國立臺北科技大學九十九學年度碩士班招生考試

系所組別：1420 能源與冷凍空調工程系碩士班乙組

第二節　自動控制　試題

注意事項：

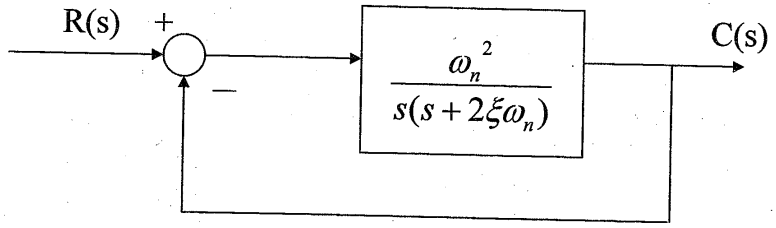
1. 本試題共 5 題，配分共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

1. (a) Prove $L^{-1}\left\{\frac{1}{s^{n+1}}\right\}=\frac{t^n}{\Gamma(n+1)}$,

   where $n > -1$ (10 pts)

   (b) Calculate the inverse transfer, $L^{-1}\left\{\frac{24-30\sqrt{s}}{s^4}\right\}$ (10 pts)

2. A standard second order unity feedback system can be expressed by the following block diagram



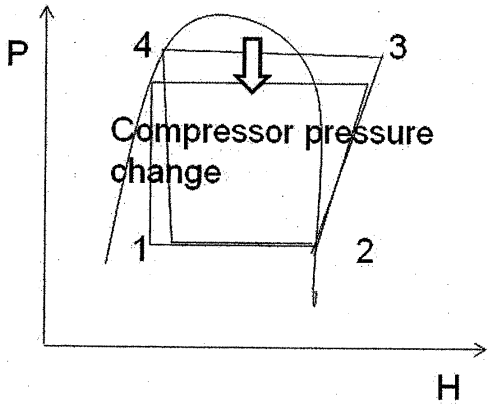
   Write down the system transfer function. (10pts)
   What's the step function response of this system in time domain if $\xi < 1$? (10pts)

3. Considering a single input and single output system with the following time response function:

   $y'''(t)+y''(t)+6y'(t)+(k-3)y(t)=u(t)$

   How can you set k value to stabllize this system? (20 pts)

4. Referring to the following pressure enthalpy diagram (p-h diagram), explain how do control points change on the vapor compression cycle curve (1-2-3-4) as inverter control is introduced into air conditioning control? (20 pts)



5. Key energy-saving technology of air conditioner is the inverter. Describe what's the difference between 120°square wave and 180°sine wave in control part? According to your own judgment, which one is more suitable for energy conservation in home air conditioning? (20 pts)