B.Tech. – VIEP – ELECTRONICS AND COMMUNICATION ENGINEERING (BTECVI)

00409 **Term-End Examination**

December, 2014

BIEL-013 : ANTENNAS AND PROPAGATION

Time : 3 hours   *Maximum Marks : 70*

Note : *Attempt any* **seven** *questions. All questions carry equal marks. Use of scientific calculator is allowed.*

1. (a) Discuss the following in brief :   *6*
        (i)   Isotropic radiator
        (ii) Directive gain
        (iii) Effective area

    (b) The transmitted frequency of the transmitter is 50 MHz and effective aperture area is 150 cm^2. It is transmitted in a particular direction. Find out the directivity of the transmitter.   *4*

2. (a) Show that the directivity of an antenna is
        $$D = \frac{4\pi}{\Omega_A}$$ *5*

    (b) What is the advantage of antenna arrays ? Discuss end-fire arrays with its radiation pattern.   *2+3*

3. Derive the electric field expression of linear arrays of n-isotropic point sources of equal amplitude and equal spacing. *10*

4. (a) Show that the radiation resistance of a half wave dipole is 73 Ω. *5*

(b) Write down a short note on microstrip antenna. *5*

5. (a) How is a loop antenna utilized for calculating the field strength and to determine the direction of an incoming radio signal ? *6*

(b) Compute the directivity of a rectangular horn antenna whose both sides are equal to 10 λ. *4*

6. (a) Explain the working operation of slot antenna with suitable diagrams. *5*

(b) Compare omnidirection antenna and isotropic antenna with its radiation pattern. *5*

7. Derive the EMF equation of loop antenna with its working operation. *10*

8. (a) Discuss the operation of a helical antenna in normal mode and axial mode with its radiation pattern. *5*

(b) Compare parabolic reflectors with corner reflectors. *5*

9. (a) Discuss the structural details of the ionosphere briefly. *5*

   (b) Find the frequency of the propagating wave for D-layer to have refractive index of 0·5. [Electron concentration for D-layer is $400 \, e^-/cm^3$] *5*

10. (a) Derive the expression for the refractive index of the ionospheric layer *7*

$$\mu = \sqrt{1 - \frac{81 \, N}{f^2}}$$

   (b) Explain critical frequency with suitable expression for the ionospheric layer. *3*