

## Topicwise Tests

Test No.	Test Syllabus	No. of Ques.	Marks	Time	Activation Date
1	<b>Electrical Circuits-1:</b> Voltage and current sources: independent, dependent, ideal and practical; v-i relationships of resistor, inductor, mutual inductor and capacitor; Kirchoff's laws, mesh and nodal analysis, superposition, Thevenin, Norton, maximum power transfer and reciprocity theorems; Peak-, average- and rms values of ac quantities; apparent-active- and reactive powers; phasor analysis, impedance and admittance.	17	25	45 min	Activated
2	<b>Electrical Circuits-2:</b> Electrical Circuits-2: Transient analysis of RLC circuits with dc excitation; series and parallel resonance, locus diagrams, realization of basic filters with R, L and C elements. One-port and two-port networks, driving point impedance and admittance, open-and short circuit parameters.	17	25	45 min	
3	<b>Control Systems-1:</b> Feedback principles, signal flow graphs, transient response, steady-state-errors, Routh criteria, root loci.	17	25	45 min	
4	<b>Control Systems-2:</b> Control Systems-2: Bode plot, phase and gain margins, Nyquist criteria, design of lead, Lag and Lead-lag compensators, state-space representation of systems; time-delay systems.	17	25	45 min	
5	<b>Process control:</b> Mechanical, hydraulic and pneumatic system components, synchro pair, servo and stepper motors, servo valves; on-off, P, P-I, P-I-D, cascade, feedforward, and ratio controllers.	17	25	45 min	
6	<b>Sensors and Industrial Instrumentation-1:</b> Resistive, capacitive, inductive, piezoelectric, Hall effect sensors and associated signal conditioning circuits; transducers for industrial instrumentation: displacement (linear and angular), velocity, acceleration, force, torque, vibration, shock.	17	25	45 min	
7	<b>Sensors and Industrial Instrumentation-2:</b> Pressure (including low pressure), flow (differential pressure, variable area, electromagnetic, ultrasonic, turbine and open channel flow meters) temperature (thermocouple, bolometer, RTD (3/4 wire), thermistor, pyrometer and semiconductor); liquid level, pH, conductivity and viscosity measurement.	17	25	45 min	
8	<b>Microprocessors:</b> 8-bit microprocessor and microcontroller: applications, memory and input-output interfacing; basics of data acquisition systems.	17	25	45 min	
9	<b>Engineering Mathematics-1:</b> Linear Algebra, calculus, Vector Analysis, Probability and statistics	17	25	45 min	
10	<b>Engineering Mathematics-2:</b> Differential Equations, Analysis of complex variables, Numerical Methods.	17	25	45 min	
11	<b>General Aptitude-1:</b> Numerical Ability: numerical computation, numerical estimation, numerical reasoning and data interpretation.	17	25	45 min	
12	<b>General Aptitude-2:</b> Verbal Ability: English grammar, sentence completion, verbal analogies, Word groups, instruction, critical reasoning and verbal deduction.	17	25	45 min	
13	<b>Analog Electronics-1:</b> Characteristics and applications of diode, Zener diode, BJT and MOSFET; small signal analysis of transistor circuits, feedback amplifiers.	17	25	45 min	Activated
14	<b>Analog Electronics-2:</b> Characteristics of operational amplifiers; applications of opamps: difference amplifier, adder, subtractor, integrator, differentiator, instrumentation amplifier, precision rectifier, active filters and other circuits. Oscillators, signal generators, voltage controlled oscillators and phase locked loop.	17	25	45 min	
15	<b>Digital Electronics-1:</b> Basics of number systems, Combinational logic circuits, minimization of Boolean functions. IC families: TTL and CMOS. Arithmetic circuits, comparators, Schmitt trigger, multi-vibrators.	17	25	45 min	
16	<b>Digital Electronics-2:</b> Sequential circuits, flip-flops, shift registers, timers and counters; sample-and-hold circuit, multiplexer, analog-to digital (successive approximation, integrating, flash and sigma-delta) and digital-to analog converters (weighted R, R-2R ladder and current steering logic). Characteristics of ADC and DAC (resolution, quantization, significant bits, conversion/settling time).	17	25	45 min	
17	<b>Signals and Systems-1:</b> Periodic, aperiodic and impulse signals; Laplace, Fourier transform, transfer function, frequency response of first and second order linear time invariant systems, impulse response, convolution, correlation.	17	25	45 min	
18	<b>Signals and Systems-2:</b> z-transforms; Discrete time system: impulse response, frequency response, pulse transfer function; DFT and FFT; basics of IIR and FIR filters.	17	25	45 min	
19	<b>Communication-1:</b> Amplitude- and frequency modulation and demodulation; Shannon's sampling theorem.	17	25	45 min	
20	<b>Communication-2:</b> Pulse code modulation; frequency and time division multiplexing, amplitude-, phase-, frequency-, pulse shift keying for digital modulation.	17	25	45 min	
21	<b>Measurement-1:</b> SI units, systematic and random errors in measurement, expression of uncertainty- accuracy and precision index, propagation of errors. PMMC, MI and dynamometer type instruments; dc potentiometer, Measurement of voltage and current, voltage and current scaling.	17	25	45 min	
22	<b>Measurement-2:</b> bridges for measurement of R, L and C, Q-meter. Measurement of Power in single and three phase circuits; ac and dc current probes; true rms meters Instrument transformers, timer/counter, time, phase and frequency measurements, digital voltmeter, digital multimeter, oscilloscope, shielding and grounding.	17	25	45 min	
23	<b>Optical instrumentation-1:</b> Basics of fibre optic sensing, interferometer: applications in metrology.	17	25	45 min	
24	<b>Optical Instrumentation-2:</b> Optical sources and detectors: LED, laser, photo-diode, light dependent resistor and their characteristics.	17	25	45 min	

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Detailed Schedule

# GATE 2022: Online Test Series

## INSTRUMENTATION ENGINEERING



### Topicwise Tests

Test No.	Test Syllabus	No. of Ques.	Marks	Time	Activation Date
25	Electrical Circuits + Electrical Machines	33	50	90 min	<b>Activated</b>
26	Control Systems + Process Control	33	50	90 min	
27	Sensors & Industrial Instrumentation	33	50	90 min	
28	Electricity and Magnetism	33	50	90 min	
29	Engineering Mathematics	33	50	90 min	
30	General Aptitude	33	50	90 min	
31	Signals & Systems	33	50	90 min	<b>Activated</b>
32	Measurements	33	50	90 min	
33	Communications	33	50	90 min	
34	Digital Electronics & Microprocessors	33	50	90 min	
35	Analog Electronics	33	50	90 min	
36	Optical Instrumentation	33	50	90 min	
<b>Multiple Subject Tests</b>					
37	Electrical Circuits + Electricity and Magnetism + Electrical Machines	33	50	90 min	<b>Activated</b>
38	Analog Electronics + Digital Electronics & Microprocessors	33	50	90 min	
39	Sensors & Industrial Instrumentation + Control Systems + Process Control	33	50	90 min	
40	Signals & Systems + Communications	33	50	90 min	
41	Measurements + Optical Instrumentation	33	50	90 min	
42	Engineering Mathematics + General Aptitude	33	50	90 min	
<b>Full Syllabus Tests</b>					
43	Full Syllabus Test-1 (Basic Level)	65	100	180 min	<b>Activated</b>
44	Full Syllabus Test-2 (Basic Level)	65	100	180 min	
45	Full Syllabus Test-3 (Basic Level)	65	100	180 min	
46	Full Syllabus Test-4 (Basic Level)	65	100	180 min	
47	Full Syllabus Test-5 (Advance Level)	65	100	180 min	<b>Activated</b>
48	Full Syllabus Test-6 (Advance Level)	65	100	180 min	
49	Full Syllabus Test-7 (Advance Level)	65	100	180 min	
50	Full Syllabus Test-8 (Advance Level)	65	100	180 min	
<b>Mock Tests</b>					
51	GATE Mock Test 1	65	100	180 min	<b>Activated</b>
52	GATE Mock Test 2	65	100	180 min	
53	GATE Mock Test 3	65	100	180 min	
54	GATE Mock Test 4	65	100	180 min	