Assignment-5

Q.1. Ans.

GPP	DSP
1. Designed for general purpose computing task	1. Specifically designed for signal processing task.
2. Follows a Von Nueman Architecture.	2. Generally follows a narrard architecture
3. Higher clock speed and more cores.	3. Lower clock speed.
4. Typically has a cache hirarchy for data and instruction access.	4. Typically has specialized instruction optimized for signal processing.
5. Includes a wide range of instruction set.	5. Includes specialized instruction optimized for signal processing.

Q2. Ans. Multi-rate signal processing is a technique used to process digital signals by changing their sampling rate. In other words, it is a technique of converting a signal from one sampling rate to another. This technique involves selective filtering and decimating or interpocating the signal to reduce or increases it's sampling rate.

Some fields of application are;

i) Digital audio and video processing:

They are used to compress digital audio and video signals. The technique allows the efficient transmission and storage of digital audior and video signals.

ii) Digital signal filtering:

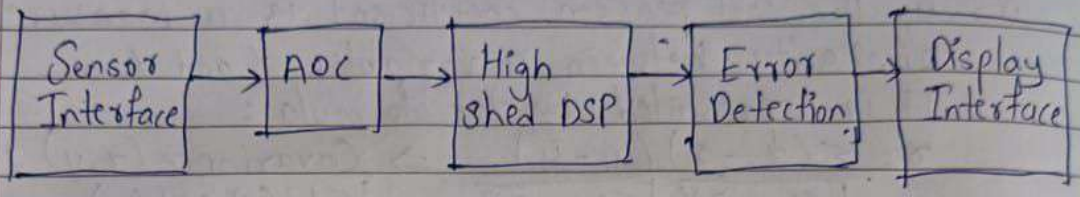
Multirate signal processing techniques are used to design efficient digital filters with lower computational complexity.

Q.3. Ans. The carl pearson coefficient is a measure of similarity between 2 variables X and Y.
It is represented by the formula;

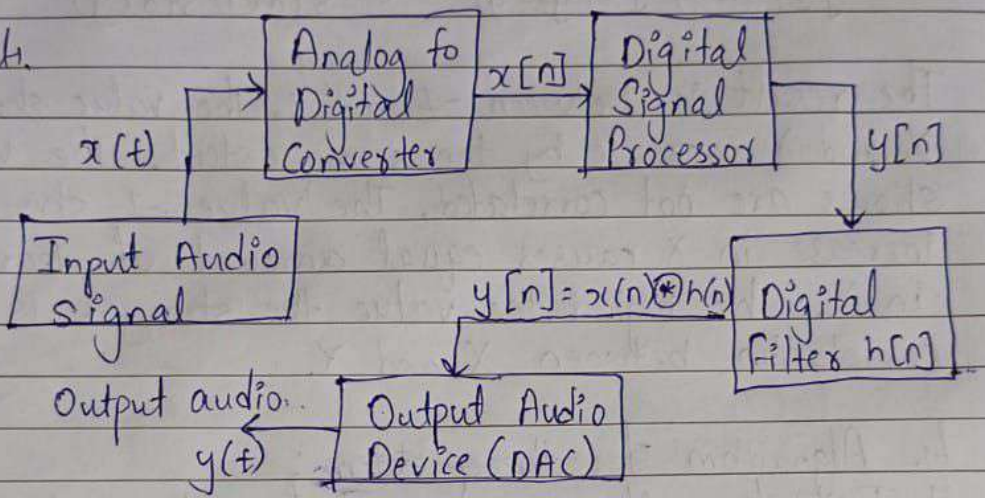
$$r = \frac{\Sigma (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\Sigma (x_i - \bar{x})^2} \sqrt{\Sigma (y_i - \bar{y})^2}} \Rightarrow \frac{Covariance(x,y)}{Std(x)\, Std(y)}$$

The result is between -1 and 1. The value shows i.e. X and Y increase by the same extent. The value 0 shows are not correlated. The value -1 shows an increase in X causes equal amount of decrease in Y. The higher the value the stronger is the correlation between X and Y.

Q.4. Ans. Algorithm for the problem;
i) Initialize the sensor interface to capture vibration data.
ii) Initialize the high speed DSP processor to filter and extract features from libration data.
iii) Set a user defined threshold value for vibration data.
iv) Continuously read ~~radius~~ values.
v) Process the vibration data using high speed DSP processor to extract relevant features.
vi) Compare with threshold.
vii) If exceeded display error
viii) Repeat 4-7 for real time monitor of bridge-vibration data.
ix) End



Q.5. Ans.



Three main blocks for algorithm:

i) ADC:
This block converts analog audio signal to digital signal can be processed by DSP processor.

ii) DSP:
This block performs actual signal processig. It takes audio and applies digital filter to remove noise. Convulation x(n) and h(n).

iii) DAC:
Convert digital signal back to analog signal.