## Lecture 26

**Q1.A series RC circuit with R= 10 Ω, C= 100 μF and frequency of 50 Hz obtain expression for the voltage if the current is given by**

(i) $i = 30 \sin(\omega t)$
ii) $I = 30 \sin(\omega t + 45^0)$
(ii) $i = 3 \sin(\omega t - 60^0)$
(iii) $i = 3 \sin(\omega t + 30^0)$

**Solution**

$R = 10\ \Omega,\ C = 100\ \mu F$
$X_c = 1/2\pi f C = 1/2(3.14)(50)\ 100X10^{-6}$
$= 31.84\ \Omega$
$Z = 33.36\ \Omega$
$V_m = I_m * Z$
$= 30(33.36) = 1000$ Volt
$\Phi = (X_c/R)$
$\Phi = 72.55^0$

(i) $i = 30 \sin(\omega t)$
$V = 1000 \sin(\omega t - 72.55^0)$

(ii) $i = 30 \sin(\omega t + 45^0)$
$V = 1000 \sin(\omega t + 45^0 - 72.55^0)$
$V = 1000 \sin(\omega t - 27.55^0)$
$V_m = I_m / Z = 3(33.36) = 100$ Volt

(iii) $i = 3 \sin(\omega t - 60^0)$
$V = 100 \sin(\omega t - 60^0 - 72.55^0)$
$V = 100 \sin(\omega t - 132.55^0)$

(iv) $i = 3 \sin(\omega t + 30^0)$
$V = 100 \sin(\omega t + 30^0 - 72.55^0)$
$V = 100 \sin(\omega t - 42.55^0)$