RAJ KUMAR GOEL INSTITUTE OF TECHNOLOGY & MANAGEMENT, GZB

1st Sessional Examination 2017-18 (Odd Semester)

Roll No.: **Subject Name: Antenna and wave propagation**

Year/Branch: **3rd Year/ EC** **Subject Code: NEC-504**

Max Time: 1Hour 30 Minute **Max Marks: 50**

SECTION-A

Q.1 Attempt all parts carry equal marks. Write answer of each part in short. (2x5=10)

(a) Discuss the beam area (or beam solid angle).
(b) Elaborate the term gain and directivity of an antenna.
(c) What do you mean by the radiation pattern? Discuss the field pattern of directional antenna.
(d) Calculate the directivity of isotropic antenna.
(e) Calculate the maximum effective aperture of an antenna which is operating at a wavelength of 2 m and has a directivity of 100.

SECTION-B

Note: Attempt any five questions from this section. (5x5=25)

Q.2 Elaborate the radio communication link. Derive the friis transmission formula.

Q.3 Discuss the phenomenon troposphere scatters propagation.

Q.4 Give your views on Virtual height and skip distance as applied to sky wave propagation.

Q.5 Derive the relation between skip distance and maximum usable frequency for flat earth.

Q.6 Discuss the theory of formation of ionosphere regions.

Q.7 Describe the term effective aperture and directivity and prove that

$$D = 4\Pi \frac{A_e}{\lambda^2}$$

Q.8 The power delivered to an isotopic radiator is 1kW and antenna efficiency is 90%. Find the electric field intensity at a distance of 100 km.

Q.9 What do you mean by antenna effective area and also and prove that

$$A_e = Vrms^2 \; R_L/4R^2_L \; S$$

SECTION-C

Note: Attempt any two questions from this section. **(7.5x2=15)**

Q.10 A television transmitting antenna mounted at a height of 120 m radiates 15kw power equally in all directions in azimuth at a frequency of 50 MHz Calculate

(1) Maximum line of sight range.

(2) The field strength at a receiving antenna mounted at a height by 16m at a distance of 12 km.

Q.11 Using ray treatment, show that the refractive index of the ionosphere in absence of magnetic field and collision is given by

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

Q.12 Derive the field strength relationship for space wave communication.