This question paper contains 3 printed pages.

3345 *Your Roll No.....*

B.Tech. (P/T) / III

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Paper III - ANTENNAS AND TRANSMISSION LINES
(EEC - 303)

Time : 3 hours *Maximum Marks :70*

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt any five questions.
All questions carry equal marks.

1. a) Define the following terms :
   (i) Beam solid angle
   (ii) Radiation Intensity
   (iii) Directivity
   (iv) Half power beam width *06*

   b) Radial component of the radiated power density of an infinitesimal linear dipole antennas is given by :

   $$Wr = \frac{A_0 \sin^2\theta}{r^2} (\text{watt/m}^2)$$

   find the maximum directivity of the antenna. *04*

   c) Normalized radiation intensity of a given antenna is given by :
   (i) $U = \sin\theta \sin^2\phi$
   (ii) $U = \sin\theta \sin^3\phi$
   for $0 \leq \theta \leq \pi$ and $0 \leq \phi \leq \pi$. Find the maximum directivity. *04*

P.T.O

2 a) For a thin Halfwave dipole, the current distribution is given as :

$$I_z = \begin{cases} I_0 \text{ Sin } \left[k\left(\frac{l}{2} - z\right)\right] & 0 \le z \le l/2 \\ I_0 \text{ Sin } \left[k\left(\frac{l}{2} + z\right)\right] & -l/2 \le z \le 0 \end{cases}$$

Determine the electric and magnetic field vector for above distribution. Also find the radiation resistance. *12*

b) Prove that maximum directivity of Half wave dipole is 3/2. *02*

3 a) What is phase difference between two consecutive element in Broad side and End - five array ? Prove your answer. *04*

b) Determine the radiation pattern of array of two point sources feed with equal amplitude and phase quadrature. *04*

c) Determine the direction of pattern maximas for the array of four element separated at $\lambda/2$ distance (between two consecutive elements) for broadside case. 06

4 a) Prove that input impedence of folded dipole antenna is four - times the simple half wave dipole. *04*

b) Explain the different feed system for a paraboloid reflector antenna. *06*

c) Find the Half Power Beam Width and power gain of circular aperture antenna with diameter 4m and the frequency of operation 6GHz. *04*

5 a) Explain the quaterwave transform. *04*

b) Determine the input impedence of a transmission line terminated with any load impedance. *06*

c) Define the characteristic impedance of a transmission line. A high frequency transmission line consists of a pair of open wires having distributed capacitance of 0.01μf per km and distributed inductance of 3mH per km. Find its characteristics impedance and propagation constant at f = 10MHz. *04*

6 a) Define the voltage coefficient of a transmission line and derive an expression for it. *04*

b) A low lossless transmission line of 100 ohm characteristic impedance is connected to a load of 200ohm. Calculate the VSWR for this line. *02*

c) A 50Ω short circuit line of length 0.5λ is feed with a source with frequency 500MHz. Calculate its equivalent input impedance. *04*

d) Explan the working of Yagi - Vda antenna. *04*

7 Write a short note on any of the two of the following :

a) Long wire antenna and Rhombic antenna.

b) Long - periodic antenna

c) Binomial array.

d) Helical antenna. *7 + 7*

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