Technological University Dublin

ARROW@TU Dublin

1934

Building Construction (3rd Year): Technical School Examinations 1934

Department of Education: Technical Instruction Branch

COURSE IN BUILDING.

AN ROINN OIDEACHAIS.
(Department of Education.)

BRAINSE AN CHEÁRD-OIDEACHAIS.
(Technical Instruction Branch.)

TECHNICAL SCHOOL EXAMINATIONS.
1934.

BUILDING CONSTRUCTION.
(Third Year.)

Friday, May 18*th*—7 *to* 10 *p.m.*

Examiner—W. DAVIDSON, ESQ.
Co-Examiner—F. W. SINCLAIR, ESQ.

GENERAL INSTRUCTIONS.

You are carefully to enter on the Answer Book and Envelope supplied your Examination Number and the subject of examination, but you are not to write your name on either. No credit will be given for any Answer Book upon which your name is written, or upon which your Examination Number is not written.

You must not have with you any book, notes, or scribbling paper.

You are not allowed to write or make any marks upon your paper of questions.

You must not, under any circumstances whatever, speak to or communicate with another candidate ; and no explanation of the subject of the examination may be asked for or given.

You must remain seated until your answer-book has been taken up, and then leave the examination-room quietly. You will not be permitted to leave before the expiration of twenty minutes from the commencement of the examination, and will not be re-admitted after having once left the room.

If you break any of these rules, or use any unfair means, you are liable to be dismissed from the examination, and your examination may be cancelled by the Department.

Three hours are allowed for this paper. Answer-books, unless previously given up, will be collected at 10 p.m.

INSTRUCTIONS.

Read the General Instructions on page 1.

(*a*) Not more than *six* questions are to be attempted.

(*b*) Answers must be written in *ink*. Diagrams may be in *pencil*.

(*c*) Small diagrams and sketches, to illustrate written descriptions, should be made upon squared paper.

(*d*) Write the number of the question before the answer.

(*e*) Equal values are attached to the questions.

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1. A proposed brick building, with basement, is to be erected on a water-logged site. A satisfactory foundation bed for the external walls has been found at a depth of 11 feet below the ground level, on which the concrete foundations are to be laid. It is not possible, owing to the depth, to provide a dry area around the building, so that the basement walls will be in contact with the surrounding soil. The upward pressure of the water may be taken as being fairly considerable. The basement floor is of concrete and the ground floor, the top of which is about 18 inches above ground level, is supported on wood joists 9 inches deep.

Make a vertical cross-section through the basement showing how it is protected from the entry of moisture. The complete span between the basement walls, which are 18 inches thick need not be shown.

Make use of a scale of $\frac{3}{8}$ inch or $\frac{1}{4}$ inch to a foot.

2. It has been suggested that the bases of walls would be best formed in solid concrete from the damp-proof course downwards. On this assumption, make a vertical cross-section through the front wall of a dwelling thus treated. The ground level is 6 inches below the damp-proof course and the brickwork above is $13\frac{1}{2}$ inches thick. Show a wood floor with $4\frac{1}{2}$ inch joists on the inside. Give suitable proportions of cement, aggregate and sand for this work. How many cubic yards of concrete would be required to form 20 feet in length of the base you have just drawn?

3. The external brick walls of a building meet at an angle of 120°, forming an obtuse squint quoin. Draw to a scale of one inch to a foot the plans of two successive courses in English bond at the angle of the building.

The walls are two bricks thick and about 3 feet in length of the front face of each wall may be shown. Draw an elevation about five courses in height and at right angles to the front wall.

4. Draw to a scale of one inch to a foot the plans of two consecutive courses of brickwork in a chimney stack containing three flues in a row, the centre one being $13\frac{1}{2}$ in. × 9 inch., the remaining two being 9 in. × 9in. Sides of flues, half brick thick.

Draw a little of the elevation showing projecting necking, neat and simple cornice, and tapering chimney pots.

5. A dwelling house, 20 feet frontage, forming one of a row (not the corner house) is to be converted into a shop. There is a door and plain window on the ground floor and two windows on the first floor.

Make a vertical cross-section to a scale of $\frac{1}{4}$ inch to a foot, through the front wall, showing the necessary shoring required preparatory to the removal of the brickwork.

Show the new steel beam in position and the method of temporarily supporting the floors and brickwork.

Name and dimension the principal timbers. You may choose the heights from floor to floor and other details.

Make an outline elevation, showing the needles in position with the brickwork removed.

How long would you allow the shoring to remain after the necessary pinning-up had been completed?

6. Make an elevation to a scale of $\frac{1}{4}$ inch to a foot of an open-timber tie-beam roof of 45° pitch, for a public hall.

The span is 25 feet and the walls are of stone, 2 feet thick. Show moulded and ornamented ribs and any other details that will improve the appearance of the truss. Indicate the joints used in the construction and the ornamental ironwork. Give the name of a suitable timber for the truss.

7. Explain the meaning of the following, giving sketches where they will help :—(*a*) natural seasoning, (*b*) artificial seasoning, (*c*) second seasoning, (*d*) waney edge, (*e*) sapwood, (*f*) bridle joint at bottom end of a king-post truss, (*g*) hammer beam.

8. Draw to a scale of one inch to a foot the elevation of a six panel, double-margin door 7 ft. 3 in. × 4 ft. × $2\frac{1}{4}$ ins. thick. The door has raised panels bolection moulded on the front and planted flush mouldings on the back.

Indicate on the elevation how the two halves of the door are secured together and dot in the tenons on one style of the door.

Make an enlarged detail drawing of the joint between the margin styles in horizontal section. Show on the same drawing details of the raised panels and mouldings.

9. Show a part plan and vertical section of the bottom end of a wood staircase with bull-nose step. Show a turned newel and about three balusters with handrail. The going is 11 inches and the riser 6 inches; close strings and capping. The staircase is supported on a 4½ in. × 3 in. carriage. It will be sufficient to show about four of the treads in section. Give all necessary details complete and show how the string is secured to the newel. Scale, one inch to a foot.

10. Draw to a scale of ½ inch to a foot the elevation of a semi-circular stone arch in a brick wall. Span of arch, 4 ft. 9 ins. The voussoirs are to be equally divided on the soffit and the bed joints are struck from the centre of the semi-circle. The voussoirs are to be finished in a serrated fashion at their upper ends to suit the horizontal joints of the brickwork and are to increase in height as they reach the keystone, which is to be dropped one inch below the other ring stones at the soffit. Show about three jamb stones below the springing.

On the left side of the arch draw in a portion of the brickwork in Flemish bond to a height of about three courses above the arch.

Show by means of sketches the following :—(a) inband and outband in a rebated stone ope, (b) corbel, (c) kneeler.

Given two pieces of stone, one being sandstone, the other limestone. In appearance they are very much alike, how would you prove beyond doubt the identity of the limestone?

11. Make a line diagram of a steel roof truss of 25 ft. span to a scale of ¼ inch to a foot. Pitch ¼ span.

The truss is intended to support an ordinary light roof, this need not be shown.

To a scale of one inch to a foot give details of all the joints. Draw the shape of the section on each member and give its dimensions.

12. Make a vertical cross-section to a scale of ¾ inch to a foot through an inspection chamber and disconnecting trap in connection with the drainage of an urban villa

residence. The internal length of the manhole is 3 feet and it is also about 3 feet deep to the open channel level. Show clearly the brick manhole; disconnecting trap with inspection arm and the entry of the main drain at the opposite end. Show two subsidiary drains at the side. Add a fresh air inlet and cast-iron sealed cover.

13. Make a sketch vertical section through a good type of wash-down W.C. Give clear details of the joint between the basin and the cast-iron soil-pipe through a wall 9 inches thick. Scale, one inch to a foot.

14. What is the object of using hollow walls in buildings? Mention some advantages and disadvantages of their use. Sketch and describe the following :—(a) the method of ventilating an apartment through a hollow wall, (b) how window frames are protected from moisture finding its way into the cavity. How would you provide for the escape of moisture from the bottom of the cavity.