B.E. Fifth Semester (Electronics Telecommunication / Electronics Communication Engineering) (C.B.S.)

Antenna & Wave Propagation

P. Pages : 2 **NKT/KS/17/7328**

Time : Three Hours * 0 0 1 6 * Max. Marks : 80

Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Due credit will be given to neatness and adequate dimensions.
9. Assume suitable data whenever necessary.
10. Illustrate your answers whenever necessary with the help of neat sketches.
11. Use of non programmable calculator is permitted.

1. a) Derive the voltage & current Equation for the lossy transmission line. **7**

b) A Transmission line has series inductance of 0.5 mH/km and $C = 0.08\mu f / km$. Assuming lossless transmission line, Calculate characteristics impedance Z_o, velocity of propagation V_P & propagation constant. **6**

OR

2. a) Derive the expression for the input impedance of transmission line & show that $Z_o^2 = Z_{sc}\, Z_{oc}$. **7**

b) A transmission line has characteristic impedance of 300Ω & It has load impedance of 150 + j150 then find out & locate VSWR, Input impedance at 0.1λ & Reflection coefficient an smith chart. **6**

3. a) Derive the expression for $\overline{E}$ & $\overline{H}$ radiated in a space by a Hertziandipole Antenna. **8**

b) Give the application of Half wave dipole and folded dipole Antenna. **6**

OR

4. a) A magnetic field strength of $5\mu A/m$ is required at a point an $Q = \pi/2$, 2km away from an antenna in free space Neglecting ohmic loss, how much power must the antenna transmit if it is, **7**
i) a herteziandipole of length $\lambda/25$?
ii) a half wave dipole?

b) Write a short note on loop antenna & write its application. **7**

5. a) Derive the expression for Array factor of a N-element uniform linear array. **7**

b) Obtain the field pattern for a broadside array with number of elements N = 5 and spacing between the element is $d = \lambda/2$? **6**

OR

6. a) Define th pattern multiplication in brief. **5**

b) Write the procedure for array design using Dolph-Chebyshev, Use the same method to Design a 5-element Dolph Chebyshev array with $d = 0.5\lambda$ and side labes which are 20 dB below the main beam. **8**

7. a) Write a short note on Rectangular microstrip Antenna. Also write the formulas for it dimension. **7**

b) Design a Rectangular Patch Antenna using a substrate RT/ duraid 5880 with dielectric constant of 2.2, h = 0.14cm. So as to resonate at 10GHz. **6**

OR

8. a) What are the advantages and disadvantages of Microstrip antenna over conventional Antenna. **6**

b) State and explain various configuration that can be used to feed Microstrip antenna. **7**

9. a) Explain the working principle, radiation pattern and application of the corner reflector. **8**

b) State the different types of Reflector. Discuss any one in detail. **6**

OR

10. a) The dimension of an Aperture of a Pyramidal horn are 10×5 cm. It is a operated at 6GHz frequency. Find beam width, power gain and directivity. **6**

b) Write a short note on: **8**
i) Aperture Antenna Applications.
ii) Cassegriain dual Reflector system.

11. a) Explain the Gain measurement with suitable measuring setup. **7**

b) State the various source of error in Antenna measurement. **6**

OR

12. Write short notes on **any two.** **13**
i) Noise and Interference in radio wave propagation.
ii) Terrestrial propagation of electromagnetic waves
iii) Ground wave propagation.

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