

### **SCHEME & SYLLABUS FOR TTA DIRECT RECRUITMENT EXAMINATION**

The standard of paper in General ability test will be such as may be expected of an Engineering Diploma holder. The standard of papers in other subjects will be approximately be that of Diploma level of Indian Polytechnic. There shall be **single** multiple choice objective type Paper of 3 hours duration as per details given below:-

<b><u>Paper</u></b>	<b><u>Marks</u></b>	<b><u>Time allowed</u></b>
Part-I :General ability test	20	3 hours
Part-II :Basic Engineering	90	
Part-III :Specialization	90	

Note: The candidate is required to obtain minimum qualifying marks in each of these parts as may be prescribed by the BSNL.

#### **Detailed Syllabus**

#### **PART-I: GENERAL ABILITY TEST- 20 MARKS**

The candidate's comprehension and understanding of General English shall be tested through simple exercise such as provision of antonyms and synonyms, fill in the blanks and multiple-choice exercises etc. This shall also include questions on current events, general knowledge and such matters of everyday observation and experience as may be expected of Diploma holder.

#### **PART -II: BASIC ENGINEERING- 90 MARKS**

##### **Detailed Syllabus is as under:**

1. **Applied Mathematics**: Co-ordinate Geometry; Vector Algebras, Matrix and Determinant ; Differential calculus ; Integral calculus, Differential equation of second order; Fourier Series; Laplace Transform; Complex Number; Partial Differentiation.

2. **Applied Physics**: Measurement-Units and Dimensions; Waves, Acoustics, Ultrasonic; Light; Laser and its Applications; Atomic Structure and Energy Levels.

3. **Basic Electricity**: Electrostatics, coulomb's law, Electric field, Gauss's theorem, concept of potential difference; concept of capacitance and capacitors; Ohm 's law, power energy, Kirchoff's voltage and current laws and their applications in simple DC circuits; Basic Magnetism; Electro Magnetism; Electromagnetic induction; Concept of alternating voltage & current; cells and Batteries ; Voltage and Current Sources; Thevenin's theorem, Norton's theorem and their applications.

4. **Electronics Devices and Circuits**: Classification of materials into conductor ,semi conductor, insulator etc. electrical properties, magnetic materials, various types of relays, switches and connectors. Conventional representation of electric and electronic circuit elements. Active and Passive components; semi conductors Physics; Semi Conductor Diode; Bipolar Transistor & their circuits; Transistor Biasing & Stabilization of operating point; Single stage transistor amplifier; field effect transistor, Mosfet circuit applications.

Multistage Transistor Amplifier; Transistor Audio Power Amplifiers; Feedback in Amplifier; Sinusoidal Oscillators; tuned Voltage Amplifier; Opto Electronics Devices and their applications; Operational Amplifier; wave shaping and switching circuits.

Block diagram of I.C timer(such as 555) and its working; Multivibrator circuits; Time base circuits; Thyristors and UJT; Regulated Power Supply.

**5. Digital Techniques:** Applications and advantages of digital systems; number system(binary and hexadecimal); Logic Gates; Logic Simplification; Codes and Parity; Arithmetic Circuits; Decoders. Display Devices and Associated Circuits; Multiplexers and De-multiplexers; Latches and Flip Flops; Counters; Shift Register; Memories; A/D and D/A converters.

### **PART-III: SPECIALIZATION-90 MARKS**

**Detailed Syllabus is as under:**

**1. Electrical:** 3 phase vs single phase supply, Star Delta Connections, relation between phase & line voltage, power factor and their measurements; construction and principles of working of various types of electrical measuring instruments, all types of motor and generator-AC & DC transformers, starters, rectifiers, invertors, battery charges, batteries, servo and stepper motors, contactor control circuits, switch gear, relays, protection devices & schemes, substation, protection relaying, circuit breaker, generator protection, transformer protection, feeder & lightening protection, feeder & bus bar protection, lightening arrestor, earthing, voltage stabilizer & regulators, power control devices & circuits, phase controlled rectifiers, invertors, choppers, dual converters, cyclo converters; power electronics application in control of drivers, refrigeration & air conditioning.

**2. Communication:** Modulation and demodulations-principles and operation of various types of AM, FM and PM modulators/demodulators; pulse modulation-TDM, PAM, PPM, PWM; Multiplexing, Principles and applications of PCM.

Induction of Basic block diagram of digital and data communication system; coding error detection and correction techniques; Digital Modulation Techniques-ASK,ICW,FSK,SK; Characteristics/working of data transmission circuits; UART,USART; Modems; Protocols and their functions, brief idea of ISDN interfaces, local area Network; Carrier telephony-Features of carrier telephone system.

Microwave Engineering; Microwave Devices; Waveguides; Microwave Components; Microwave antennas; Microwave Communication System-Block diagram & working principles of microwave communication link.

**3. Network, Filters and Transmission Lines:** Two point network, Attenuator; Filters; Transmission Lines and their applications; characteristic impedance of line; concept of reflection and standing waves on transmission line; Transmission line equation; Principle of impedance matching; Bandwidth consideration of transmission line.

**4. Instruments and Measurements:** Specification of instruments-accuracy, precision, sensitivity, resolution range. Error in measurement and loading effect; Principles of voltage, current and resistance measurement; Transducers, measurement of displacement & strain, force & torque measuring devices, flow of measuring devices, power control devices & circuits. Types of AC milli voltmeters-Amplifier rectifier amplifier. Block diagram explanation of a basic CRO and a triggered sweep oscilloscope, front panel controls; Impedance Bridges and Q-Meters.

Principles of working and specification of logic probes, signal analyzer and logic analyzer, signal generator, distortion factor meter, spectrum analyzer.

**5. Control Systems:** Basic elements of control system , open and closed loop system, concepts of feedback. Block diagram of control system, Time lag, hysteresis linearity concepts; Self regulating and non self regulating control systems. Transfer function of simple control components, single feedback configuration.

Time response of systems.

Stability Analysis; Characteristics equation. Routh's table, Nyquist Criterion, Relative stability, phase margin and gain margin.

Robin Harwitz criterion; Root Locus technique, Bode plot, Polar plot, gain margin and phase margin.



**6. Microprocessors:** Typical organization of microcomputer system and functions of its various blocks, Architecture of a Microprocessor; Memories and I/O Interfacing; Brief idea of M/C & assembly languages, Machines and Mnemonic codes; Instructions format and Addressing mode; concept Instruction set; programming exercises in assembly language; concept of interrupt; Data transfer techniques-sync data transfer, async data transfer, interrupt driven data transfer, DMA, serial output data, serial input data.

**7. Computer:** Computers and its working, types of computers, familiarization with DOS and window-concept of file, directory, folder, Number Systems; Data Communication. Programming-Elements of a high level programming language, PASCAL, C; use of basic data structures; Fundamentals of computer architecture, Processor design, control unit design; Memory organization. I/O System Organization. Microprocessor-microprocessor architecture, instruction set and simple assembly level programming. Microprocessor based system design: typical examples. Personal computers and their typical uses, data communication principles, types and working principles of modems, Network principles, OSI model, functions of data link layer and network layer, networking components; communication protocol-x.25, TCP/IP.

Database Management System-basic concepts, entity relationship model, relational model, DBMS based on relational model.