



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.*

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