

Tentative Syllabus for the Post of Junior Laboratory Assistant (Technical)
School of School of Civil & Environmental Engineering- Agriculture
Post Code- 002
Advertisement No. IIT Mandi/Recruit./NTS/2025/05 dated 17.12.2025

1. General Aptitude

Verbal Aptitude Basic English grammar: tenses, articles, adjectives, prepositions, conjunctions, verb-noun agreement, and other parts of speech Basic vocabulary: words, idioms, and phrases in context. Reading and comprehension, Narrative sequencing.

Quantitative Aptitude Data interpretation: data graphs (bar graphs, pie charts, and other graphs representing data), 2- and 3-dimensional plots, maps, and tables Numerical computation and estimation: ratios, percentages, powers, exponents and logarithms, permutations and combinations, and series Mensuration and geometry Elementary statistics and probability.

Analytical Aptitude Logic: deduction and induction, Analogy, Numerical relations and reasoning. Spatial Aptitude Transformation of shapes: translation, rotation, scaling, mirroring, assembling, and grouping paper folding, cutting, and patterns in 2 and 3 dimensions.

2. Soil and Water Conservation Engineering

Scope and objectives of soil and water conservation, agents and causes of soil erosion, types of soil erosion including water and wind erosion, rainfall characteristics, classification and measurement, hydrologic cycle and its components, runoff process and factors affecting runoff, rainfall–runoff relationship, estimation of runoff and time of concentration, sedimentation and soil loss estimation concepts, basic hydrology of watersheds including infiltration, evaporation and evapotranspiration, principles of erosion control, biological soil conservation measures including contour farming, strip cropping and vegetative barriers, engineering soil conservation measures such as contour bunds, graded bunds, bench terracing, contour trenches, contour stone walls and grassed waterways, gully erosion, classification of gullies and gully control measures, temporary and permanent gully control structures, drop spillway, chute spillway and drop inlet spillway, hydraulic jump and Froude number, stream bank protection works, water harvesting techniques including farm ponds and percolation tanks, watershed management concepts including watershed investigation, prioritization, planning and implementation, land capability classification, moisture conservation practices, principles of flood control and flood routing, basics of irrigation in soil and water conservation including soil–water–plant relationship, crop water requirement concepts, field application efficiency, irrigation scheduling under conserved moisture conditions, drainage problems including waterlogging and

salinity and their control measures, wind erosion process, mechanics of wind erosion, design principles of shelter belts and wind breaks and their management.

3. Farm Power and Machinery

Status and scope of agricultural mechanization, sources of farm power including human, animal, mechanical, electrical and renewable energy sources, internal combustion engines including types, components and working principles, comparison of two-stroke and four-stroke engines, spark ignition and compression ignition engines, engine terminology, fuel, air intake, cooling, lubrication and governing systems, tractor classification and types, power tillers, power transmission system including clutch, gearbox, differential, final drive and power take-off, tractor hydraulic system, primary and secondary tillage implements, implements for hill agriculture and horticulture, sowing, planting and transplanting machinery, calibration principles of seed drills, intercultural implements, plant protection equipment including sprayers and dusters, harvesting, threshing and combining machinery, machinery for land development and earth moving operations, operation, maintenance and safety of farm machinery, ergonomics and man-machine system, cost analysis of tractor and implement system.

4. Food Processing / Agricultural Process Engineering

Scope and importance of post-harvest technology, causes of post-harvest losses in agricultural produce, engineering properties of agricultural materials including physical, thermal and aerodynamic properties, cleaning and grading of agricultural produce, size reduction and densification, drying and dehydration including moisture content, equilibrium moisture content and drying theory, types of dryers such as tray dryer, fluidized bed dryer, deep bed dryer and solar dryer, material handling equipment including belt conveyors, screw conveyors and bucket elevators, capacity and power requirement concepts, processing of cereals, pulses and oilseeds, basic principles of rice milling, dairy processing including cream separation, pasteurization, homogenization, butter, cheese and ice-cream manufacture, packaging of agricultural produce, utilization of agro-industrial by-products such as rice husk, rice bran, sugarcane bagasse, crop residues and coir pith.

5. Smart / Precision Agriculture

Concept and need of precision agriculture, site-specific crop management, soil-plant- water relationship under precision farming, remote sensing principles and applications in agriculture, types of satellite imagery and basic image interpretation, GIS fundamentals and spatial data handling, GPS principles and agricultural applications, crop monitoring and yield mapping, sensor-based measurement of soil moisture, water flow, pressure and temperature, basics of data acquisition systems, computer applications in agriculture, input and output devices, data processing and visualization, decision support systems in agriculture, use of ICT in smart farming, automation in irrigation systems, UAV and drone applications in agriculture, introduction to smart irrigation and sensor-based farming technologies.