Printed Pages : 3   **TEC-605**

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

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

B. Tech.

(SEM. VI) EXAMINATION, 2007-08
ANTENNA AND WAVE PROPAGATION

Time : *3 Hours]*   *[Total Marks : 100*

Note :   *Attempt **all** questions.*

1   Attempt any **two** of the following :   10×2=20

   (a)   What functions does an antenna fulfil ? What does
          the principle of reciprocity say about the properties
          of the antenna ? Explain the same in details.

   (b)   What factors govern the selection of the feed point
          of a dipole antenna ? How do current feed and
          voltage feed differ ? Explain in details.

   (c)   A thin dipole antenna is $\left(\dfrac{\lambda}{15}\right)$ long, where λ

          is the operating wave length. If the dipole has
          a loss resistance of 1.5 ohm determine its

          (i)   Radiation resistance

          (ii)   Terminal resistance.

2   Attempt any **two** of the following :   10×2=20

   (a)   Describe the end fire array and its radiation pattern. Explain how the pattern can be made directional.

   (b)   Why parabolic geometry is a suitable choice for antenna reflectors ? Explain why an antenna using a paraboloid reflector is likely to be a highly directive receiving antenna.

   (c)   Describe the log periodic dipole array antenna with the help of neat sketches. What are its applications ?

3   Attempt any **two** parts of the following :   10×2=20

   (a)   Why electromagnetic waves are said to be transverse ? In what ways are transverse waves different from longitudinal waves ? Illustrate each type with the help of sketches.

   (b)   Describe ground wave propagation. What is the angle of tilt ? How does it affect the field strength at a distance from the transmitter ?

   (c)   Show, with the aid of a suitable sketch, what happens as the angle of incidence of a radio wave using sky wave propagation is brought closer and closer to the vertical. Define the skip distance, and show how it is related to the maximum usable frequency.

4   Attempt any **two** parts of the following :   10×2=20

(a)   A waveguide has an internal breadth a of 3 cm, and carries the dominant mode of a signal of unknown frequency. If the characteristic wave impedance is **500 Ω**. What is this frequency ?

(b)   What are waveguides ? Compare waveguides and transmission lines from the point of view of frequency limitation, attenuation, spurious radiation and power handling capacity.

(c)   Describe briefly the various methods of exciting waveguides, and explain under what circumferences each is most likely to be used.

5   Attempt any **two** parts of the following :   10×2=20

(a)   Make a clear distinciton between velocity modulation and current modulation. Show how each occurs in the Klystron amplifier and explain how current modulation is necessary if the tube is to have significant power gain.

(b)   Explain how oscillations are sustained in the cavity magnetron, with suitable sketches, assuming that the π mode oscillations already exist. Make clear why more energy is given to the RF field than is taken from it.

(c)   With the aid of a schematic diagram, describe the travelling wave tube. What is a slow wave structure ? Why does the TWT need such a structure ?

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