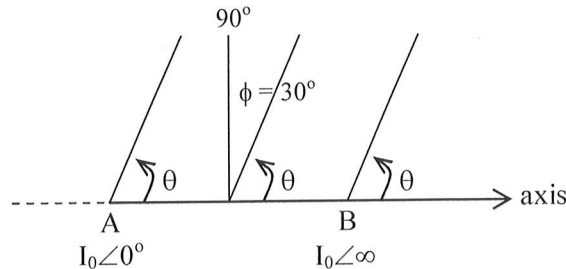


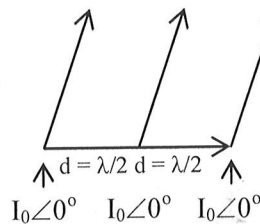
## ARRAY ANTENNAS

12<sup>TH</sup> MAY 2021

01. Compute the beam width between first nulls for a uniform broadside linear array having 20 Hertzian dipoles.
02. Two Isotropic antennas form an array as shown in figure below. The currents fed to the elements in the array are  $I_0 \angle 0^\circ$  &  $I_0 \angle \infty$  respectively. What should be the value of ' $\alpha$ ' such that radiation pattern has a null at  $30^\circ$  from broad side direction as shown in figure. Also, find the direction of maximum radiation for the calculated value of ' $\alpha$ '.



03. Elements of a linear array of 3 equally spaced radiators excited as shown in figure below. Determine the direction of the main lobe and calculate its half power beam width in degrees.



04. A linear array of 6 isotropic point sources located with a space of  $\frac{\lambda}{3}$ , when excited with a series of current sources having a successive phase shift of  $45^\circ$ , then determine the direction of principal lobe and width between first nulls.
05. Design a 4 – element binomial array of linearly spaced elements with inter element spacing of 'D'; (a) What are the normalized excitations required for this array and (b) using them calculate the array factor and find out the array factor maximum.
06. Maximum radiation due to any array of two isotropic radiators with in-phase current occurs
  - (a) along the array axis
  - (b) perpendicular to the direction of the array axis
  - (c) at  $45^\circ$  to the array axis
07. The spacing between two isotropic radiators is  $s$ , and the free-space phase constant is  $\beta_0$ . if the phase angle between currents of the radiators is  $\beta_0 s$ , radiation maximum occurs
  - (a) along the array axis
  - (b) perpendicular to the direction of the array axis
  - (c) at  $45^\circ$  to the array axis
08. Find the width of the principal lobe in an end-fire array with number of elements = 4. Inter antenna element spacing is 0.45 times of operating wavelength. Find the progressive phase shift required to place the beam pointing towards  $45^\circ$  from the array axis.
09. Give the excitation coefficients for a 6 element binomial array. What is the progressive phase shift needed to scan the beam to  $40^\circ$  of broad side, if the spacing is  $\lambda/2$ .