Please check that this question paper contains 9 questions and 2 printed pages within first ten minutes.

EVENING

[Total No. of Questions: 09] 12 JUN 2023 [Total No. of Pages: 2]

Uni. Roll No. .....

Program: B.Tech. (Batch 2018 onward)
Semester: 5th
Name of Subject: Antenna and Wave Propagation
Subject Code: PCEC-113
Paper ID: 16420
Scientific calculator is Allowed

Time Allowed: 03 Hours **Max. Marks: 60**

NOTE:

1) Parts A and B are compulsory
2) Part-C has Two Questions Q8 and Q9. Both are compulsory, but with internal choice
3) Any missing data may be assumed appropriately

Part – A

[Marks: 02 each]

Q1.

a) Draw the current distribution on thin wire antenna for $l < \lambda/2$.

b) Define Bandwidth of an Antenna.

c) Define Antenna Array.

d) State Babinet's principle in electromagnetics.

e) Determine the critical frequency for reflection at vertical incidence if the maximum value of electron density is 1.26×10^6 cm^{-3}

f) Determine the radiation resistance of a $\lambda/15$ wire dipole in free space.

Part – B

[Marks: 04 each]

Q2. Explain the concept of near field and far field regions of an antenna.

Q3. Explain the physical concept of radiation from a dipole using suitable diagrams.

Q4. Explain advantages and shortcomings of Binomial Arrays.

Q5. Compare any two feed networks for microstrip antenna.

Q6. Determine the maximum power received at a distance of 10 Km over a free space. There is 1000 MHz link consisting of transmitting antenna with a 30 dB gain and a

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receiving antenna with a 25 dB gain w.r.t. isotropic antennas. Input power to transmitting antenna is 150 W.

Q7. Determine the gain of an antenna with a circular aperture of diameter 3 m at a frequency of 6 GHz.

Part – C **[Marks: 12 each]**

Q8. Explain the concept of Retarded Potential and Lorentz Gauge Condition.

OR

Explain the concept of Friis Transmission Equation.

Q9. Derive an expression for range of Space Wave Propagation. Also rewrite this expression considering effective earth's radius.

OR

Derive array factor for N element linear antenna array with uniform amplitude and spacing.

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