**DSP**

* Calculus/Diff EQ
* What is the characteristic equation? Remember your diff eq!
* Solve a simple ODE
* Partial Fraction Decomposition
* Double derivative related question
* What is the Nyquist Sampling Rate?
* What is the Laplace transform of this ODE?
* FIR vs. IIR for discrete time signals
* Calculus/Diff EQ
* Explain PID control?
* Gave transfer function and asked to evaluate damping coeff. and natural frequency of system.
* eigenvalues, function of ki, kp and kd in PID controller
* 1.Plot the derivative of the function(C)
* 2.Find the partial fraction of given expression(C)
* 3.Find the gradient of the given function.(C)
* 1.Explain lead and lag compensators(C)
* 2.Linearise the system(C)
* 3.Find the Transfer function from the state space equation.(C)
* 4.Given x1 and x2 dot ,find the Lyapunov equation.(NC)
* Transforming an array, parsing a mathematical expression, class hierarchies, asymptotic complexity, etc
* Lyapunov function and stability?
* Linearization and state space model of system.
* Relation between Transfer function roots and system stability.
* Laplace transforms. Lyapunov function and stability?
* Linearization and state space model of system.
* Relation between Transfer function roots and system stability.
* Laplace transforms.
* Can you describe the difference between Direct Form I and Direct Form II
* .Difference between cross-correlation and convolution
* 2. Position of poles for a stable LTI system.
* 3. Eigenvalues and eigenvectors
* Embedded systems and OS: what is priority inversion? Difference between threads and processes?
* Calculus/Diff EQ
* What is the characteristic equation? Remember your diff eq!
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* FIR vs. IIR for discrete time signals
* What is the Nyquist Sampling Rate?
* What is Nyquist theorem? Given the sequence and asked the sampling frequency and explain it. Causal and linear system defn. A equation was given and was asked to find whether it was linear,causal and time variant.

DSP

1) Nyquist Theorem - Aliasing -How do you eliminate aliasing

Ans) Using anti-aliasing filters ,which are low pass filters

2) Convolution and Correlation - Problem based on that

3) Convolution theorem.

4) Difference between FIR and IIR

5) Z transform and Region of Convergence (ROC) -problem.

Signal Processing

Given two discrete sequences and asked to find convolution

Asked difference between Discrete and Circular convolution

Given a sequence x[n] and asked to find step interpolated down sampling x[2n - 0.5] and up sampling x[n/2 + 0.5]

FIR, IIR, Convolution, Correlation, Z-transform, ROC, DFT, FFT, IFFT. They were looking at how good you are with the basics of signal processing. The HR round was much easier followed by a lunch session.

Embedded -> RTOS and multi threading

1.Difference between cross-correlation and convolution

2. Position of poles for a stable LTI system.

3. Eigenvalues and eigenvectors

Dot product and cross product.

It included signal processing questions like what is FFT and what is DTFT.

When is a system stable?

and when is it BIBO?

questions on system stability (control systems)

controllability and observability (modern control system)

Control Systems:

• Explain stability in discrete plane? (answered unit circle and z plane concept etc)

Follow up que: Can you tell how to go from s-plane to z-plane

• Rank of a matrix

• Controllability, Observability

• Given a 2nd order tf, find natural frequency and damping ratio? (Messed up in natural frequency somehow)

• Explain Lyapunov stability (Blabbered a little because was thinking of last question)

• Why we use negative feedback?

a. What is PID controller?

b. Why negative feedback is preferred?

c. Where do we use positive feedback?