# Syllabus for Written Test for Admission to MS and PhD in Control and Sensor Systems

School of Computing and Electrical Engineering,
Indian Institute of Technology Mandi

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**NOTE:** In written test, Part A is mandatory. However, you may choose to write either Part B or Part C.

## Part A

### Mathematics:

Single variable and many variable calculus; Complex analysis; Linear differential equations; Linear algebra; Elementary probability.

### Engineering:

Basic computer programming; Boolean logic; Sequential logic and state machines; Basic electric circuits; Fourier series and Fourier transforms; Laplace transforms; Mathematical modelling of signals and systems;

## Part B

Control systems: Linear systems-time domain and frequency domain analysis; PID, lead, lag and similar compensation techniques.

## Part C

Sensor system & Instrumentation: Resistive-, capacitive-, inductive-, piezoelectric-, Hall effect sensors and associated signal conditioning circuits; transducers for industrial instrumentation, basics of optic sensing and interferometers.

### Reference text-books:

1. Kreyszig, Erwin. Advanced engineering mathematics. John Wiley & Sons, 2010.
2. Lee, Edward and Varaiya, Pravin. Structure and Interpretation of Signals and Systems, Second Edition, ISBN 978-0-578-07719-2, 2011. `http://leevaraiya.org`
3. Aström, Karl and Murray, Richard. Feedback systems: an introduction for scientists and engineers. Princeton university press, 2010. `http://www.cds.caltech.edu/~murray/amwiki/index.php/Second_Edition`
4. Moris, Allan. Measurement and Instrumentation principles Butterworth Heinemann, 3rd Edition 2001.
5. Patranabis, D. Principles of Industrial Instrumentation, Tata McGraw Hill, 3rd Edition, 2010.
6. Kuo, Franklin. Network Analysis and Synthesis. Wiley India, 2nd Edition, 2009.

### Note:

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`http://mandicon.iitmandi.ac.in`