Woodworking machinery: Circular, frame, and band saws; planing, mortising, tenoning, and moulding machines, &c.; knowledge of their management and control, and the systematic handling of work. Safety guards. Bearings—lubrication and adjustment. Pulleys and shafting.

PRACTICAL WORK.—ADVANCED CARPENTRY AND STAIR-BUILDING.

Candidates for this examination must satisfy the examiners or their deputies in (*a*) drawing, (*b*) practical work.

In drawing they must submit to the examiners—

(*a*) A complete set of drawings for a framed building;

(*b*) Drawings of a geometrical staircase, or similar problem illustrating the application of compound curves.

Each set of drawings is to be accompanied by specifications of materials, quantities, and costs.

SPECIAL EXAMINATION IN BUILDING-CONSTRUCTION.

The examination in building-construction will include—

1. Materials: A general knowledge of the properties and strengths of stone, brick, cement, mortar, concrete, cast iron, wrought iron, and steel.

2. Foundations of concrete, stone, and brick; damp-courses; proportions and mixing of limes, cements, and mortars; bonds of brickwork; construction of solid and hollow walls, chimney-flues, arches, and bricklayers' work generally.

3. Masonry structures: Different kinds of masonry; nomenclature; qualities of building-stone. Retaining-walls and small-span arches. Safe pressures on foundations in different classes of earth. Damp-prevention. Intensity of pressure on foundations of retaining-walls. Line of resistance or resultant pressure in retaining-walls and masonry dams.

4. Different forms of timbering for foundations and reinforced-concrete work, scaffolding, staging and gantries, shoring, derrick, towers, &c., with a clear knowledge of their requirements to ensure safety. Temporary buildings.

5. Loads on structures: Weights of various materials of construction. Dead and live loads. Wind-pressure in ordinary cases.

6. The determination of the forces in framed structures, treated theoretically and practically. The effect of the joints on the stresses in structures.

7. Roof-trusses: The various types of timber and steel trusses, and spans for which they are suitable. Calculation of stresses due to dead load by method of sections, and the obtaining of stresses by means of stress diagrams. Wind-pressures; wind-stress diagrams.

8. Detailed arrangement of joints in simple trusses.

9. The calculation of the loads that given timber or steel beams and cantilevers will carry; the calculation of the sizes of beams and cantilevers to carry given loads; in each case regard to be paid to necessary stiffness (or resistance to deflection). Structural details of joints and connections to pillars, stanchions, &c.

10. Bending-moment: The calculation and graphical illustration by scale diagrams of bending-moment due to simple cases of loading, as, for example, systems of concentrated loads, uniformly distributed load, and uniform load over a portion of the span, in the case of simply supported girders. Bending-moments in fixed beams and in beams continuous over intermediate supports.

11. Shearing-force: Diagrams of shearing-force corresponding with the above cases of bending-moment.

12. Principles underlying the methods of strengthening beams and girders by flitching and trussing. Cambering; the use of bolts, fish-plates, straps, and keys.

13. Girders: The general method of designing a plate girder for a given span and load. Structural details, rivets, gusset-plates, stiffeners, &c.

14. General knowledge of reinforced-concrete construction. Proportions and grading of aggregates; determination of voids; testing of cement. Waterproofing materials; allowances for temperature changes. Specifications for foundations, retaining-walls, beams, columns, walls, floors, &c. Elementary theory of beams, slabs, and columns, treated as far as possible graphically; methods of fabrication and placing of reinforcement forms; shuttering; mixing and mixing-machines; lifting and placing concrete; removal of forms.

15. General knowledge of plastering, external and internal slaters' and tilers' work. Plumbing-work, internal and external, including a general knowledge of the properties of lead, copper, brass, tin, zinc, and alloys; electrolysis. Hot-water installations, heating of buildings; ventilation and other hygienic and sanitary requirements of buildings.