2002 SCHEME

USN | | | | | | | | | | |

EC65

Sixth Semester B.E. Degree Examination, June 2012
Antennas and Propagation

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

1 a. Explain the term "Radiation Pattern". **(06 Marks)**

b. An antenna field pattern has a main lobe whose half power beam width in $\theta = 20°$; and in $\phi = 30°$. Determine the directivity of the antenna. **(14 Marks)**

2 a. An antenna array has four isotropic elements spaced $\lambda/2$ apart in a line and fed in phase. Find the positions of the nulls and maxima in the radiation pattern. **(14 Marks)**

b. Establish that the field pattern of an array of non-isotropic elements is the product of pattern of individual source and that of isotropic sources having the same d and feed. **(06 Marks)**

3 a. An antenna radiates power P at a frequency of 10 MHz and is 9 meters long. Find i) Far field range and ii) Effective height. **(12 Marks)**

b. What is "radiation resistance"? Find the radiation resistance of a thin $\lambda/2$ wire antenna? Assume H_P and $\in_Z$ are known. **(08 Marks)**

4 a. Compare the far fields of a small loop antenna and a short dipole. **(12 Marks)**

b. What happens to the value of radiation resistance and field strength at a point for a loop if diameter is doubled? **(08 Marks)**

5 a. What are the important parameters in the design of monopolar axial mode helical antenna? **(04 Marks)**

b. For a monopolar axial mode helical antenna, what are the HPBW; directivity and gain? **(08 Marks)**

c. For a 10 turn helical antenna, find the HPBW, D and sketch the approximate beam pattern Diameter of helix = 6 cm, distance between turns = 1.5 cm. The antenna is to work at 6 GHz. **(08 Marks)**

6 a. State Babinet's principle. Name its applications. **(08 Marks)**

b. Describe the main features of, i) Patch antenna ii) Rectangular horn antenna. **(12 Marks)**

7 a. How are FM waves in the frequency range 1 – 2 MHz propagated for broad cast purposes? What are the effects of earth's properties like dielectric constant on the propagation? **(10 Marks)**

b. What is the effect of elevation on surface of earth of an antenna working at 7 MHz and $\lambda/2$ long horizontal wire? **(10 Marks)**

8 a. Describe briefly the structure of the ionosphere and its uses for radio communication. **(08 Marks)**

b. What is meant by 'maximum usable frequency' and 'virtual height'? **(06 Marks)**

c. What are the main features of propagation of FM waves at frequencies of the order of 1 to 4 GHz? **(06 Marks)**

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