KUMARAGURU
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Register Number: ……..

B.E DEGREE EXAMINATIONS: NOV/DEC 2014

(Regulation 2009)

Sixth Semester

ELECTRONICS AND COMMUNICATION ENGINEERING

ECE115**:** Antennas and Wave propagation

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. The wavelength of 2-GHz wave is
   a) 15 cm b) 15 mm
   c) 1.5 cm d) 1.5 mm
2. The directive gain may have a numerical value between
   a) 0 to 1 b) 0 to 10
   c) 0 to infinity d) -1 to +1
3. The standard reference antenna for the directivity is
   a) Infinitesimal dipole b) elementary doublet
   c) isotropic antenna d) half wave dipole
4. A dipole antenna is a straight radiator, usually fed in the center. It produces a maximum of radiation
   a) in the plane parallel to its axis b) in the plane normal to its axis
   c) at the place of feed d) at its extreme ends
5. The circular loop of diameter d is generally regarded as small loops if
   a) $d < \lambda/2$ b) $d < \lambda/4$
   c) $d < \lambda/8$ d) $d < \lambda/10$
6. Antennas commonly used for microwave links are
   a) Loop antennas b) Log periodic antennas
   c) Rhombic antennas d) Parabolic dishes

7. The Huygens principle

a) Neglects the vector nature of electromagnetic field.

b) Neglects the effects of current flow at the edges of slot.

c) Neglects the effects of current flow at the edges of horn.

d) Neglects all aspects listed in (a, b & c) above.

8. The directivity D is given in terms of the antenna aperture A_e by the following relation.

a) $D = 4\pi A_e/\lambda^2$

b) $D = 4\pi \lambda^2 / A_e$

c) $D = A_e / 4\pi \lambda^2$

d) $D = A_e / 4\pi \lambda$

9. If wave of critical frequency 30 MHz is departing at an angle of 60^0 , then the MUF is

a) 10 MHz

b) 15MHz

c) 40 MHz

d) 60 MHz

10. When microwave signal follows the curvature of the earth, the phenomenon is called

a) Faraday's effect

b) ducting

c) Tropospheric scatter

d) ionospheric reflection

PART B (10 x 2 = 20 Marks)

11. Define radiation intensity.
12. What is meant by pattern multiplication?
13. Define retarded vector potential.
14. Define radiation resistance.
15. List the applications of Loop antenna.
16. Why do we go for helical antenna?
17. Write the relationship between slot and dipole impedances.
18. Mention the applications of parabolic reflector.
19. Define Critical Frequency.
20. Define diversity reception.

PART C (5 x 14 = 70 Marks)

21. a) (i) Explain the terms: Radiation pattern and Directivity. (6)

(ii) Write a brief note on folded dipole. (8)

(OR)

b) Derive the expression for the far field components for an array of two isotropic point sources with Equal amplitude and phase.

22. a) Derive the expressions for Electric and Magnetic - far field components of a half wave dipole.

(OR)

b) Derive an expression for the power radiated by the current element and hence calculate its radiation resistance.

23. a) Explain the principle of operation and applications of loop antenna. (6)

Write a brief note on Gain measurement. (8)

(OR)

b) Explain in detail the working principle of Helical antenna. (6)

With a suitable diagram, discuss the construction and operation of a Yagi-Uda antenna. (8)

24. a) (i) Explain in detail radiation from a Huygen's source. (7)

(ii) Explain different types of feeds employed in parabolic dishes. (7)

(OR)

b) (i) Discuss in brief about Biconical antennas. (7)

(ii) Write a brief note on slot antennas and mention its advantages. (7)

25. a) Explain in detail ground wave propagation of radio waves and mention its applications.

(OR)

b) (i) Write a brief note on layers of ionosphere. (7)

(ii) Explain in detail sky wave propagation and hence define the term skip distance. (7)

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