

REVIEW

Unit 4 – Structures and Forces

1.0 Natural and man-made (Manufactured)

- ❖ Structural forms can be **shells, frames or solids**
- ❖ Each structure performs a specific function and can vary in its design
- ❖ Climate, culture, tradition, technology and economics influence the design of a structure

2.0 External and Internal Forces act on structures

- ❖ Effect of a force on a structure depends on **magnitude, direction** and **location** of the force
- ❖ **External** force is applied on the outside of a structure
- ❖ **Stability** is affected by the changes in the mass distribution and the design of its foundation
- ❖ A structure's ability to withstand a load depends on its overall strength and stability
- ❖ Performance standards are included in the overall structural design
- ❖ **Internal** forces include **compression, tension** and **shear**.
- ❖ Material shape and properties determine resistance to internal forces acting on them
- ❖ Structures undergo **structural stress, fatigue** and **failure**

3.0 Strength and Stability

- ❖ Natural and synthetic materials are classified by a range of properties
- ❖ Strength and flexibility of materials can be tested – **deformation**
- ❖ **Joints** – fixed or movable – friction, bonding or flexibility
- ❖ **Stability, strength** and **function** rely on the proper use of materials

4.0 Designing, Evaluating and Improving to Meet Human Needs

- ❖ Environmental factors can affect the stability and safety of a structure
- ❖ **Corrugation** and **Lamination** can strengthen materials
- ❖ Structural evaluation criteria: **costs, benefits, safety** and **potential environmental impact**