

**Antenna Theory & Techniques**  
**2E8507**  
**Paper-(EC-229)**

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Time : 3 Hours

**Maximum Marks : 80**  
**Min. Passing Marks : 28**

**Instructions to Candidates:**

Attempt any five questions marks of questions are indicated against each question.

- a) The radiation intensity of an antenna is given by

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$$w(\theta, \phi) = \begin{cases} B_0 \sin \theta \sin^2 \phi & 0 \leq \theta \leq \pi, 0 \leq \phi \leq \pi \\ 0 & \text{elsewhere} \end{cases}$$

Determine the maximum directivity

(8)

Explain, How the effective length and radiation resistance of an antenna depends on its current distribution. Discuss the

- i) Linear and
- ii) Sinusoidal current Distribution case in dipole antenna.

(8)

Find the expression for first null beam-width (FNBW) for a rectangular aperture mounted on an infinite ground plane.

(12)

Write the Babinet's principles, explain the concept of complementary dipole used in it.

(4)

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Compare the different feeding methods for microstrip antennas. Draw their equivalent circuits

(4+4=8)

Design a rectangular microstrip antenna using a substrate with dielectric constant of 2.2, h=0.1588 so as to resonate at 10 GHz.

Eg-14.1  
 Pg - 825

4. a) A microstrip antenna with overall dimensions of L=0.906 cm, w=1.186 cm height (h) = 0.1588 cm. and dielectric constant Cr=2.2 that is operating 10GHz. Find
- i) Input impedance
  - ii) The position of the inset feed point where the input impedance is 50 ohm
- b) Draw the field configurations for rectangular microstrip patch. With follow mode.

i)  $TM_{020}$

ii)  $TM_{001}$

(2+2)

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Design an optimum X band (8.2-12.4 GHz) pyramidal horn so that its gain (abistropic) at f=11GHz is 22.6 dB. The horn is fed by a (WR-G0) rectangular waveguide with inner dimensions of g=2.286 cm and b=1.016cm.

Eg 13. Pg - 782

Q-13

Par 4

- a) Explain the Wheeler cap measurement scheme for antenna efficiency, Do can be used for nonresonant antennas.
- b) Draw the radiation pattern for 4x4 rectangular patch in x-y plane. What be direction of polarization?

- a) Write short notes on any two.

i) Smart antennas

ii) Infrared detection

iii) Fourier transform methods

iv) Broadband Antenna.

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