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Engineering Academy
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**Tamil Nadu Public Service Commission
Combined Technical Services Examination
(Non - Interview Posts)**

***Online* Test Series**

**Electrical Engineering
Schedule**

No.of Tests : 26		
	Paper-I(Part-B)	Paper-II
Subject Wise Tests	10	10
Full Length Mock Tests	3	3

Note:

- ❖ The Syllabus considered as per Notification of TNPSC. ACE Engineering Academy does not take any responsibility for deviations in syllabus in the final TNPSC exam. As per Notification of TNPSC each question carries '1.5' marks.
- ❖ The Dates of Tests may Change according to the TNPSC Exam schedule.
- ❖ Tests will be activated at 6:00 pm on scheduled day.
- ❖ All tests will be Active upto TNPSC Examination.
- ❖ Test series available in ENGLISH medium only.

Subject Wise Tests

Test No	Name of the Test		No. of Questions	Max Marks	Duration	Date of Activation
Test-01	General Science	Paper-I Part-B	30	45	27Mins	05-08-2024
Test-02	Electrical Circuits	Paper-II	30	45	27Mins	
Test-03	Current Events	Paper-I Part-B	30	45	27Mins	10-08-2024
Test-04	Electric And Magnetic Fields	Paper-II	30	45	27Mins	
Test-05	Geography Of India	Paper-I Part-B	30	45	27Mins	13-08-2024
Test-06	Measurements And Instrumentation	Paper-II	30	45	27Mins	
Test-07	History And Culture Of India	Paper-I Part-B	30	45	27Mins	17-08-2024
Test-08	Control Systems	Paper-II	30	45	27Mins	
Test-09	Indian Polity	Paper-I Part-B	30	45	27Mins	20-08-2024
Test-10	Electrical Machines	Paper-II	30	45	27Mins	
Test-11	Indian Economy	Paper-I Part-B	30	45	27Mins	24-08-2024
Test-12	Power Systems	Paper-II	30	45	27Mins	
Test-13	Indian National Movement	Paper-I Part-B	30	45	27Mins	27-08-2024
Test-14	Analog And Digital Electronics	Paper-II	30	45	27Mins	
Test-15	History, Culture, Heritage And Socio - Political Movements In Tamil Nadu	Paper-I Part-B	30	45	27Mins	31-08-2024
Test-16	Power Electronics And Drives	Paper-II	30	45	27Mins	
Test-17	Development Administration In Tamil Nadu	Paper-I Part-B	30	45	27Mins	03-09-2024
Test-18	Digital Processors And Communication	Paper-II	30	45	27Mins	
Test-19	Aptitude And Mental Ability	Paper-I Part-B	30	45	27Mins	07-09-2024
Test-20	Renewable Energy Sources And Storage Devices	Paper-II	30	45	27Mins	

Full Length Mock Tests

Test No			No. of Questions	Max Marks	Duration	Date of Activation
Test-21	Full length Mock-01	Paper-I Part-B	100	150	90 mins	14-09-2024
Test-22	Full length Mock-02	Paper-II	200	300	180 mins	
Test-23	Full length Mock-03	Paper-I Part-B	100	150	90 mins	24-09-2024
Test-24	Full length Mock-04	Paper-II	200	300	180 mins	
Test-25	Full length Mock-05	Paper-I Part-B	100	150	90 mins	05-10-2024
Test-26	Full length Mock-06	Paper-II	200	300	180 mins	

Syllabus

Paper-I (Part-B)

GENERAL STUDIES

(Degree Standard)

Unit I: General Science

- (i) Scientific Knowledge and Scientific Temper - Power of Reasoning - Rote Learning vs Conceptual Learning - Science as a tool to understand the past, present and future.
- (ii) Nature of Universe - General Scientific Laws – Mechanics - Properties of Matter, Force, Motion and Energy - Everyday application of the Basic Principles of Mechanics, Electricity and Magnetism, Light, Sound, Heat, Nuclear Physics, Laser, Electronics and Communications.
- (iii) Elements and Compounds, Acids, Bases, Salts, Petroleum Products, Fertilisers, Pesticides.
- (iv) Main concepts of Life Science, Classification of Living Organisms, Evolution, Genetics, Physiology, Nutrition, Health and Hygiene, Human Diseases.
- (v) Environment and Ecology.

Unit II: Current Events

- (i) History - Latest diary of events - National symbols - Profile of States - Eminent personalities and places in news – Sports - Books and authors.
- (ii) Polity - Political parties and political system in India - Public awareness and General administration - Welfare oriented Government schemes and their utility, Problems in Public Delivery Systems.
- (iii) Geography - Geographical landmarks.
- (iv) Economics - Current socio - economic issues.
- (v) Science - Latest inventions in Science and Technology.
- (vi) Prominent Personalities in various spheres – Arts, Science, Literature and Philosophy.

Unit III: Geography of India

- (i) Location – Physical features - Monsoon, Rainfall, Weather and Climate - Water Resources - Rivers in India - Soil, Minerals and Natural Resources - Forest and Wildlife - Agricultural pattern.
- (ii) Transport - Communication.
- (iii) Social Geography – Population density and distribution - Racial, Linguistic Groups and Major Tribes.
- (iv) Natural calamity – Disaster Management – Environmental pollution: Reasons and preventive measures – Climate change – Green energy.

Unit IV: History and Culture of India

- (i) Indus Valley Civilization - Guptas, Delhi Sultans, Mughals and Marathas - Age of Vijayanagaram and Bahmani Kingdoms - South Indian History.
- (ii) Change and Continuity in the Socio-Cultural History of India.
- (iii) Characteristics of Indian Culture, Unity in Diversity – Race, Language, Custom.
- (iv) India as a Secular State, Social Harmony.

Unit V: Indian Polity

- (i) Constitution of India - Preamble to the Constitution - Salient features of the Constitution - Union, State and Union Territory.
- (ii) Citizenship, Fundamental Rights, Fundamental Duties, Directive Principles of State Policy.
- (iii) Union Executive, Union Legislature – State Executive, State Legislature – Local Governments, Panchayat Raj.
- (iv) Spirit of Federalism: Centre - State Relationships.
- (v) Election - Judiciary in India – Rule of Law.
- (vi) Corruption in Public Life – Anti-corruption measures – Lokpal and Lok Ayukta - Right to Information - Empowerment of Women - Consumer Protection Forums, Human Rights Charter.

Unit VI: Indian Economy

- (i) Nature of Indian Economy – Five year plan models - an assessment – Planning Commission and Niti Ayog.
- (ii) Sources of revenue – Reserve Bank of India – Fiscal Policy and Monetary Policy - Finance Commission – Resource sharing between Union and State Governments - Goods and Services Tax.
- (iii) Structure of Indian Economy and Employment Generation, Land Reforms and Agriculture - Application of Science and Technology in Agriculture - Industrial growth - Rural Welfare Oriented Programmes – Social Problems – Population, Education, Health, Employment, Poverty.

Unit VII: Indian National Movement

- (i) National Renaissance – Early uprising against British rule - Indian National Congress - Emergence of leaders – B.R.Ambedkar, Bhagat Singh, Bharathiar, V.O.Chidambaranar, Jawaharlal Nehru, Kamarajar, Mahatma Gandhi, Maulana Abul Kalam Azad, Thanthai Periyar, Rajaji, Subash Chandra Bose, Rabindranath Tagore and others.
- (ii) Different modes of Agitation: Growth of Satyagraha and Militant Movements.
- (iii) Communalism and Partition.

Unit VIII: History, Culture, Heritage and Socio - Political Movements in Tamil Nadu

- (i) History of Tamil Society, related Archaeological discoveries, Tamil Literature from Sangam Age till contemporary times.
- (ii) Thirukkural :
 - (a) Significance as a Secular Literature
 - (b) Relevance to Everyday Life
 - (c) Impact of Thirukkural on Humanity
 - (d) Thirukkural and Universal Values - Equality, Humanism, etc
 - (e) Relevance to Socio-Politico-Economic affairs
 - (f) Philosophical content in Thirukkural
- (iii) Role of Tamil Nadu in freedom struggle - Early agitations against British Rule - Role of women in freedom struggle.
- (iv) Evolution of 19th and 20th Century Socio-Political Movements in Tamil Nadu - Justice Party, Growth of Rationalism - Self Respect Movement, Dravidian Movement and Principles underlying both these Movements, Contributions of Thanthai Periyar and Perarignar Anna.

Unit IX: Development Administration in Tamil Nadu

- (i) Human Development Indicators in Tamil Nadu and a comparative assessment across the Country – Impact of Social Reform Movements in the Socio - Economic Development of Tamil Nadu.
- (ii) Political parties and Welfare schemes for various sections of people – Rationale behind Reservation Policy and access to Social Resources - Economic trends in Tamil Nadu – Role and impact of social welfare schemes in the Socio - Economic Development of Tamil Nadu.
- (iii) Social Justice and Social Harmony as the Cornerstones of Socio- Economic Development.
- (iv) Education and Health Systems in Tamil Nadu.
- (v) Geography of Tamil Nadu and its impact on Economic growth.
- (vi) Achievements of Tamil Nadu in various fields.
- (vii) e-Governance in Tamil Nadu.

Unit X: Aptitude and Mental Ability

- (i) Simplification – Percentage - Highest Common Factor (HCF) - Lowest Common Multiple (LCM).
- (ii) Ratio and Proportion.
- (iii) Simple interest - Compound interest - Area - Volume - Time and Work.
- (iv) Logical Reasoning - Puzzles-Dice - Visual Reasoning - Alpha numeric Reasoning – Number Series.

ELECTRICAL ENGINEERING / ELECTRICAL AND ELECTRONICS ENGINEERING

(Degree Standard)

UNIT I: ELECTRICAL CIRCUITS

Circuit elements – Kirchoff's Laws – Mesh and Nodal Analysis - Network Theorems and Applications for DC and AC circuits: Thevenin's Theorem, Norton's Theorem, Superposition Theorem, Maximum Power Transfer Theorem – Sinusoidal Steady State Analysis of RL-RC-RLC Circuits- Resonant Circuits - Natural and Forced Response – Transient Response of RL-RC-RLC Circuits-Two-port networks – Three Phase Circuits-Star-delta transformation - real and reactive power-powerfactor

UNIT II: ELECTRIC AND MAGNETIC FIELDS

Coulomb's Law-Electric Field Intensity-Electric Flux Density-Gauss's Law - Divergence - Electric Field and Potential due to Point, Line, Plane and Spherical Charge Distributions - Effect of Dielectric Medium - Capacitance of Simple Configurations- Magnetic Circuits- Magnetomotive force - Reluctance-Faraday's laws-Lenz's law-Biot - Savart's law - Ampere's law - Fleming's Left and Right Hand Rule-Lorentz force - Inductance - Self and Mutual Inductance-Dot Convention-Coupled Circuits

UNIT III: MEASUREMENTS AND INSTRUMENTATION

Units and Standards – Static and Dynamic Characteristics-Types of Errors - Error Analysis – Measurement of Current, Voltage, Power, Power-factor and Energy – Indicating instruments – Measurement of Resistance, Inductance, Capacitance and Frequency – Bridge Measurements – Instrument Transformers- Electronic Measuring Instruments – Multi meters-True RMS meter-Spectrum Analyzer-Power Quality Analyser- Recording Instruments-XY Recorder-Magnetic Recorders-Digital Data Recorder-Oscilloscopes- DSOLED and LCD Display-Transducers and their applications to the Measurement of Non-Electrical Quantities like Temperature, Pressure, Flow-rate, Displacement, Acceleration, Noise level - Data Acquisition Systems – A/D and D/A Converters- Data Transmission Systems-PLC –smart meters

UNIT IV: CONTROL SYSTEMS

Mathematical Modelling of Physical Systems – Transfer Function - Block Diagrams and Signal Flow Graphs and their Reduction using Mason's Rule – Time Domain and Frequency Domain Analysis of Linear Time Invariant (LTI) System – Errors for Different Type of Inputs and Stability Criteria for Feedback Systems – Stability Analysis Using Routh-Hurwitz Array – Nyquist Plot and Bode Plot – Root Locus – Gain and Phase Margin – Basic Concepts of Compensator Design – PI,PD and PID Controllers-State Variable formulation-state transition matrix- Eigen values and Eigen vectors-free and forced responses of Time Invariant systems - controllability and observability.

UNIT V: ELECTRICAL MACHINES

D.C. Machines – Construction, Excitation methods – Armature Reaction and Commutation – Characteristics and Performance Analysis – Generators and Motors – Starting, Speed Control and braking – Testing – Losses and Efficiency. Transformers-Types-Construction and Operation- Testing – Equivalent Circuits – Losses and Efficiency-All day efficiency – Regulation – Parallel Operation – Three Phase Transformers – Auto-transformer. Induction Machines – Construction, Principle of operation – Rotating Magnetic Field – Performance, Torque-Speed Characteristics, No-load and Blocked Rotor tests, Equivalent Circuit, – Starting, Speed Control and braking – Single - Phase Induction Motors – Linear Induction Motors – Hysteresis Motors – Reluctance Motors. Synchronous Machines – Construction – Operating characteristics and Performance analysis – Efficiency and Voltage regulation – Parallel operation – V and inverted V curves of synchronous motors – Power factor improvement-permanent magnet synchronous motorPermanent magnet brushless dc motor – stepper motor

UNIT VI: POWER SYSTEMS

Single Line Diagram of Power System-Per Unit Quantities-Power Generation Types- Hydro, Thermal and Nuclear Stations – Pumped storage plants – Co generation– Economic and operating factors – Modelling and performance characteristics of Power transmission lines and Cables-HVDC transmission– Mechanical Design of Transmission Lines-Sag-Insulators - ZBus and YBus formulation - Load flow studies – Shunt and Series Compensation - Symmetrical and Un symmetrical Faults Analysis - Transient and Steady- State Stability of Power Systems – Equal Area Criterion-Voltage and Frequency Control – Power System Transients – Power System Protection – Circuit Breakers – Relays classification of protection schemes- overcurrent, distance, differential and carrier-Equipment protection-transformer, generator, motor, busbars and transmission line –AC and DC Distribution - deregulation-energy conservation and energy auditing

UNIT VII: ANALOG AND DIGITAL ELECTRONICS

Semiconductor Devices – PN junctions – Transistors – FET – Zener, Photo diodes and their applications – Rectifier circuits – Voltage regulators – Multipliers. Biasing circuits – Small signal amplifiers – Frequency response – Multistage amplifiers – Coupling methods – Large signal amplifiers – Push - pull amplifiers – Feedback amplifiers – Oscillators – Operational amplifiers and its applications – Precision rectifiers – Multivibrators - Voltage Controlled Oscillator - Timer. Digital logic gate families (DTL, TTL, ECL, MOS, CMOS) – Logic gates - Simplification of Logic Functions- Design of Combinational circuits - Sequential logic circuits-latch–Flipflops– Counters – Registers – multiplexers and demultiplexers - Schmitt triggers- Memories (ROM,PLA and FPGA).

UNIT VIII: POWER ELECTRONICS AND DRIVES

Principle of Operation and Static and dynamic behaviour of Power Semiconductor devices - Power Diode, DIAC, SCR, TRIAC, GTO, MOSFET and IGBT - Single and Three Phase AC to DC Converters – uncontrolled and controlled rectifiers - performance parameters – Single and Three Phase AC to AC converters - Switched Mode Power Supplies – buck, boost and buck boost converter topologies -switching losses-Inverters-Single and Three Phase Inverters – Voltage control- Pulse Width Modulation techniques

- harmonic elimination techniques– Uninterrupted Power Supplies- Electrical drives-motor load dynamics- load torque characteristics-Speed Control of DC Drives– Converter/Chopper fed dc motor drives- Speed control of AC drives - induction motor drives –stator voltage control and V/f control - synchronous motor drives-V/f control, self control, margin angle control and power factor control

UNIT IX: DIGITAL PROCESSORS AND COMMUNICATION

Architecture of 8085, 8086 and 8051 – Instruction Sets – Assembly Language Programming – Interfacing for memory and I/O: 8255 Programmable Peripheral Interface – 8253 Programmable Timer Interface – 8279 Programmable Keyboard and Display Interface – 8257 Direct Memory Access Interface - Embedded processors (ARM and PIC basics only). Classification of Signals and systems – Properties of Discrete Fourier Transforms - FFT Computation – FIR Filters – IIR Filters: Butterworth Filters – Chebyshev Filters. Digital Communication Systems: Pulse Code Modulation and Demodulation – Adaptive Delta Modulation - Frequency Division and Time Division Multiplexing – Data Communication Network Topologies - 7-layer OSI Protocol-IoT concepts

UNIT X: RENEWABLE ENERGY SOURCES AND STORAGE DEVICES

Renewable Energy – Sources and Features - Solar Radiation Spectrum - Radiation Measurement-Solar Photovoltaic Cell – principle of operation-types - MPPT - Microhydel- Operating principle- Wind Energy – components- wind power turbine types-MPPT - Site Selection -Types of Wind Generators-smart grid - Electric vehicles - V2G and G2V - Fuel Cells - Batteries - types and characteristics - Super Capacitors.