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SF-8335

B. E. III (Sem. VI) (ECC) Examination

May / June – 2011

Antenna & Wave Propagation

(New sylllabus)

Time : **3** Hours] [Total Marks : **100**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **B. E. III (Sem - VI) (ECC)**

Name of the Subject :

☛ **Antenna & Wave Propagation (New)**

☛Subject Code No. : **8 3 3 5** ☛Section No. (1, 2,.....) : **1, 2**

Seat No. :

Student's Signature

(2) Answer to the two sections must be tied separately.
(3) Assume suitable data wherever necessary.
(4) Figures to the right indicate full marks.
(5) Attempt all questions.
(6) Programmable calculators are not allowed.

SECTION - I

1 (a) Define the following : **10**
(1) Radiation intensity.
(2) Broadside array
(3) Effective aperture
(4) Retarded Potential
(5) End-fire array.

(b) Derive the expression for average power for the current element at the distance r. **10**

2 (a) Explain the concept of multiplication of patterns with the example of 4-element uniform array. **8**

(b) Find the basic and actual transmission losses between two antennas separated by 30m operating at 10 MHz when the gain of each antenna is 1.65 dB. **7**

OR

2 (a) Derive the expression of radiation resistance of quarter wave monopole 8

(b) Prove that effective length of an antenna in transmitting and receiving mode are equal. 7

3 Attempt any three. 15

(1) Explain the concept of multiplication of patterns.
(2) Geometry of helical antenna.
(3) Binomial array.
(4) Axial mode of helical antenna
(5) Polarization.

SECTION - II

4 (a) Answer the following questions : 10

(1) Define : Critical Frequency.
(2) Define : MUF
(3) For frequency independence, Rumsey enunciated the concept of _____.
(a) Angle (b) Log periodic
(c) Both (d) None
(4) Line of sight conditions are required for _____.
(a) Space wave propagation
(b) Ground wave propagation
(c) Sky wave propagation
(d) Ionospheric propagation.
(5) Lens Antennas are used at frequencies above _____.
(a) 3GHZ (b) 0.5 MHZ
(c) 300 MHZ (d) None
(6) In log-periodic dipole array, the region between feed and active region is _____.
(a) Transmission region
(b) Reflection region
(c) Transition region
(d) None
(7) The power gain of a parabolic reflector with aperture diameter D is _____.

(a) $\left(D/\lambda\right)^2$ (b) $6\left(D/\lambda\right)^2$

(c) $70\left(D/\lambda\right)^2$ (d) $60\left(D/\lambda\right)^2$

(8) Wave propagation in the troposphere occurs due to which meachanisms ?

(9) What is Rayleigh criteria ? Write the condition for roughness measurement.

(10) Give the classification of Horn Antenna.

(b) (i) Derive the equation of refractive index in terms of ionization density and frequency of incident wave. Also derive the equation for maximum ionization density. **6**

(ii) A single hop sky wave communication link is operating, connecting two points on earth at distance of 1500 km using an ionospheric layer located at a height of 300km. If the critical frequency is 7 MHZ, find the maximum usable frequency for the two points. **4**

5 (a) Explain the cassegrain feed system. **5**

OR

(a) Determine the field intensity variation in the aperture plane of the dielectric lens. **5**

(b) Explain the various methods available for the measurement of antenna gain. **5**

OR

(b) State the Rumsey's principle and describe any one antenna based on this principle. **5**

(c) What is Babinet's principle ? Why and how this principle was executed by booker ? **5**

6 Write the short notes on : (any three) **15**

(1) Microstrip antenna.

(2) Log-periodic antenna.

(3) Parabolic Reflectors.

(4) Helical antenna.

(5) Yagi-Yuda antenna.
