THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATION COUNCIL

DIPLOMA IN TECHNICAL EDUCATION EXAMINATION

783 **BUILDING CONSTRUCTION**

Time: 3 Hours. **ANSWERS** **Year: 2019**

Instructions

1. This paper consists of **five (5)** questions.

2. Answer all questions.

4. Cellular phones are **not** allowed inside the examination room.

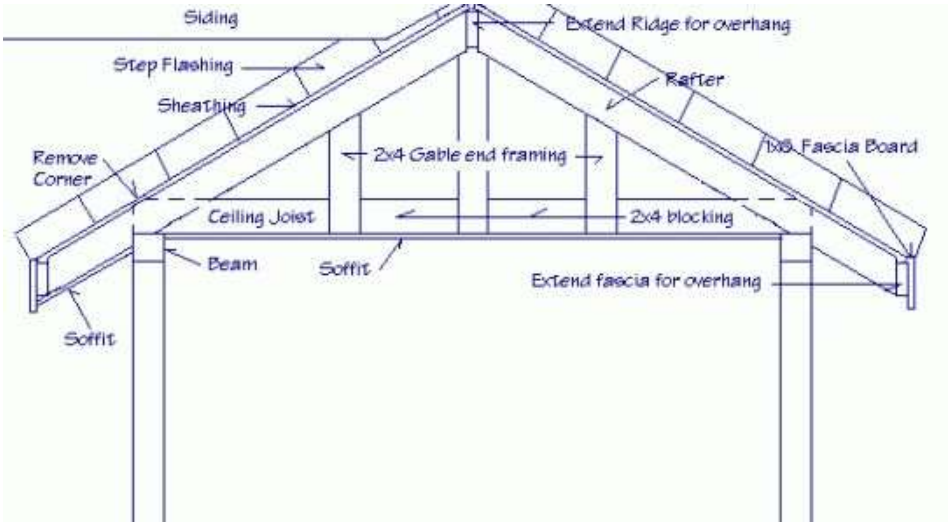
5. Write your **Examination Number** on every page of your answer booklet

1. (a) A roof has span of 6m. Suggest by giving two reasons the suitable type of pitched roof that should be used.

For a roof with a span of 6 meters, a gable roof is suitable. Firstly, a gable roof is simple in design and economical to construct, making it ideal for moderate spans like 6 meters. Secondly, it allows for effective water drainage and ventilation because of its sloped design, reducing the risk of water accumulation and roof leaks.

(b) Draw a well-labeled sketch of the suggested pitched roof in question 1(a).

Draw a triangle representing the gable end. Label the top as Ridge. Label the sloping sides as Rafters. Label the bottom horizontal line as Wall Plate. Optionally, show Ceiling Joists connecting the base of the rafters.



(c) Wind is one among the problems affecting roofs. Explain the suitable methods that should be used to safeguard roofs.

Roofs can be safeguarded from wind by secure fixing of roof coverings using nails, screws, or bolts to prevent lifting. Another method is the use of wind straps or ties, which connect the roof structure to the walls to resist lateral wind forces. Additionally, ensuring the roof has an aerodynamic design with an appropriate pitch reduces the impact of wind pressure.

2. (a) Explain how the first course of walls can be set out after the concrete slab has been laid and set.

After the concrete slab has set, the first course of walls is set out by marking the wall lines on the slab using a tape measure and chalk or string line. Corners are established using a mason's square, and levels are checked using a spirit level to ensure the walls will be vertical. This ensures that subsequent courses of bricks are accurately aligned.

(b) Sketch an elevation of four courses of a Flemish bond and label its main parts.

The sketch can be described as follows: Draw four horizontal courses. Each course alternates header, which is the short side of the brick facing out, and stretcher, which is the long side facing out. Label the Header, Stretcher, and Perpend joint, which is the vertical joint between bricks. Show the bond line connecting headers in successive courses.

(c) Drainage is very important to be observed in flat roofs. Briefly explain how these operations can be carried out.

Drainage in flat roofs is achieved by sloping the roof slightly towards drainage points. Gutters and downpipes are installed to collect and channel rainwater away. Additionally, roof surfaces should be kept free of debris, and waterproofing membranes should be applied to prevent water penetration.

3. (a) Briefly explain the preparation and placing of concrete lintel on a door opening by precast method.

Precast concrete lintels are prepared by casting them in a mold offsite using reinforced concrete. After curing, they are transported to the site and positioned above the door opening using lifting equipment. The lintel is then secured on bearing surfaces of the walls and filled with mortar or grout to ensure stability.

(b) Why admixtures are added into concrete mix?

Admixtures are added to modify the properties of concrete. For example, water-reducing admixtures improve workability, retarders slow down setting in hot weather, accelerators speed up curing, and plasticizers enhance fluidity without adding water. This ensures better performance and durability.

(c) Describe the manufacture of ordinary Portland cement by the wet process.

In the wet process, raw materials like limestone and clay are crushed and mixed with water to form a slurry. The slurry is then fed into a rotary kiln where it is heated to about 1450°C, producing

clinker. The clinker is cooled and ground with a small amount of gypsum to produce ordinary Portland cement.

4. (a) A committee of six people was assigned to visit a site at Mnemela village for the purpose of developing it. Suggest six things that should be included in their report.

The report should include site location and accessibility, existing infrastructure such as roads and utilities, topography and soil conditions, water sources and drainage, land use and vegetation, and recommendations for development including potential projects and improvements.

(b) Briefly explain how to carry out construction of concrete slab above the hardcore.

First, the hardcore layer is compacted to provide a stable base. A blinding layer of lean concrete is laid on top. Steel reinforcement is then positioned according to the slab design. Formwork is erected, and concrete is poured, leveled, and allowed to cure properly to form a durable slab.

(c) State four safety regulations to be considered when excavating trenches for foundations.

Trench excavation safety regulations include providing proper shoring or trench supports to prevent collapse, using safe access and egress ladders, keeping heavy equipment away from trench edges, and ensuring workers wear protective equipment such as helmets and boots.

5. (a) Briefly explain the purpose and suitability of framed buildings in modern constructions.

Framed buildings are suitable because they provide structural stability while allowing flexible interior spaces. The frame supports both walls and floors, reducing the need for load-bearing walls. They are especially useful in modern multi-storey buildings and areas prone to earthquakes due to their strength and adaptability.

(b) What four main considerations should be taken by an engineer in order to provide an adequate control of sun rays affecting the residential buildings?

Engineers should consider building orientation to minimize direct sunlight exposure, use of shading devices like overhangs and louvers, selection of reflective materials for walls and roofs, and planting trees or vegetation to reduce solar heat gain.

(c) Differentiate single floors from double floors as used in suspended timber ground floors.

Single floors consist of one layer of joists spanning between beams, providing basic support. Double floors have two layers of joists, with one set above the other, increasing strength and rigidity. Double floors are used where greater load-bearing capacity or insulation is required.