Sixth Semester B.E. Degree Examination, June/July 2016
Antennas and Propagation

Time: 3 hrs.   Max. Marks:100
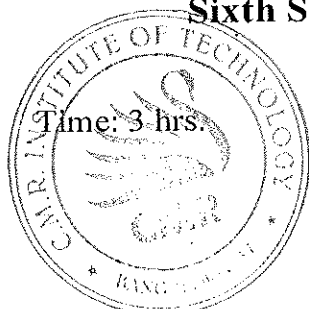
Note: *Answer FIVE full questions, selecting*
atleast TWO questions from each part.

PART – A

1 a. An antenna has a field pattern given by $E(\theta) = \cos^2\theta$ for $0° \le \theta \le 90°\theta$. Find the half power beam width (HPBW). (04 Marks)
   b. Define the following terms with respect to antennas, i) beam efficiency ii) directivity iii) radiation intensity iv) Aperture efficiency. (08 Marks)
   c. Explain antenna field zones with a diagram. (08 Marks)

2 a. Derive an expression for total electric field for two isotropic point sources of same amplitude and phase. (10 Marks)
   b. Obtain the field pattern for a linear uniform array of isotropic antennas, satisfying the following parameters, $n = 5$, $d = \lambda/2$, $\delta = -d_r$. (10 Marks)

3 a. Explain V-antennas with the aid of antenna structures and radiation patterns. (08 Marks)
   b. Explain thin linear antenna. (06 Marks)
   c. Show that the radiation resistance of a $\lambda/2$ antenna is 73Ω. (06 Marks)

4 a. Derive expression for far field components of a small loop antenna. (10 Marks)
   b. Explain slot antennas. (10 Marks)

PART – B

5 a. State Babinet's principle. Explain the same with diagrams. (10 Marks)
   b. Explain horn antennas with diagrams. (10 Marks)

6 a. Describe the construction of an Yagi –Uda antenna. Explain its basic operation briefly. (07 Marks)
   b. Explain sleeve antenna. (07 Marks)
   c. Explain embedded antenna with construction details. (06 Marks)

7 a. A free – space LOS microwave link operating at 10 GHz consists of a transmit and receive antenna each having a gain of 25 dB. The distance between the two antennas is 30 km and the power radiated by the transmit antenna is 10 W. calculate the path loss of the link and the received power. (06 Marks)
   b. Explain knife – edge and rounded surface diffraction models. (08 Marks)
   c. Explain the concept of ground reflection with a diagram. (06 Marks)

8 a. An antenna located at the surface of the earth is used to receive the signals transmitted by another antenna located at a height of 80 m from the spherical surface of the earth (mean radius = 6370 km). Calculate the optical and radio horizons if $dN/dh = -39/km$. (06 Marks)
   b. With illustrations for variation of heights of the ionosphere layers during the summer and winter seasons, explain ionospheric propagation. (08 Marks)
   c. Explain skip distance with respect to wave propagation. (06 Marks)

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