Total No. of Questions :8]

SEAT No. :

P1736

[Total No. of Pages :3

[5058]-370

T.E. (E&TC)

ANTENNA AND WAVE PROPAGATION

(2012 Course) (End-Semester) (Semester - II)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) A plane wave of 200MHz travelling in free space impinges normally on a large block of material having $\varepsilon r=4$, $\mu r=9$ and $\sigma=0$, determine η_1, η_2, β_1, β_2, Γ_T and Γ_R. **[8]**

b) Explain the field regions surrounded by an antenna. **[6]**

c) Explain the following characteristics of wireless channel **[6]**

i) coherence band width

ii) coherence time and

iii) fading

OR

Q2) a) What is polarization of wave. Explain linear and circular polarization of wave. **[6]**

b) Derive the fundamental equation of free space propagation. Also explain the spatial loss in detail. **[8]**

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c) Calculate the maximum effective aperture of a lossless horn antenna operating at 10GHz with a directivity of 20db. Also find maximum power received when incident power density is 2×10^{-3} (W/m^2). **[6]**

Q3) a) Derive the equation for input impedance and directivity of half wave dipole. **[8]**

b) Give the comparison of far fields of small loop and short dipole. **[8]**

OR

Q4) a) What do you meant by loop antennas; give the classification of loop antennas explain the properties of electrically small loop antenna. **[6]**

b) A 1 m long car radio antenna operates in the AM frequency of 2MHz. How much current is required to transmit 4 watts of power? **[4]**

c) Show the current distribution on small dipole and derive the equation for its input impedance. **[6]**

Q5) a) Explain in detail the working principle of broadside array. **[6]**

b) Derive antenna array factor for N-element linear array taking the centre element as reference for N is odd and even. **[6]**

c) With the help of suitable diagram explain the principle of pattern multiplication. **[4]**

OR

Q6) a) Draw and explain the radiation pattern of an end fire array. **[8]**

b) Design a broadside Dolph - Tchbyschev array of 10 elements with half wave spacing (d) between the elements and with a major to minor lobe ratio of 26 dB. Calculate the excitation coefficient. **[8]**

Q7) Explain the following antennas with its structural details dimensions, radiation pattern, diagram, specifications, features and applications. **[18]**

a) Micro strip antenna

b) Slot antenna

c) Super turnstile antenna

OR

Q8) a) With the help of suitable diagram explain the operating principle of **[10]**

i) Biconical antenna

ii) Lens antenna

b) Explain the Rhombic antenna in detail. **[8]**

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