



**In The Name of God, The Merciful, The Compassionate**  
**Signals & Systems**  
**Department of Computer Engineering**  
**Sharif University of Technology**  
**Fall 2010 – CE 40-242**  
**Quiz #7 Solution**  
**22<sup>nd</sup> November 2010**

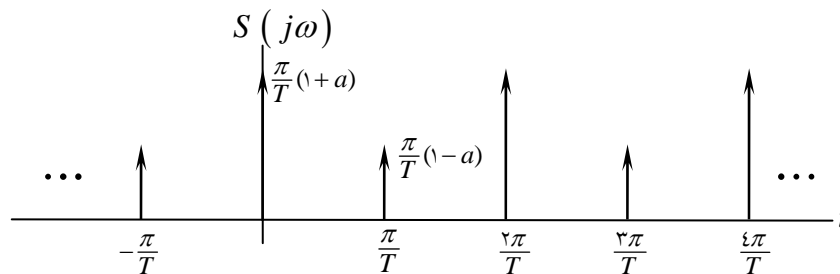
زمان: ۱۵ دقیقه

شماره دانشجویی:

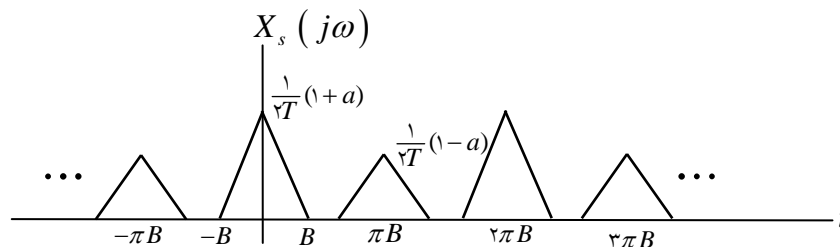
نام و نام خانوادگی:

الف- طیف قطار ضربه  $S(j\omega)$  به شکل زیر است:

$$\begin{aligned}
 s(t) &= \sum_{k=-\infty}^{\infty} \delta(t - k(\gamma T)) + a \sum_{k=-\infty}^{\infty} \delta(t - T - k(\gamma T)) \\
 &\Downarrow \\
 S(j\omega) &= \frac{\gamma\pi}{\sqrt{T}} \sum_{k=-\infty}^{\infty} \delta(\omega - k \frac{\gamma\pi}{T}) + a \frac{\gamma\pi}{\sqrt{T}} \sum_{k=-\infty}^{\infty} \delta(\omega - k \frac{\gamma\pi}{T}) e^{-j\omega T} = \\
 &= \frac{\gamma\pi}{\sqrt{T}} \sum_{k=-\infty}^{\infty} \delta(\omega - k \frac{\gamma\pi}{T}) (1 + a e^{-jk\pi}) = \frac{\pi}{T} \sum_{k=-\infty}^{\infty} \delta(\omega - k \frac{\pi}{T}) (1 + a(-1)^k)
 \end{aligned}$$



(ب)



(ج) واضح است که باید  $B \leq \pi/T - B$  و در نتیجه  $B \leq \pi/2T$ .