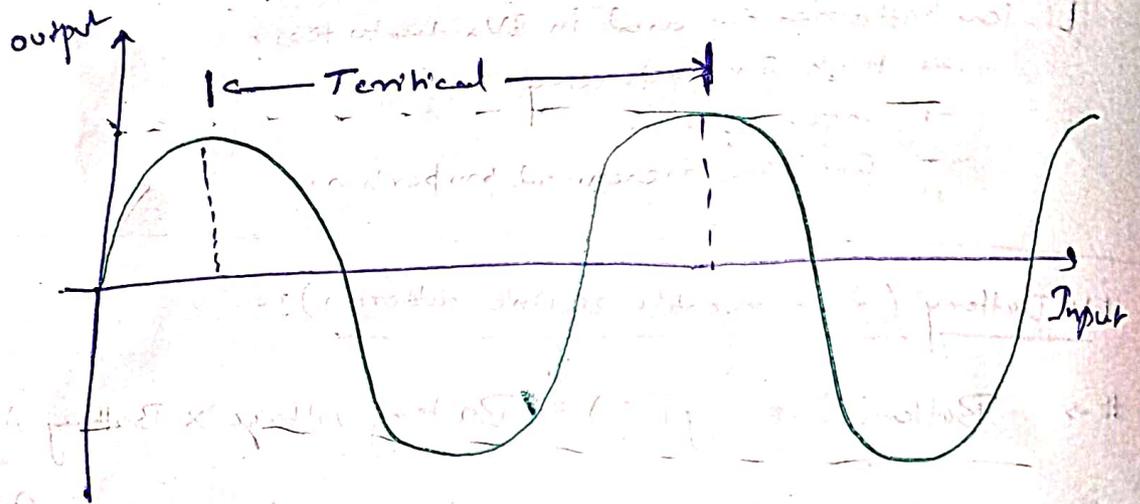


Ziegler - Nichol PID Tuning Method :-

⇒ Choosing the proper value of K_p , K_I and K_D is called tuning of PID controller

⇒ In 1950, Ziegler - Nichol suggested a method for tuning PID, that tuning method is known as Ziegler - Nichols tuning method.

2) In this method to find the values of K_p , K_I and K_D , first of all switch off the K_I (Integral) and K_D (Derivative) mode of controller then by hit and trial method find the value of K_p (proportional) mode so, that the given system exhibit sustained oscillation i.e. marginal stability stability. :-



$T_{critical} = \text{Difference of time period of two peak values}$

slow	$K_p = 0.6 K_{critical}$	①	$K_{critical} = K_{marginal}$
	$K_I = \frac{1.2 \times K_{critical}}{T_{critical}}$	②	
	$K_D = \frac{0.6 \times K_{critical} \times T_{critical}}{8}$	③	

Steps for tuning PID Controller using Ziegler - Nichols Method :-

- ① Obtain T_r & F
- ② Obtain characteristic eqn
- ③ Using Routh-array calculate
K_{marginal} & ω (crosscorresponding to K_{marginal})
- ④ Using ω, calculate T_{critical}
- ⑤ Using K_{critical} & T_{critical} calculate the value of K_p, K_i & K_d.

Quest Design PID controller using Ziegler - Nichol method for unity feedback system having

$$G(s) = \frac{1}{s(s+1)(s+2)}$$

Soln

