**Indicative Syllabus**

1 Analog and [Digital](http://rozgarpatrika.com/2010/11/gail-exam-syllabusgail-exam-syllabus-downloadgail-executive-trainee-electrical-syllabus) Electronics: Characteristics of diodes, BJT, FET; [amplifiers](http://rozgarpatrika.com/2010/11/gail-exam-syllabusgail-exam-syllabus-downloadgail-executive-trainee-electrical-syllabus) – biasing, equivalent circuit and frequency response; oscillators and feedback amplifiers; [operational amplifiers](http://rozgarpatrika.com/2010/11/gail-exam-syllabusgail-exam-syllabus-downloadgail-executive-trainee-electrical-syllabus) – characteristics and applications; simple active filters; VCOs and timers; combinational and sequential logic circuits; multiplexer; Schmitt trigger; multi-vibrators; sample and hold circuits; A/D and D/A converters; 8-bit / 16-bit microprocessor basics, architecture, programming and interfacing.

2 Control Systems: Principles of feedback; transfer function; block diagrams; steady-state errors; Routh and Niquist techniques; Bode plots; root loci; lag, lead and lead-lag compensation; state space model; state transition matrix, controllability and observability.

3 Electric Circuits and Fields: Network graph, KCL, KVL, node and mesh analysis, transient response of dc and [ac](http://rozgarpatrika.com/2010/11/gail-exam-syllabusgail-exam-syllabus-downloadgail-executive-trainee-electrical-syllabus) networks; sinusoidal steady-state analysis, resonance, basic filter concepts; ideal current and voltage sources, Thevenin?s, Norton?s and Superposition and Maximum Power Transfer theorems, twoport networks, three phase circuits; Gauss Theorem, electric field and potential due to point, line, plane and spherical charge distributions; Ampere?s and Biot-Savart?s laws; inductance; dielectrics; capacitance.

4 Electrical and Electronic Measurements: Bridges and potentiometers; PMMC, moving iron, dynamometer and induction type instruments; measurement of voltage, current, power, energy and power factor; instrument transformers; digital voltmeters and multimeters; phase, time and frequency measurement; Q-meters; oscilloscopes; error analysis.

5 Electrical Machines: Single phase transformer – equivalent circuit, phasor [diagram](http://rozgarpatrika.com/2010/11/gail-exam-syllabusgail-exam-syllabus-downloadgail-executive-trainee-electrical-syllabus), tests, regulation and efficiency; three phase [transformers](http://rozgarpatrika.com/2010/11/gail-exam-syllabusgail-exam-syllabus-downloadgail-executive-trainee-electrical-syllabus) – connections, parallel operation; auto-transformer; energy conversion principles; DC machines – types, windings, generator characteristics, armature reaction and commutation, starting and speed control of motors; three phase induction motors – principles, types, performance characteristics, starting and speed control; single phase induction motors; synchronous machines – performance, regulation and parallel operation of generators, motor starting, characteristics and pplications; servo and stepper motors.

6 Power Electronics and Drives: Semiconductor power diodes, transistors, thyristors, triacs, GTOs, MOSFETs and IGBTs – static characteristics and principles of operation; triggering circuits; phase control rectifiers; bridge [converters](http://rozgarpatrika.com/2010/11/gail-exam-syllabusgail-exam-syllabus-downloadgail-executive-trainee-electrical-syllabus) – fully controlled and half controlled; principles of choppers and inverters; basis concepts of adjustable speed dc and ac drives. Variable speed control of AC machines.

7 Power Systems: Basic power generation concepts; transmission line models and performance; cable performance, insulation; corona and radio interference; distribution systems; per-unit quantities; bus impedance and admittance matrices; load flow; voltage control; [power factor](http://rozgarpatrika.com/2010/11/gail-exam-syllabusgail-exam-syllabus-downloadgail-executive-trainee-electrical-syllabus) correction; economic operation; symmetrical components; fault analysis; principles of over-current, differential and distance protection; solid state relays and digital protection; circuit breakers; system stability concepts, swing curves and equal area criterion; HVDC transmission and FACTS concepts. Numeric Relays.

8 Signals and Systems: Representation of continuous and discrete-time signals; shifting and scaling operations; linear, time-invariant and causal systems; Fourier series representation of continuous periodic signals; sampling theorem; Fourier, Laplace and Z transforms.  
9 Electrochemical cell, galvanic or sacrificial anodes, electrochemical potential, corrosion protection through cathode