INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Four Year B.Tech V Semester End Examinations (Regular) - November, 2018
Regulation: IARE – R16
ANTENNAS AND PROPAGATION
Time: 3 Hours (ECE) **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT – I

1. (a) Derive the equation relating directivity and effective aperture of an antenna. Estimate the directivity of an antenna with $\theta H_P = 2^0$, $\phi H_P = 2^0$ and find the gain of the antenna if efficiency K=0.8. **[7M]**

   (b) Derive the near fields and far fields radiated by a current element with uniform current distribution. **[7M]**

2. (a) Show that the radiation resistance of a half wave dipole is 73Ω and derive its directivity. **[7M]**

   (b) Using image theory, derive the fields radiated by a Quarter wave monopole antenna **[7M]**

UNIT – II

3. (a) Derive the expression for directivity of broad side array. **[7M]**

   (b) Draw the Yagi-Uda antenna and sketch its radiation pattern. Write down the design equations of Yagi-Uda antenna. **[7M]**

4. (a) With neat diagram explain how an array of 2 isotropic point sources can produce radiation patterns with uniform phase. **[7M]**

   (b) Describe the design considerations for monofilar helical antenna to operate in axial and normal mode. **[7M]**

UNIT – III

5. (a) What are the uses of horn antennas? Explain the design considerations of pyramidal horn antenna. **[7M]**

   (b) Derive an expression for the impedance of Slot antenna. **[7M]**

6. (a) Mention the characteristics of microstrip patch antenna and describe the geometry of rectangular patch antenna. **[7M]**

   (b) Explain the working of non-metallic dielectric lens antenna with neat diagram. **[7M]**

UNIT – IV

7. (a) Describe in detail about Offset, Cassegrain and Gregorian feeding methods used in parabolic reflector **[7M]**

    (b) Explain in detail about near field and far field antenna measurements. **[7M]**

8. (a) Discuss in brief about sources of errors in antenna radiation pattern measurements and illustrate the pattern measurement arrangements. **[7M]**

    (b) Explain how gain of an antenna under test is measured using comparison method with neat diagram. **[7M]**

UNIT – V

9. (a) Explain in detail about how does the plane earth reflects in ground wave propagation. **[7M]**

    (b) Explain the mechanism of wave reflection by Ionosphere in detail. **[7M]**

10. (a) Derive the relation between MUF & Skip distance. **[7M]**

    (b) The space wave propagates between transmitting and receiving stations of heights h_1 and h_2 respectively. Derive expression for the field strength. **[7M]**

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