 or  0248043888
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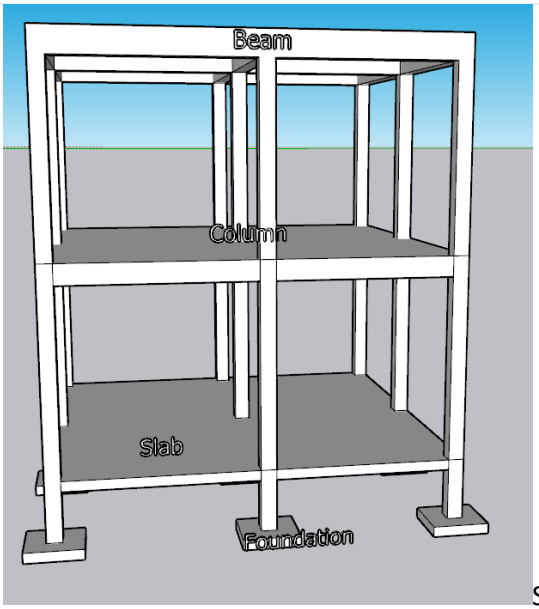
BASIC 8

WEEKLY LESSON PLAN – WEEK 3

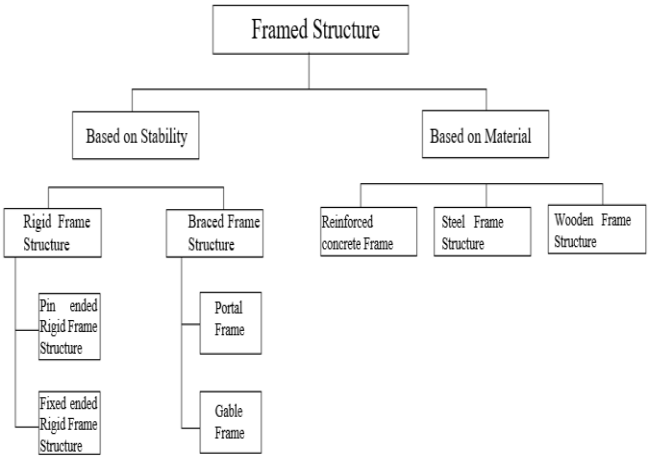
Strand:	Technology		**Sub-Strand:**	Simple structures and mechanisms, electric and electronic systems	
Content Standard:	B8.4.1.1 Demonstrate understanding of application of principles of forces acting on structures.				
Indicator (s)	B8.4.1.1.1: Experiment the principles of forces on structures. B8.4.1.1.1.2: Design and make simple school technology projects		**Performance Indicator: :** Learners can design simple school technology projects.		
Week Ending	14-07-2023				
Class	B.S.8	**Class Size:**		**Duration:**	
Subject	Career Technology				
Reference	Career Technology Curriculum, Teachers Resource Pack, Learners Resource Pack, Textbook.				
Teaching / Learning Resources	Computer, Smart Phones connected to the internet, Posters, Video.		**Core Competencies:**	• Digital Literacy • Creativity and Innovation • Analytical skills • Teamwork	

DAY/DATE	**PHASE 1 : STARTER**	**PHASE 2: MAIN**	**PHASE 3: REFLECTION**
MONDAY	Learners brainstorm to explain "Framed Structure".	1. Discuss with Learners about types of framed structures. 2. Assist Learners to identify the structural components of frame structure. 3. Assist Learners to explain types of forces that can act on structural members in frame construction 4. Learners brainstorm to describe the features of the forces that can act on structural members in frame construction. **What is a Framed structure?** It is a rigid and stable framework of structures that consists of structural members like slabs, beams, and columns that can resist the deformation due to the self-weight and high external loads and transfer the applied loads safely to the substructure and consecutively to the ground. It is made of different materials, such as reinforced concrete, steel, and wood. In ancient days, load-bearing structures were	Through questions and answers, conclude the lesson. **Exercise;** 1. State two types of framed structures. 2. Outline 3 components of frame structure.

used to build houses and houses were built using load-bearing walls.



Structural Components of Framed structure



Rigid frame structure

A structural frame that can resist the deformation caused due to applied vertical and lateral loads using the rigidly connected joints. In this frame, the moments are transferred through the joints.

Pin ended rigid frame structure

This type of frame has pinned end conditions and if these pinned supports are removed, the frame behaves like a non-rigid structure.

Fixed ended rigid frame structure

This type of framed structure has its support ends fixed.

Braced Frame Structure

In this type of framed structure, bracing (diagonal support) is provided between the structural elements to resist lateral and seismic loads.

Portal frame structure

This framed structure has its vertical supports connected with its horizontal supports using fixed joints to increase the moment-resisting capacity.

Gable frame structure

This framed structure has a triangular extension at the top of the roof and is used for single-story frame construction. Also, this frame is employed in places where heavy rain and snow are common occurrences.

Structural components of frame structure

Columns
A column is a vertical structural element that is designed to take up the downward or axial compressive load acting on the framed structure and transmit it to the foundation. In reinforced concrete structures, the slabs, beams, and columns are cast monolithically.

The columns are classified based on the loading, slenderness ratio, and cross-section.

Based on Loading

(a) Axially loaded column

If the load is applied directly along the longitudinal axis of the column, it is called an axially loaded column.

(b) Uniaxially loaded column (Eccentrically loaded column)

When the load acts away from the centroid of the column, it is called an eccentrically loaded column. In the uniaxially loaded column, the eccentricity will be along with any one of the axes (either X-axis or Y-axis) and cause a moment along that particular axis.

(c) Biaxially loaded column (Eccentrically loaded column)

In the biaxially loaded column, the loads are applied at points other than the axes of the column resulting in moments acting about both the X-axis and Y-axis simultaneously.

Based on the slenderness ratio

(a) Short column

For a short column, the ratio of the effective length of the column to its least lateral dimension (LLD) is equal to or less than 12. The short column usually fails due to direct compression or crushing.

(b) Long column

For a long column, the ratio of the effective length of the column to its LLD is greater than 12. The failure of the long column takes place by buckling.

Based on cross-section

The columns are classified as rectangular, square, circular, L-shaped, and T-shaped columns based on their cross-section.

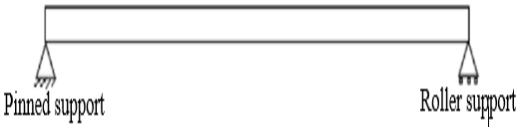
Beams

Beams are horizontal structural members that run horizontally between columns and transfer the applied load to the column. It takes up the load that is laterally applied to its axis. Beams are classified based on the type of support, material, cross-section of the beam, and based on function.

Based on the type of support

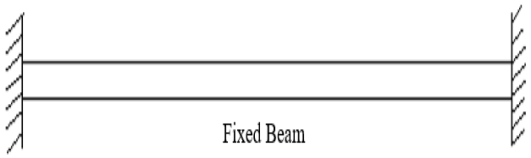
(a) Simply supported beam

It is a beam in which both of its ends are supported, one of the ends has pin support and the other end has roller support. This type of beam gets subjected to both bending moment and shear force depending on the loading condition.



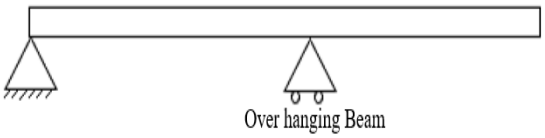
(b) Fixed beam

This type of beam has its ends fixed into the column to provide more stability. Generally, beams of the general building area of fixed beam type.



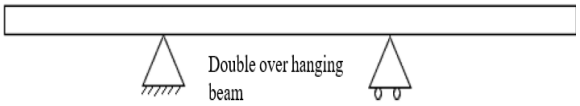
(c) Overhanging beam

When the length of the beam exceeds the support on its side, it is called an overhanging beam. It is employed to construct balconies in buildings.



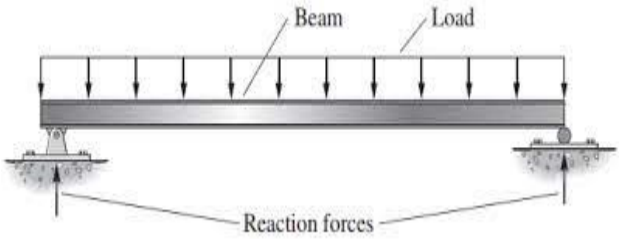
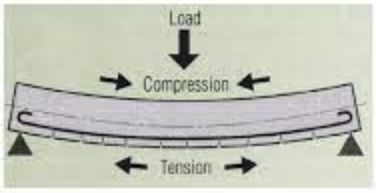
(d) Double overhanging beam

It has overhanging on both sides of the beam.



(e) Continuous beam

The beam which has supports at intermediate points in addition to the supports at the end is called a continuous beam. This type of beam has more than one span and is generally employed in the construction of bridges.

FRIDAY	Review Learners knowledge on the previous lesson.	1. Assist Learners to make sketches of the types of forces acting on structural members. 2. Learners brainstorm to identify suitable resistant materials that can be used to experiment the various kinds of forces acting on structural members 3. Learners in small groups to discuss to perform experiments to show the following: i. how tension force can force a member to 'stretch' ii. how compression force can cause a member to 'squash' or 'buckle' iii. how shear force can cause materials to slide over another iv. how torsion force can cause a member to twist v. how a bending force which acts at an angle to a member tends to make it bend 4. Assist Learners to identify simple school technology projects.  Forces Acting Simply Supported Beam  **1.Bending** **Types of loads that can act on a structure;** ○ Tension ○ Compression ○ Shear ○ Bending ○ torsion.	Learners brainstorm to explain reasons for choosing the project. **Exercise;** Make sketches of the types of forces acting on structural members.

Name of Teacher: ***School:*** ***District:***