Departmentof Instrumentation& Control Engineering

Technical Assistant

Stage-I (Screening Test)

Stage-I (Screening Test): A screening test   shall be conducted in the first phase in form of multiple choice written test. Written test shall be of **90 minutes'** duration comprising of **75 questions**. Each **correct answer will be awarded One [1] mark** and for each **wrong answer One-fourth [1/4] mark shall be deducted**. Screening test shall consist of questions on **General English**(Tenses, Active and Passive, Direct and Indirect speech, Punctuation, Correction of sentences, One word substitutes, Modals, Articles, Clauses, Synonyms, Antonyms, Idioms and Phrases); **Numerical Aptitude Arithmetic**(Simplification of Fractions, Simple and Compound Interest, Profit and Loss, Percentage, Averages, Number System, Time and Work, Problems on Trains, Calendar, Area, Problems on Numbers, Square root, Cube root, Time and Distance and Other basic Arithmetic related matters);**Reasoning and Data Interpretation** (Number Series Compilation, Missing Number finding, Pattern series, Direction Sense Test, Series Compilations, Classification, Missing Character finding, odd man out, Blood relations, Analogy, Coding and Decoding, Letter and Symbol Series, Verbal reasoning, Statement and Conclusions, Letter and Symbol Series, Logical Problems, Arithmetic reasoning, Logical Sequence of words, Pie Chart and Bar Chart).

Eligible candidates **Ten Times** of the positions in each category will be screened for the Stage-II subject to the fulfillment of all educational qualification etc. as per the Recruitment Rules-2019.

Stage-II (Skill test)

Stage-II (Skill Test): The skill test will be of qualifying nature.
Laboratory Experiments etc. as per nature of the postshall be conducted in the respective laboratories/field. Minimum qualifying marks in the skill test will be [UR:30%; EWS:27%; OBC:27%; SC;20%; ST:20%; PwD:15%].

The candidates, who will qualify the skill test, will be called for the final written test. The Candidates appearing in the written test must ensure their eligibility for the particular category

of post. The documents in support of their eligibility shall be verified before the Final test. If any candidate will not have requisite qualification etc. as per the post for which he is appearing will not be allowed to sit in the final test (Stage-III).

Stage-III (Final test)

Stage-III (Final Test): Final written test shall be of 2 hours duration comprising of 100 multiple choice questions.

Each **correct answer will be awarded One [1] mark** and for each **wrong answer One-fourth [1/4] mark shall be deducted**. Only those who are screened in after the Screening test [Stage –I] and qualify the Skill Test [Stage-II] will be allowed to appear in the Final Test [Stage III]. The minimum passing marks in Final test will be [UR:30%; EWS:27%; OBC:27%; SC;20%; ST:20%; PwD:15%].

The final merit list shall be drawn on the basis of the stage-III written test.

SYLLABUS FOR SKILL TEST AND FINAL WRITTEN TEST IS AS PER ANNEXURE-IV.

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Syllabus of Skill Test (Technical Assistant)

1. To verify Theremin's Theorem and Norton Theorem for a given network
2. To determine resonance frequency & Q factor in RLC circuits
3. To measure amplitude , frequency and phase angle by   Cathode Ray Oscilloscope (CRO).
4. To measure the unknown. Resistance by *Wheatstone's bridge (use null deflection method*.)
5. To measure unknown capacitance by wien bridge
6. To perform open circuit test on a single phase transformer
7. To perform short circuit test on a single phase transformer
8. To determine the speed-Torque characteristics of a AC servo motor
9. To determine the speed-Torque characteristics of a DC servo motor
10. To Perform addition of two, 8-Bit numbers using assembly language code for 8085 microprocessor kit.
11. To Perform Hexadecimal additions of two numbers using assembly language code for 8085 microprocessor kit.
12. To convert temperature from °Celsius to °Fahrenheit and Kelvin scale.
13. To obtain Lissajous pattern for two different sinusoidal signals.
14. To plot the Characteristics of I/P converter and Pneumatic control valve in Pressure process station.
15. To determine PH, Conductivity and Turbidity of unknown Solution
16. To determine the viscosity of given sample

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Syllabusfor Final writtentest (TechnicalAssistant)

Computerawareness:
Basic knowledge of Computer Applications, viz; MS Word, MS Excel, Power Point etc. Internet,MS-DOS,Computer Generation&Development,UNIX, Windows,Lotus,SmartSuite,DataEntry,Softwaresknowledge,NetworkingPlatforms,applic ationsofcomputersinInstrumentation/Electricalengineering

BasicInstrumentation: PrincipleofmeasurementofA.C./D.C.Voltageandcurrent,measure ment of Resistance, Characteristics and specification of analog electronic voltmeter ofdifferent kinds of Circuits for DC voltmeter using BJTs and FETs, Ramp type Digital Volt Meter,Integrating type Digital Volt Meter; Cathode Ray Oscilloscope: Block diagram, Construction ofCRT, Working Principle and Application of: Q-meter, Transistor tester, Digital frequency counter,LCRBridge,FunctionGenerator;SignalGeneration:Sine-wavegenerators,Frequencysynthesizedsignalgenerators,Sweepfrequencygenerators,Fr equency:Time&Intervalmeasurement, Transformer construction and working, AC Motors, DC Motors, Generator andStarters.

Basic Electronics: Characteristics and applications of diode, Zener diode, BJT and MOSFET;small signal analysis of transistor circuits, feedback amplifiers. Characteristics of operationalamplifiers;applicationsofop-amps:differenceamplifier,adder,subtractor,integrator,differentiator,instrumentationamplifi er,precisionrectifier,activefiltersandothercircuits.Oscillators,signalgenerators,voltage controlledoscillators.

Digital Electronics: Combinational logic circuits, minimization of Boolean functions. IC families:TTL and CMOS. Arithmetic circuits, comparators, Schmitt trigger, multi-vibrators, sequentialcircuits,flip-flops,shiftregisters,timersandcounters;sample-and-holdcircuit,multiplexer,analog-to digital (successive approximation, integrating, flash and sigma-delta) and digital-toanalogconverters.

Microprocessor: 8-bit microprocessor and microcontroller: applications, memory and input-outputinterfacing;basicsofdataacquisitionsystems,microprocessorapplicationsandprogra mming.

Electrical Circuits: Voltage and current sources, resistor, inductor, and capacitors. Kirchhoff'slaws, mesh and nodal analysis, superposition, Thevenin, Norton, maximum power transfer andreciprocity theorems, Peak,average and r.m.s. values ofac quantities; fundamentals ofR, LandC circuits.

Control Systems: Feedback principles, signal flow graphs, hydraulic and pneumatic

systemcomponents,synchropair,servoandsteppermotors,servovalves;on-off,P,P-I,P-I-D,cascade,feed-forward,andratiocontrollers,PIDiagrams,Controlvalvescharacteristics,Introductiontoprogrammablelogic controllers,methodofdevelopingPLCprogramming.

Measurements: systematic and random errors in measurement, expression of uncertainty -accuracy and precision index. PMMC, MI and dynamometer type instruments; dc potentiometer;bridges for measurement of R, L and C, Q-meter. Measurement of voltage, current and power insingle and three phase circuits; ac and dc current probes; true rms meters, voltage and currentscaling,instrumenttransformers,timer/counter,time,phaseandfrequencymeasurements,digitalvoltmeter,digitalmulti-meter;oscilloscope,shielding andgrounding.

Transducers & Telemetry: Resistive-, capacitive-, inductive-, piezoelectric-, Hall effect sensorsandassociatedsignalconditioningcircuits;transducersforindustrialinstrumentation: displacement(linearandangular),velocity,acceleration,force,torque,vibration,shock,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 viscositymeasurement.Amplitude-andfrequencymodulationanddemodulation,timedivisionmultiplexing,amplitude,phase,frequency,pulseshiftkeyingfordigitalmodulation;opticalsourcesanddetectors:LED,laser,photo-diode,lightdependentresistorandtheircharacteristics; interferometer:applicationsinmetrology;basicsoffiberopticsensing.