

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

Term-End Examination

December, 2015

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. Missing data, if any, may be suitably assumed.

1. (a) Show that the directivity of an antenna is

$$D = \frac{4\pi}{\theta_{HP} \phi_{HP}},$$

where θ_{HP} and ϕ_{HP} are the beam width of an antenna in horizontal and vertical plane respectively.

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- (b) Draw and explain the various components of the radiation pattern of an antenna.

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2. Discuss the following parameters of an antenna in brief : $4 \times 2 \frac{1}{2} = 10$
- (a) Radiation intensity
 - (b) Effective height
 - (c) Antenna temperature
 - (d) Power gain and directive gain
3. Derive and plot the radiation pattern for two isotropic point sources of same amplitude but opposite phase. 10
4. (a) What is a thin linear antenna ? Write down the advantages of folded dipole over linear dipole. 5
- (b) Derive the expression for the radiation resistance of a short dipole. 5
5. (a) Describe horn antenna. How is this antenna fed and what are its applications ? 5
- (b) Compute the directivity of a rectangular horn antenna, whose one side of aperture is $a = 10 \lambda$. 5
6. (a) Draw and explain the constructional details of slot antenna. 5
- (b) Explain Balinet's principle. 5

7. (a) Draw and explain the operation of helical antenna. 5
- (b) Find the directivity, beam width and effective area for a parabolic reflector antenna having illumination efficiency 0.65, reflector diameter of 5 m and operating frequency of 10 GHz. 5
8. Discuss various types of reflectors used to modify the radiation pattern of any antenna with their radiation pattern. 10
9. Explain how the Earth's magnetic field affects the propagation of radio waves in the ionosphere. Discuss its affect on the polarization of radio waves. 10
10. Define and explain with reference to ionospheric propagation : $4 \times 2 \frac{1}{2} = 10$
- (a) Critical Frequency
- (b) Critical Angle
- (c) Maximum Usable Frequency (MUF)
- (d) Skip Distance
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