No. of Printed Pages : 3

**BIEL-013**

00285

# B. Tech. IN ELECTRONICS AND COMMUNICATION ENGINEERING

## Term-End Examination

## June, 2012

## BIEL-013 : ANTENNAS AND PROPAGATION

*Time : 3 hours* *Maximum Marks : 70*

***Note :*** *(i) Attempt **any seven** questions. Each question carries **ten** marks.*

*(ii) Use of scientific calculator is permitted.*

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**1.** A plane wave is incident on a short dipole as shown in FIG - 1, wave is linearly polarized with E in y - direction, current in the dipole is constant and terminating resistance $R_T$ = Rr, where Rr is the radiation resistance, $R_L$ = O (Loss resistance) Determine : **10**

(a) Dipole's maximum effective aperture

(b) Its directivity

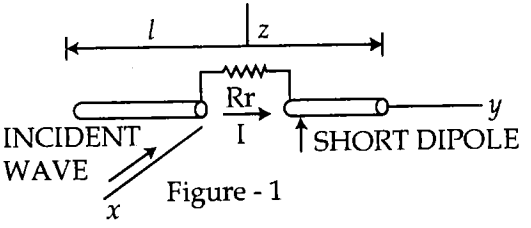


Figure - 1

**2.** Define Antenna Aperture. Derive an expression for the power radiated and directivity in terms of aperture. **10**

3. Derive an expression for the radiation resistance of a $\lambda/2$ antenna. Find its resistance at a point which is not a current maximum. **10**

4. Explain the directivity of a circular Loop Antenna with uniform current for a small and large loop. Find the radiation efficiency of a 1m diameter loop ($c = \pi m$) of 10mm diameter copper wire at : **3+7**
   (a) 1MHz (b) 10 MHz

5. Compare a parabolic reflector with a corner Reflector. **10**

6. Explain the reflection and refraction of sky waves by Ionosphere. **10**

7. For an array of two isotropic point sources, determine the field and phase equations if : **5+5**
   (a) They are of same amplitude and phase.
   (b) Equal Amplitude with any phase differences exists.

8. (a) Determine the length L,H - plane aperture and flare angles $\theta_E$ and $\theta_H$ (in E and H plane) of a pyramidal horn for which $\alpha_E = 10\lambda$. The horn is fed by a rectangular waveguide with $TE_{10}$ mode, $\delta = 0.2\lambda$ in E - plane and $0.37\lambda$ in H - plane **10**
   (b) What are the beamwidths ?
   (c) What is the directivity ?

9. Explain the properties of a Helical Antenna and a Turnstile Antenna. 10

10. Write short notes on *any two* : 2x5=10

(a) Effective height of an Antenna

(b) Fading

(c) Horn Antennas