1934

Building Construction (4th Year): Technical School Examinations 1934

Department of Education: Technical Instruction Branch

COURSE IN BUILDING.

AN ROINN OIDEACHAIS
(Department of Education).

BRAINSE AN CHEARD-OIDEACHAIS
(Technical Instruction Branch).

TECHNICAL SCHOOL EXAMINATIONS.

1934.

BUILDING CONSTRUCTION

(Fourth Year).

Thursday, May 17th—7 *to* 10 *p.m.*

Examiner—W. DAVIDSON, ESQ.

Co-Examiner—J. P. HACKETT, ESQ., B.E., A.R.C.SC.I.

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 books, 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 b in PENCIL.

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

(*d*) Write the number of the question before the answe

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

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1. Draw a sketch plan (thick line diagram) and elev tion of a small bungalow having the following accommod tion :—two bedrooms, kitchen, living room, pantry, bat room and W.C., and small verandah in front.

The structure is to be principally for summer use an may be built in brick or in wood and asbestos sheets, on concrete plinth or base. Give the leading dimensions an show by dotted line a simple arrangement of drains far as the first manhole at the back of the building.

2. Draw a little more than half the front elevation of steel roof truss of 36 feet span, resting on a wall 18 inch thick, to a scale of $\frac{1}{4}$ inch to a foot. Give details of t principal joints to a scale of one inch to a foot. Sho how the truss is secured to the wall in the bottom ch detail.

The roof boarding is supported on 6 in. × 3 in. purli placed about 3 feet apart along the principal raft Show in the lower end detail only, the roof in readin for the slates with projecting ogee gutter.

The following sections may be adopted (*a*) principals T iron, (*b*) struts—double flat bars, (*c*) tie-rods-roun Dimension the members.

3. Answer (*a*) or (*b*) but not both.

(*a*) Sketch and describe the working of the low pressu tank system of domestic hot water supply and state advantages and disadvantages. Show by line diagr how bath and wash-basin on first floor and kitchen s on ground floor may be connected to the system. Indi the diameter of the various pipes.

(*b*) Sketch and describe the working of the cylinder system of domestic hot water supply with secondary circulating pipes and state its advantages and disadvantages. Show by line diagram how connections may be made to bath on second floor, to bath wash-basin and linen cupboard on first floor and to housemaids pantry on ground floor. Indicate the diameters of the various pipes.

4. What is your opinion of terra-cotta as a building material; has it any advantages as compared with limestone or sandstone?

Describe briefly, the manufacture of terra-cotta and give, approximately, the composition of the clay from which terra-cotta is made.

Sketch the back of a moderate size block of terra-cotta.

5. Make a front elevation of a mansard roof truss, in wood, suitable for a span of 32 feet, to a scale of $\frac{3}{8}$ inch to a foot. Show a parapet wall and gutter. Dimension the scantlings.

Give details of three important joints of the truss to a scale of $1\frac{1}{2}$ inches to a foot. What is the principal reason for using this form of truss?

6. Make a front elevation and vertical section to a scale of $\frac{1}{2}$ inch to a foot of a superior vestibule screen in hardwood, with a pair of swing doors and side lights.

The hallway, across which the screen is to fit, measures 9 feet from wall to wall and the height from floor to ceiling is 12 ft. 9 ins. There is a plaster cornice on the ceiling.

The doors are to be 7 ft. 9 ins. high, with moulded transome and elliptical fanlight over (an approximate or compass-curve ellipse will do). Show $4\frac{1}{2}$ in. architraves at the walls and continue the architrave moulding round the elliptic head, with moulded key-block at centre reaching to the under side of the ceiling cornice. The spandrels over the elliptical head to be plastered. The height to top of dado moulding on the hall walls is 3 ft. 6 ins. The framework to be moulded throughout; panels raised and bolection moulded, lock rails to have apron pieces and hood moulds.

7. Make a plan and sectional elevation to a scale of $\frac{1}{2}$ inch to a foot of an open-newelled staircase to fit in a rectangular space, the dimensions of which you may choose. The height from floor to floor is 11 feet. There

are eight risers in the bottom flight, two quarter space landings, with three steps between the landing newels; the number of treads in the upper flight to be shown and other principal details given.

8. Make an outline plan and a fairly detailed elevation and vertical section of a shop front to a scale of ½ inch to a foot. The width over the pilasters is 16 feet and the height from floor to ceiling is 11 feet. Show a door 3 feet wide on one side, recessed about 2 ft. 6 ins.

Stallboard framing to be 2 ft. 6 ins. high, woodwork of sash to obstruct the view as little as possible. Provide a facia or name board 18 inches deep, adequate ventilation, and a sun blind. The door is to be glazed, with fanlight over.

9. You may answer (*a*) or (*b*) but not both. (*a*) *may be attempted only if Question* 1 *has been answered.*

(*a*) Write a brief specification for the Bungalow commencing with "Excavator."

(*b*) Write a brief description of the process of manufacture of Portland cement. Fineness is said to be an important quality in this cement; what degree of fineness would you expect in a good quality sample and how would you test the degree of fineness? Mention any other tests you could apply to ascertain the quality of this cement.

10. One of the monolithic granite columns supporting the arcading between the Aisle and Nave of a church is visibly out of the vertical in the direction of the range of columns, and it is desired to make the column upright. Give a brief description and sketches showing how you would have this work carried out and the precautions you would take to prevent any disturbance of the arches abutting on the cap of the column. The columns are about 14 feet apart and are supporting Gothic arches 2 feet thick.

11. In connection with fire-resisting structures, what is meant by (*a*) temporary protection, (*b*) partial protection, and (*c*) full protection.

Steel and stone are incombustible materials yet, these materials are not regarded as good fire-resisters, explain why this is so. Give sketches to illustrate how the following could be made more fire-resisting in their positions in a building:—(*d*) a circular cast iron column, (*e*) a

steel stanchion, (*f*) a steel beam carrying a concrete upper floor.

What do you consider the most satisfactory fire-resisting material for the external and party walls of a building? Give some general principles of the arrangement required in such structures as workshops and factories, with a view to minimising the loss of life and destruction of property in case of fire.

12. Do you consider reinforced concrete a satisfactory material for fire-resisting structures?

Make sketches showing the positions of the reinforcement in the following situations, (*a*) in a beam, one end of which rests on a wall, the other end being built into the wall, (*b*) in a beam passing over a pillar, (*c*) in a pillar. Show how the steel is arranged and held in position. What distance should the reinforcement be kept from the outer surface and why? What are the advantages to be gained from using the small steel rods of the present-day as compared with the former method of embedding steel beams in concrete?

13. A school is to be erected on a site which is very damp and low-lying. It is proposed to drain the subsoil prior to the erection of the building. There is a stream at the lower part of the site to which the drains may be carried. Write a brief specification for the carrying out of the work and give sketches showing, roughly, the position of the building and the drains. Give the size and kind of pipes used and suggest a suitable fall.

14. Describe the plenum system of ventilation as applied to a large public building. State how the air is filtered and warmed before entering the rooms. How is the temperature of a particular room increased without affecting the adjoining rooms? Give a sketch showing the inlet and outlet to a room and state where the vitiated air from all parts of the building escapes.