d) Given Transfer function,

$$TF = \frac{K(S+2)(S+4)}{(S+1)(S+3)}$$

Poles for given Transfer function is $S=-1$ and $S=-3$ and zeroes of given Transfer function is $S=-2$ and $S=-4$.

No. of Zeroes = No. of poles,

No. infinite zeroes (or) poles to be added, Hence, There is No. Need of asymptotes,

We can use, Characteristic Equation for Break in and Break away points,

$$1+\frac{K(s+2)(s+4)}{(s+1)(s+3)}=0 \Rightarrow K=\frac{-(s+1)(s+3)}{(s+2)(s+4)}$$

Now by doing $\frac{dK}{ds}=0$;

$$(s+2)(s+4)[2s+4]-(s+1)(s+3)[2s+6]=0$$

$$\Rightarrow 2(s+2)(s+4)(s+2)=2(s+1)(s+3)(s+3)$$

$$\Rightarrow (s+2)^2(s+4)=(s+1)(s+3)^2$$

$$\Rightarrow (s^2+4s+4)(s+4)=(s+1)(s^2+6s+9)$$

$$\Rightarrow s^3+4s^2+4s^2+16s+4s+16=s^3+6s^2+9s+s^2+6s+9$$

$$\Rightarrow \boxed{s^2+5s+7=0} \Rightarrow \underline{\text{No-roots which are real}}$$

No. Breakin or Break away point.

There is No. angle of Departure (or) Angle of Arival because There are No. Complex roots (or) No. Complex zeroes.

Hence Rootlocus is: