06 Marks)**

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