Total No. of Questions : 8] **SEAT No. :**

P2434 **[Total No. of Pages : 2**

[5253] - 157
T.E. (E & TC)
Antenna & Wave Propagation
(2012 Pattern) (Semester - II)

Time : 2.30 Hours] ***[Max. Marks : 70***

Instructions to the candidates :

1) ***Answer Q. No. 1 or 2, Q. No. 3 or 4, Q. No. 5 or 6, Q No. 7 or 8***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and stem tables is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Explain in detail the ground wave propagation. Which frequency range is used for ground wave propagation? Why vertical antenna used for ground wave propagation? **[8]**

b) A 300MHz uniform plane wave propagates through fresh water for which $\varepsilon_r = 78$, $\mu_r = 1$, and $\sigma = 0$. Calculate **[6]**

i) Phase constant

ii) Wavelength

iii) Intrinsic constant

c) Derive an expression of electric and magnetic field intensity in terms of vector potential F and magnetic current source M. **[6]**

OR

Q2) a) A free space microwave link operating at 10Ghz consists of transmitting and receiving antenna each having gain of 25dB.The distance between the two antennas is 30km and the power radiated by transmit antenna is 10W. Calculate the received power and path loss. **[6]**

b) An antenna has radiation resistance of 72Ω, a loss resistance of 8Ω and power gain of 12dB. Determine antenna efficiency and its directivity.**[4]**

c) Define and explain the following antenna terminologies: **[6]**

i) Radiation pattern

ii) Radiation power density

iii) Radiation intensity

d) State the poynting theorem. Write expression for power radiated by antenna using poynting theorem. **[4]**

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Q3) a) Derive power density and radiation resistance with respect to infinitesimal dipole. **[8]**

b) Draw current distribution and radiation pattern of .5 λ and 1.5 λ dipole **[4]**

c) Find the directivity of half dipole. **[4]**

OR

Q4) a) Explain important features of loop antenna. Describe radio direction finding. **[6]**

b) A dipole carries r.m.s. current of 200 A at 250 MHz. Its length is one meter. Calculate: **[6]**

i) Power radiated by the antenna.

ii) Effective height of the antenna.

iii) Directive gain of the antenna.

c) Draw the diagram of current distribution monopole antenna and also find radiation resistance of monopole antenna. **[4]**

Q5) a) Explain design equations for yagi uda antenna. Sketch modern version of 6-element Yagi Uda antenna with dimensions, inter-element spacing. **[8]**

b) Write steps to design dolph-Chebysheff array. Compare Dolph Chebysheff array with bionomial array. **[8]**

OR

Q6) a) Draw radiation pattern of end-fire antenna array for 8 element and spacing between elements is $\lambda/4$. Find HPBW for same antenna. **[10]**

b) Derive the expression for directivity of Broadside array. **[6]**

Q7) a) What are electromagnetic horn antennas? What are the various types of horns? What are their practical applications? Compare these antennas with paraboloidal reflector antennas. **[9]**

b) Explain Microstrip antenna with its structure, working, application, advantages & disadvantages. **[9]**

OR

Q8) a) Write short note on following with respect to structural detail, radiation pattern, detailed diagrams & features; **[12]**

i) Biconical antenna

ii) Super Turnstile Antenna

iii) Rhombic Antenna

b) Find FNBW and power gain of 3m parabolic reflector operated at 3000MHz. **[6]**