END – SEMESTER EXAMINATION
UG

Session: January-June, 2025　　　Semester: 6th　Time: 3Hrs.　Full Marks: 100

Course Code: UEC615A　　　　　　Course Title: Antennas and Propagation

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Answer any Five questions　　　　5X20=100

1. (a) Describe with necessary figure the radiation mechanism from a single wire.
   (b) How does an oscillating dipoles radiate?
   (c) What are the different field regions surrounding a radiating antenna? Describe each of them.
   (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 is an antenna aperture? Deduce the relation between the beam area and the antenna aperture
   (b) What does effective antenna of an antenna mean? Deduce the relationship between the effective height and antenna aperture.
   (c) What is antenna temperature? Prove that if the solid angle subtended by the antenna at the object is much larger than the solid angle of the major lobe then the antenna temperature is almost equal to the brightness temperature.
   (d) What is EIRP　　　　　　　　　　(2+3) + (2+3) + (2+6) + 2

3. (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

4. (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 polarization?
   (c) What is the different between 3dB beam width and 3dB AR beam width of an antenna?
   (d) What does AR bandwidth means?　　　　　　(1+9) + (2+2) +3+3

5. (a) Describe the expressions for the fields in the far field zone of a short dipole ($\frac{\lambda}{50} \leq l \leq \frac{\lambda}{10}$)
   having current distribution　$I(z') = I_o \left[1 - \frac{2|z'|}{l}\right] \widehat{a_z}$,　$\left\{-\frac{l}{2} \leq z' \leq \frac{l}{2}\right\}$
   Also derive the expression for the radiation resistance.　　　　20