General subjects for first probe Bachelor degree exam

Electrical engineering and computers program

- Impedance, reactance, resistance in AC circuits. Impedance triangle
- Resonance phenomena in RLC circuits in AC
- Powers in AC single-phase circuits. Power triangle. Power factor. Improving the power factor. Applications
- Powers in AC three-phase circuits
- Temperature sensors – effects used for temperature sensing (e.g., Seebeck effect, resistivity variation with temperature – RTDs, p-n junction and bandgap temperature sensors)
- Typical connections and interfacing circuits used for specific input signals, provided by sensors (voltage, current, charge, resistance)
- Displacement, velocity and acceleration microsensors (sensors using inductive, piezoelectric and capacitive effects)
- Electrostatic actuators. Vertical movement, Lateral movement and Dielectric movement electrostatic actuators.
- Transformer tests. Transformer losses and efficiency
- Induction machine (power losses diagram for motor/generator operating modes, mechanical characteristic)
- Synchronous generator phasors diagrams
- Parallel operation of synchronous generators – speed droop
- Electrical installation characteristics, activity, site topology, layout latitude, service reliability, maintainability, installation flexibility, power demand, load distribution, power interruption sensitivity, disturbance sensitivity, disturbance capability of circuits
- Electric shock, protection against electric shock, direct and indirect contact
- The basic functions of LV switchgear, electrical protection, isolation, switchgear control
- Circuit-breaker, standards and description, fundamental characteristics of a circuit-breaker, other characteristics of a circuit-breaker, selection of a circuit-breaker, coordination between circuit-breakers, discrimination MV/LV in a consumer's substation

- Voltage surge, the four voltage surge types, main characteristics of voltage surges, different propagation modes
- Overvoltage protection devices, primary protection devices (protection of installations, against lightning), secondary protection devices (protection of internal, installations against lightning)

Biography:

- Data Acquisition Handbook; A Reference For DAQ and Analog & Digital Signal Conditioning, 2004-2012 by Measurement Computing Corporation
- Introduction to microsensors and microactuators
- I7 / 2011 Norm
- Jacob Fraden, Handbook of modern sensors – Physics, Design and Applications, Third edition, Springer, Handbook of modern sensors
- Schneider Electrical Installation Guide
- Scutaru Gh., and all, Electrical circuits, 2004
- Stephen J. Chapman, Electric machinery fundamentals, 2005
- Theodore Wildi, Electrical, machines, drives and power systems, 2006