WEST BENGAL STATE UNIVERSITY

B.Sc. Programme 5th Semester Examination, 2020, held in 2021

ELSGDSE02T-ELECTRONICS (DSE1)

ANTENNA THEORY AND WIRELESS NETWORKS

Time Allotted: 2 Hours | Full Marks: 50

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.
All symbols are of usual significance.

1. Answer any ***five*** questions from the following: 2×5 = 10

   (a) What are near and far field regions of an antenna?

   (b) Define polarization and radiation intensity of an antenna.

   (c) What is the relation between directivity and gain of an antenna?

   (d) What is the relation between Maximum Usable Frequency (MUF) and Critical frequency for radio wave propagation?

   (e) What is aperture efficiency?

   (f) Write the basic equation governing the radiation mechanism of an antenna clearly defining each and every term.

   (g) What is Faraday's law?

   (h) What is a Bowtie antenna?

2. Answer any ***eight*** questions from the following: 5×8 = 40

   (a) What is the difference between dipole and monopole antenna? Write the expression for radiation resistance of a half-wave dipole antenna. 3+2

   (b) What are the different modes of propagation of radio waves? What is virtual height and critical frequency in connection with radio wave propagation? 3+2

   (c) Derive Friis Transmission Equation. 5

   (d) What is Half Power Beam Width of an antenna? Derive the relation between directivity and beam solid angle of an antenna. 2+3

   (e) What type of propagation takes place in the ionosphere and why does the ionosphere favour such propagation? 1+4

   (f) Describe a basic rectangular patch antenna. How do the fringing fields help in radiation from the patch antenna? $2\frac{1}{2}+2\frac{1}{2}$

   (g) Derive the expressions for the E-field components of a Hertzian dipole. 5

(h) Derive the relation between maximum effective aperture and power density of the incident wave. 5

(i) Write Maxwell's equations and explain the significance of each. 5

(j) What is the difference between isotropic and omnidirectional antenna? How does beamwidth qualify an antenna? $2\frac{1}{2}+2\frac{1}{2}$

N.B. : *Students have to complete submission of their Answer Scripts through E-mail / Whatsapp to their own respective colleges on the same day / date of examination within* 1 *hour after end of exam. University / College authorities will not be held responsible for wrong submission (at in proper address). Students are strongly advised not to submit multiple copies of the same answer script.*

———×———