Sardar Vallabhbhai Patel Institute of Technology, Vasad
Electrical Engineering Department
Basic of Electrical Engineering (3110005)

Assignment-1 (A.C. Circuit)

Sr.No.	Questions
1	Define : Direct Current, Pulsating Current and Alternating Current
2	Compare A.C. and D.C.
3	Derive the equation for the generation of Alternating Voltage
4	Define : Cycle, Amplitude, Instantaneous Value, Time Period, Frequency, Phase, Phase Difference
5	Define the R.M.S Value. Discuss the Mid Ordinate method and Analytical method.
6	Derive the RMS value of Half wave rectified A.C. Circuit
7	Define the Average Value of Alternating Quantities. Discuss the Mid-Ordinate method and analytical method.
8	Derive the Average value of Half wave rectified A.C. Circuit
9	Define the Form Factor and Form Factor and also state the significant of the Form factor and form factor
10	Discuss the vector representation of alternating quantities.
11	Explain the method for addition of the two vectors.

Tutorial

Ex.1 A voltage e=141.4 sin($100\pi t$+10^0) is applied to a circuit. It cause a steady current flow, which is given by i=14.14 sin(314.2t-20^0) Determine (1) amplitude of voltage & current (2) the RMS value of voltage & current (3) supply frequency (4) power factor of circuit (5) impedence & resistance of circuit.

Ans. V_{MAX}= 141.14, I_{MAX}= 14.14 (2) $I_{RMS} = 10, V_{RMS} = 100$ (3) F-50Hz (4) PF= 0.866 lagging, Z=10 ohm, R= 8.66 ohm.

Ex.2 Three currents i_1, i_2 and i_3 are expressed by 10sin(6280t+90^0), 20sin(6280t+30^0) and 30sin (6280t+0^0) respectively. Find expression of total current & also find the RMS value, frequency of current.

Ans. I_{TOTAL}= 51.59sin(6280t+17.10^0), I(rms)= 36.48A, F= 1000Hz

Ex.3 Calculate the following & represent in polar form

1. Add 40+j20 to 20+j20
2. Subtract 10+j30 from 20-j20
3. Multiply 15+j20 with 20+j30
4. Divide 6+j7 by 5+j3

Ex.4 Three voltages V_1, V_2 and V_3 are expressed by $20\sin\omega t$, $30\sin(\omega t-45^0)$ and $40\sin(\omega t+30^0)$ Respectively. Find expression of resultant voltage & also find the RMS value, frequency of current, the average &RMS value

Ex.5 : A 50 H z Current has an amplitude of 100 A. Find the rate of change of current in amperes per second at time t where,

(a) t = 0.0025 sec.
(b) t = 0.005 sec.
(c) t = 0.01 sec after t=0 and is increasing.

Ex. 6 : Find root mean square value, the average value and the form factor of the resultant current in a wire which carries simultaneously a direct current of 5 A and a sinusoidal alternating current with an amplitude of 5 A. Also draw the resultant current waveform.

Ex. 7 : Calculate the rms value, form factor, and peak factor of periodic voltage waveform having the following values for equal time intervals, changing suddenly from one value to the next. 0,10,20,40,60,80,100,80,60,40,20,10,0-10,-20,-40…….

Ex. 8 : The instantaneous voltage across each of the four coils connected in series by $V_1 = 100 \sin 471t$, $V_2 = 250 \cos 471t$, $V_1 = 150 \sin (471t + \pi/6)$, $V_4 = 200 \sin (471t - \pi/4)$ Determine the total voltage expressed in a similar form. Also fine the resultant voltage if V_2 is reversed.