

Total number of printed pages-4

53 (EC 710) AWPR

2021

(Held in 2022)

**ANTENNA AND WAVE  
PROPAGATION**

Paper : EC 710

Full Marks : 100

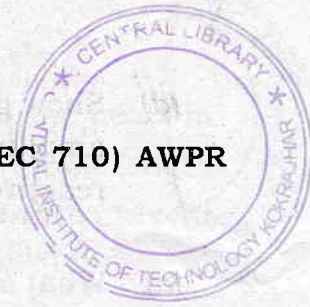
Time : Three hours

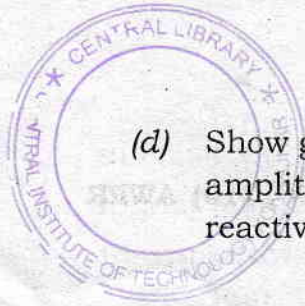
***The figures in the margin indicate  
full marks for the questions.***

*Answer any five questions.*

1. (a) Describe with necessary figure, the radiation mechanism from a single wire.
- (b) How does oscillating dipoles radiate?
- (c) What are the different field regions surrounding a radiating antenna? Describe each of them.

*Contd.*





- (d) Show graphically, how does the antenna amplitude pattern shape changes from reactive near field towards the far field.  
5+5+6+4
2. (a) What are auxiliary potential functions? Why are they used to find the radiation fields?  
(b) Derive the expressions of radiation fields E and H using auxiliary functions.  
(2+3)+15
3. (a) What are the different types of antenna polarization? Discuss each of them.  
(b) What is the axial ratio? What is its value for different types of polarizations?  
(c) What is the difference between 3dB beamwidth and 3dB AR beamwidth of an antenna?  
(d) What does AR bandwidth mean?  
(1+9)+(2+2)+3+3
4. (a) What is loop antenna?  
(b) Why is it so important?  
(c) Derive the expressions for far field and radiation resistance of a square loop antenna.  
2+2+16

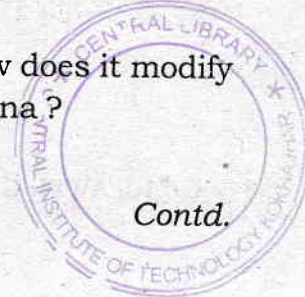
5. (a) Derive the expressions for the fields in the far field zone of a finite length infinitesimally thin dipole with current distribution

$$I_e(z') = I_0 \sin \left[ k \left( \frac{l}{2} - z' \right) \right] \quad \text{for } 0 \leq z' \leq \frac{l}{2}$$

$$I_e(z') = I_0 \sin \left[ k \left( \frac{l}{2} - z' \right) \right] \quad \text{for } -\frac{l}{2} \leq z' \leq 0$$

Also derive the expression for the radiation resistance.

- (b) Using the above derivation, find the radiation resistance for a half-wave dipole. 15+5
6. (a) What are the advantages and disadvantages of microstrip patch antenna?
- (b) How does microstrip antenna radiate?
- (c) What is fringe field? How does it modify the length of the antenna?



(d) What are the different types of feeding techniques used? Compare these methods in terms of spurious feed radiation, reliability, fabrication, impedance matching and bandwidth.

4+4+(3+2)+(2+5)

