Part A:

Basic mathematics Basic programming in C, Python Basics of signals and systems Basics of electrical circuits with passive and active devices Part B: Student will be required to select one of the following sections Section I: Electric Vehicles Different types of ADC, DAC, inverters, converters Servo motors **Basics of Control Systems and Power Electronics** Section II: Communication Systems Basics of analog and digital communication Signals and systems DSP Probability and random variables/processes Section III: VLSI Digital system design, basics of gates, muxes, counters. **Operation of MOS transistors** Scaling, effects of scaling Switching characteristics of transistors Interconnect effects, delay models, active and leakage power. Section IV: Embedded Systems Programmable devices RTOS Microprocessor architecture Sensors and sensor calibration Section V: Computer Vision Sampling and quantization of an image Edge detection techniques Generation/Interpretation of an image histogram Machine Learning concepts