Name
Roll No

ME 402: Mechatronics-II
Quiz 3

Time : 40 min Max Marks: 20

Date Tue 27th Feb 07

Return the question paper along with answer book

1 **(2marks)**

(i) Determine which of the following signals can be represented by a Fourier series.

a) $f_1(t) = \cos 6t + \sin 8t + e^{j2t}$

b) $f_2(t) = \cos t + \sin \pi t$

c) $f_3(t) = \sin 5t \times \cos t$

(ii) Determine the fundamental frequency of the periodic signal found in (i) and Hence find a suitable value for the sampling frequency to be used.

2. What is the difference between microprocessor and microcontroller? **(1mark)**

3. How do I setup sampling time of exactly 10 ms for servomotor control application using 8085 microprocessor interfaced with counter chip (8253) and programmable interrupts. Explain clearly using schematic diagrams and specifying where you will write code for your control routine. Specify where to look for whatever details you would need to setup the application. (**4marks**)

4. A low pass RC filter has been designed with R=100 KΩ and C= 4μF .What is the transfer function and corner frequency of this filter. Sketch the bode plot of the filter and suggest a situation where you would use this filter. (**3marks**)

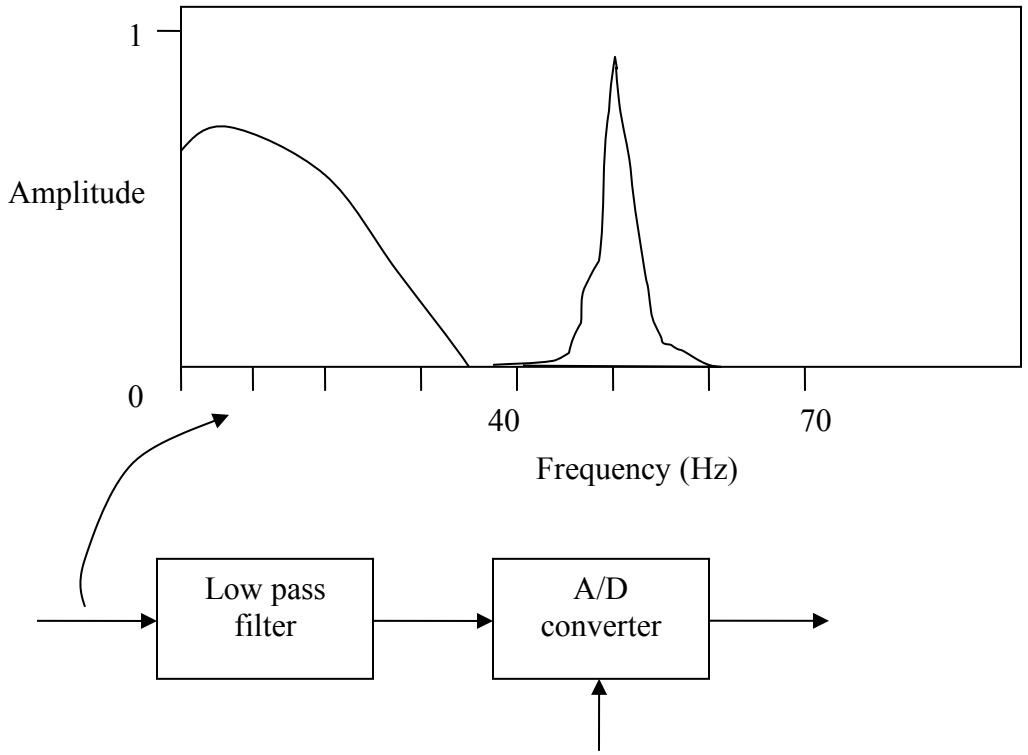
5. State true or false with justification in the space provided (**2marks each**)

a) "Amplifier used for motor driver (between digital controller and motor) is transistor based having dead zone characteristics. The problem is over come by the use of H-bridge configuration"

b) "PWM signal interface is used in servomotor control to reverse direction of motor"

c) “Shannon reconstruction can be used in CD ROM because the reconstruction process is causal”

3. A signal coming from a sensor as an input to A/D converter has the following frequency characteristics. (**4marks**)



Supposing a low pass filter is used before A/D converter as shown in the figure such that the 50 Hz noise component is reduced to 10% of the original. The frequencies below 40 Hz can be assumed to be unchanged. If a sampling frequency of 80 Hz is used, sketch the frequency spectra of sampled signal between 0 and 40 Hz.

Would you recommend an anti aliasing filter to be used?

QUIZ ENDS