

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 $\epsilon_r=4$, $\mu_r=9$ 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/m²). [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 mean 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 - Tchebyschev 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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