(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 3100   Roll No. | | | | | | | | | | |

B.Tech.

(SEM VI) EVEN SEMESTER THEORY EXAMINATION, 2009-2010

ANTENNA AND WAVE PROPAGATION

Time : 3 Hours   *Total Marks : 100*

Note :   *Attempt **ALL** the questions.*

1.   Attempt **any two** of the following :   **(2x10=20)**

(a)   Write down the Maxwell's equations and explain their significance. Derive the wave equation for a loss-less medium and show

that $C = \dfrac{1}{\sqrt{\mu\epsilon}}$.

(b)   Discuss the following :

(i)   Method of excitation of antennas.

(ii)   Yagi-Uda antenna array.

(c)   Define the effective area and radiation resistance of an antenna. Derive an expression for effective area of antenna in terms of its gain 'G'.

2. Attempt **any two** of the following : (2x10=20)

(a) What is an antenna array ? What are the reasons for using antenna arrays ? Explain the behaviour of broadside and end-fire arrays.

(b) An end-fire array consists of 16 isotropic point sources separated by uniform spacing of $\frac{\lambda}{4}$. Calculate the half power beam width of the end-fire array.

(c) Explain with suitable diagrams the working of the log-periodic antenna. What are the practical applications of these antennas ?

3. Attempt **any two** of the following : (2x10=20)

(a) Explain how the ionosphere reflects the radio waves. Derive the critical frequency of a reflecting layer in terms of ionization density. Discuss the effects of earths magnetic field on ionospheric reflection.

(b) Write short notes on **any two** :

(i) Space - wave propagation

(ii) Sources of Atmospheric noises

(iii) Maximum usable frequency and virtual height.

(c) Explain the formation of "inversion layer" in the troposphere and the phenomenon of "duct propagation". What factors help in formation of the duct.

4. Attempt **any two** of the following : (2x10=20)

(a) Derive the expression for field components for TM wave in rectangular waveguide. Define the dominant mode and Degenerate mode.

(b) An air filled rectangular waveguide has dimension of 3×2 cm. A wave is propagated in it at 6 GHz. Calculate the following for dominant mode :

    (i) The cutoff wavelength

    (ii) Guided wavelength

    (iii) Phase velocity

    (iv) Wave Impedance

(c) Explain intrinsic Wave - Impedance. Derive the formula for intrinsic Wave - Impedance for circular wave guide.

5. Attempt **any two** of the following : (2x10=20)

(a) Explain velocity modulation and current modulation. Explain the working of Two - cavity klystron with neat diagram.

(b) Describe the principle of operation of TWT with neat diagram. What is the main advantage of the TWT amplifier to klystron amplifier ?

(c) Discuss the following :

    (i) Magnetron

    (ii) Bunching process of electron in Reflex klystrons.

    (iii) Backward wave Amplifier.

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1. Attempt any four parts of the following : (4×5=20)

(a) Explain the term "Artificial Intelligence". Also give the major characteristics of AI.

(b) What do you understand by heuristics ? How heuristic is used in "Hill Climbing and Steepest Hill Climbing algorithm" ?

(c) Differentiate between breadth first search and depth first search, also give an example.

(d) Discuss the basic elements of natural language processing.

(e) What do you understand by Production rules ? Also write Production rules for "Water-Jug problem".

(f) Discuss about visual perception in brief.