



# Roof Truss in Steel Structure

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# Introduction

- Roof consists of structural elements which support roof coverings.
- The structural element may be trusses, portals, beams, slabs, shells or domes.
- Roof coverings may be A.C.sheets, G.I.sheets, wooden shingles, tiles, rcc slab etc.
- **Wood shingles** are roof shingles made of *cut* wood, used for roofing material.



A.C.sheets



G.I.sheets



Wooden shingles

# Requirements of a roof

- It should have adequate strength and stability to carry super imposed loads.
- Protect the building against rain, sun, wind etc.
- It should be water proof and should have efficient drainage arrangements.
- It should provide adequate thermal insulation, fire resistant, insulation against sound.

# Types of roofs

- Pitched or sloping roofs
- Flat roofs or terraced roofs
- Curved roofs.
- Shelled roofs

Selection of type of roof depends upon the

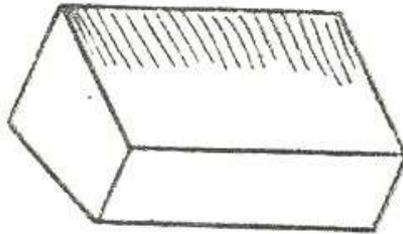
- Shape or plan of building
- Climatic conditions of area
- Type of construction materials available.

# Pitched roofs/sloping roofs

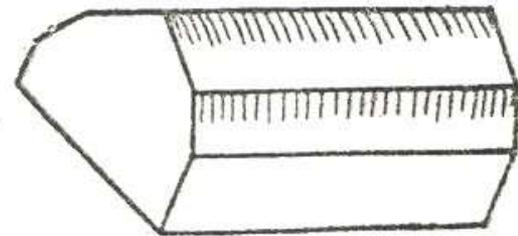
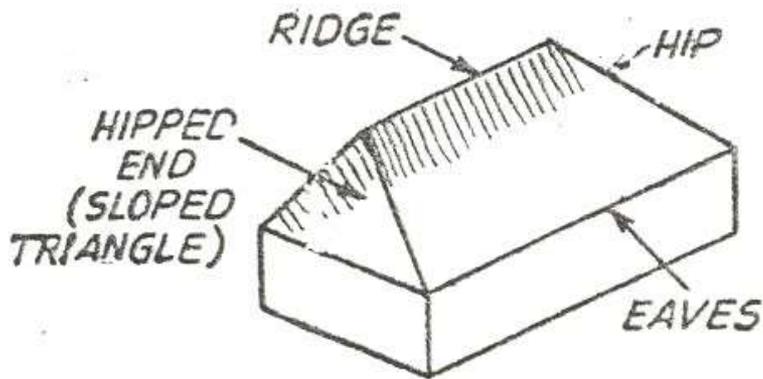
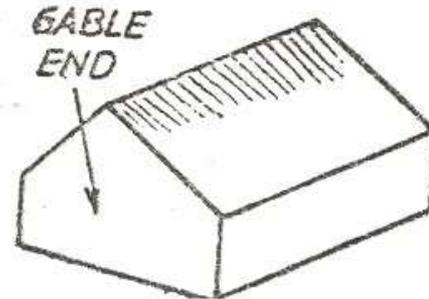
- Suitable for where rainfall/snowfall is very heavy.
- Buildings with limited width and simple shape can be covered satisfactorily by pitched roofs.
- Buildings irregular in plan not suitable.

# TYPES OF SLOPING ROOFS

Shed Roof



Gable Roof

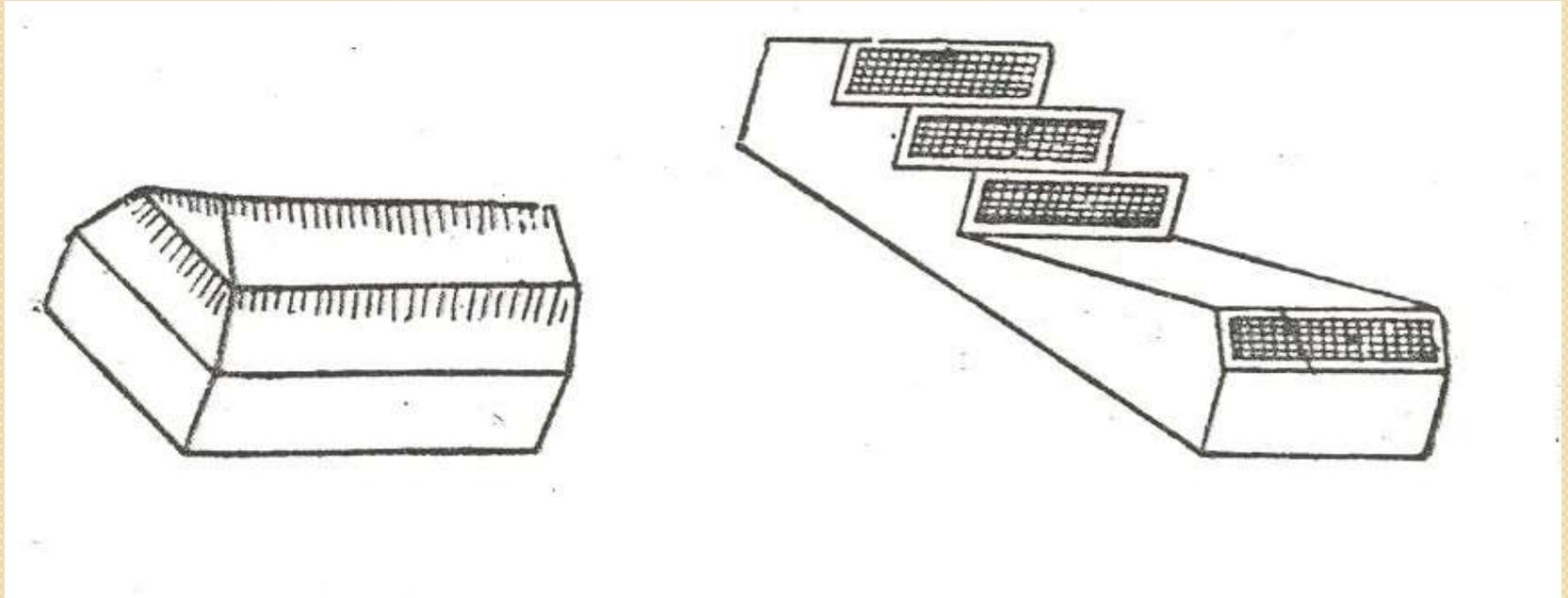


Hipped Roof

Gambrel Roof

# TYPES OF SLOPING ROOFS (- *ctd-*)

- 1. Shed Roof:-** A sloping roof having slope only in one direction is called a **Shed Roof**. This is the simplest type of sloping roof and is used for smaller spans.
- 2. Gable Roof:-** A sloping roof having slope in two directions is called a **Gable Roof**. This type of sloping roof is used for larger span.
- 3. Hipped Roof:-** A sloping roof having slope in four directions is called **Hipped Or Hip Roof**. This type of sloping roof is mostly used for buildings in hilly area.
- 4. Gambrel Roof:-** A sloping roof having slope in two directions with a break in the slope is known as **Gambrel Roof**. This type of sloping roof is mostly used for buildings in hilly area.



Mansord Roof

Saw Tooth or North Light Roof

# TYPES OF SLOPING ROOFS (- *ctd-*)

- 5. Mansard roof:-** A sloping roof having slope in four directions with a break in slope is known as **Mansard Roof**
- 6. Saw tooth or north light roof:-** A sloping roof having glazing fixed on the steep sloping sides of the roof is called **Saw Tooth Or North Light Roof**. This is generally used in factories where more light is required.

# *IMPORTANT TECHNICAL TERMS*

**Ridge:-** The highest point or line of a sloping roof where the two opposite slopes meet is known as ridge.

**Ridge piece:-** A horizontal piece of timber which runs the highest level (bridge) of a sloping roof is called ridge piece.

**Eaves:-** The lowest edges of the surfaces of a sloping roof are called eaves.

**Eave's board:-** A wooden board fixed along the eaves at the end of common rafters is known as eaves board or fascia board. Gutter is usually supported at eaves board.

# *IMPORTANT TECHNICAL TERMS*

**Rafters:-** The members which support the covering material of a sloping roof are called rafters.

**Hip:-** The line of intersection of sloping surfaces of a roof forming an external angle exceeding  $180^\circ$  is known as hip.

**Hip rafter:-** The rafter lying along the hip in a sloping roof is termed as hip rafter.

**Valley:-** The line of intersection of two sloping surfaces of a roof forming an external angle less than  $180^\circ$  is known as valley.

**Valley rafter:-** The rafter lying along the valley in a pitched roof is known as valley rafter.

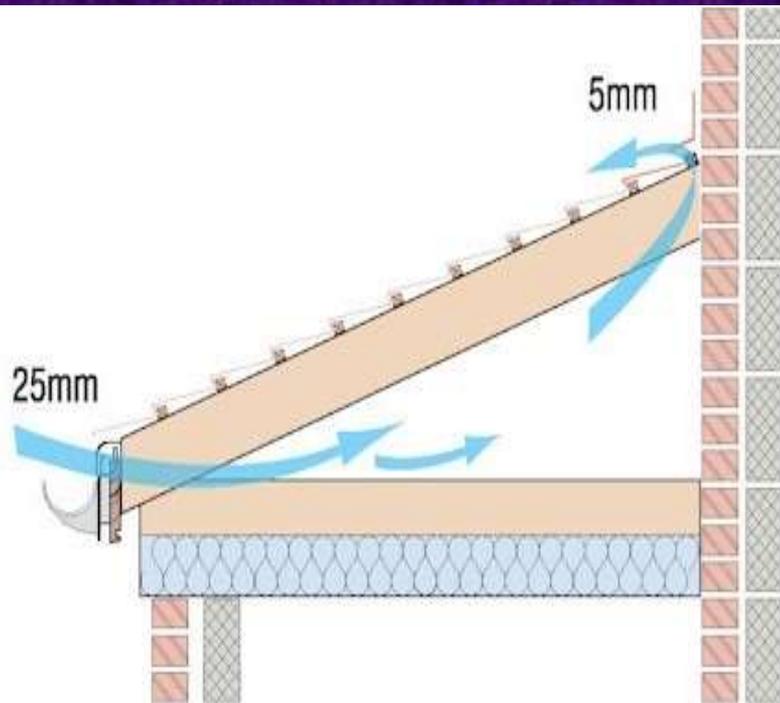
# *IMPORTANT TECHNICAL TERMS*

**Common rafters:-** The members supporting the battens or boardings under the covering of a sloping roof are known as common rafters.

**Gable:-** The end of a sloping roof finished in a vertical triangle is called gabled end or gable.

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# Lean to roof



# Flat roofs

- Suitable for buildings in plains or in hot regions, where rainfall is moderate and where snowfall is not there.
- Flat roofs are equally applicable to buildings of any shape and size.



# Curved roofs

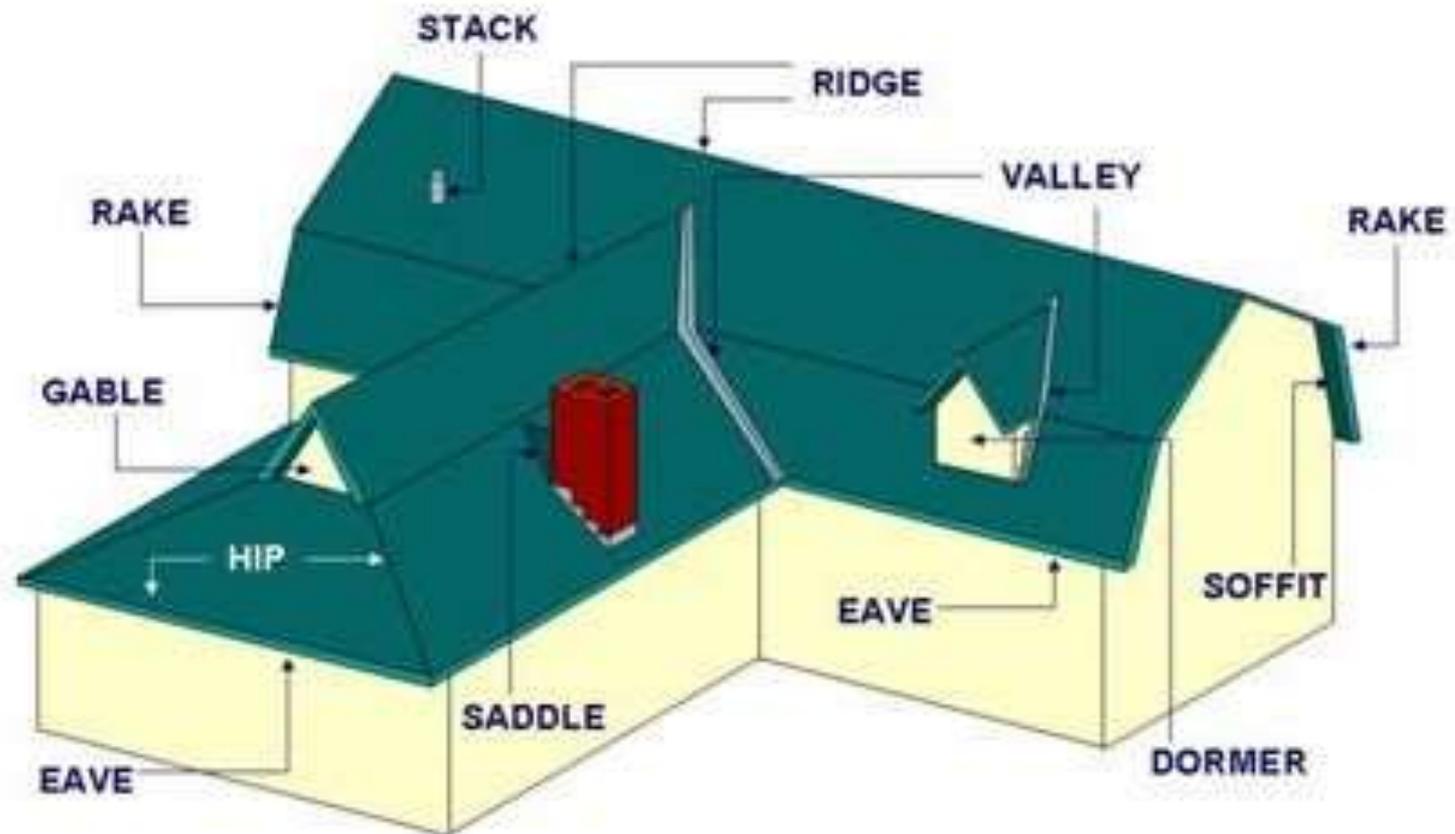
- These roofs have their top surfaces curved.
- Roof include cylindrical and parabolic shells, shell domes etc.
- More suitable for public buildings like libraries, theaters, recreation centers etc



# Curved roofs



## Slope Roof Terminology



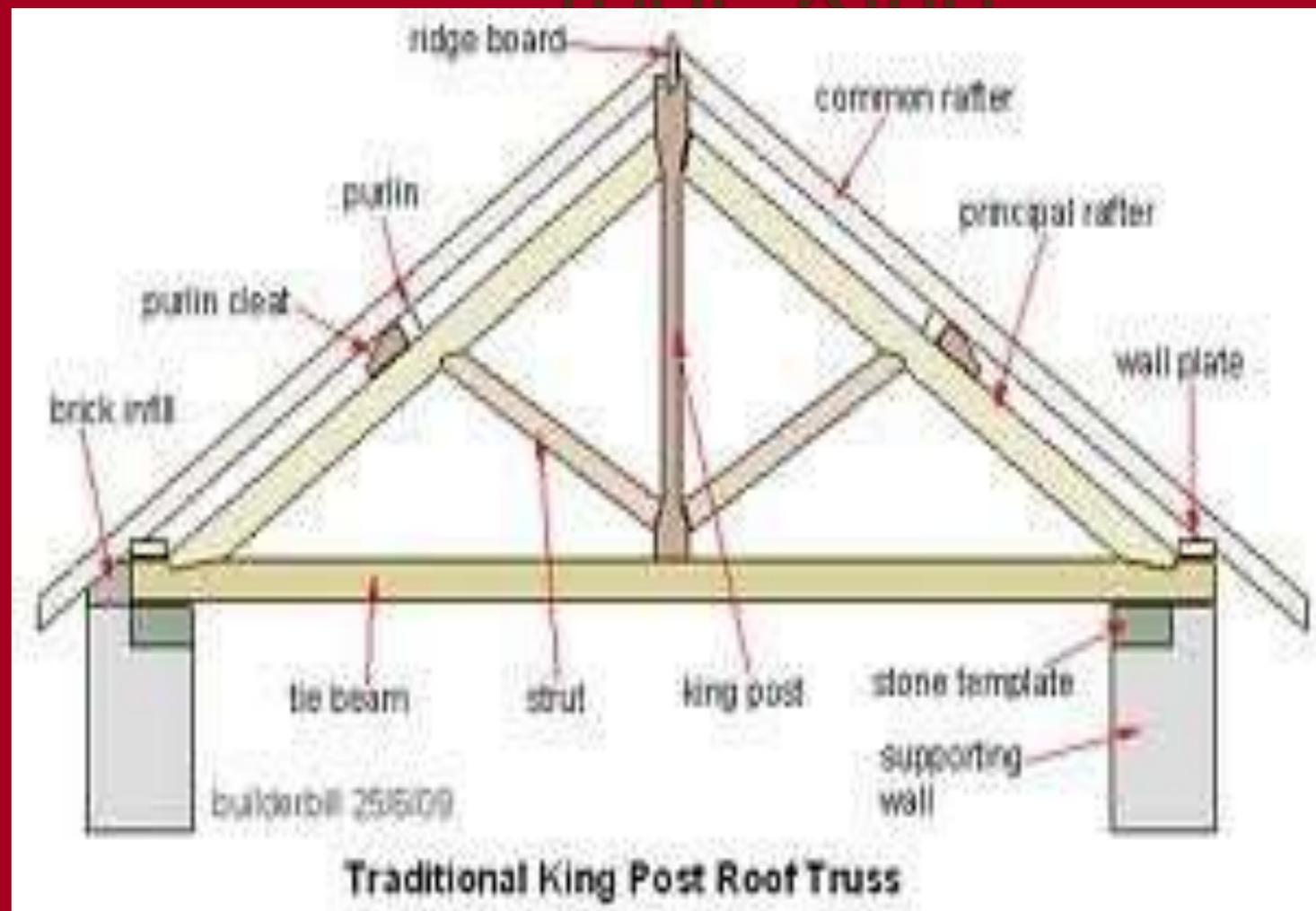
- **Span** :clear distance between supported arches, beam or roof truss.
- **Rise**: A vertical distance between top of ridge and wall plate
- **Pitch**: Inclination of the sides of roof to horizontal plane.
- **Ridge**: Apex line of sloping roof.
- **Eaves**:The lower edge of inclined roof surface.
- **Hip**:Ridge formed by the intersection of two sloping surfaces.
- **Verge**: Edge of gable wall.

- **Rafters:** wooden members running from ridge to the eaves.
- **Purlins:** Horizontal wooden or steel members used to support rafters of roof.
- **Battens:**

# King post truss

- Lower tie beam
- Principal rafters
- Struts
- King post
- Purlin
- Truss is suitable to 5 to 8 mt.

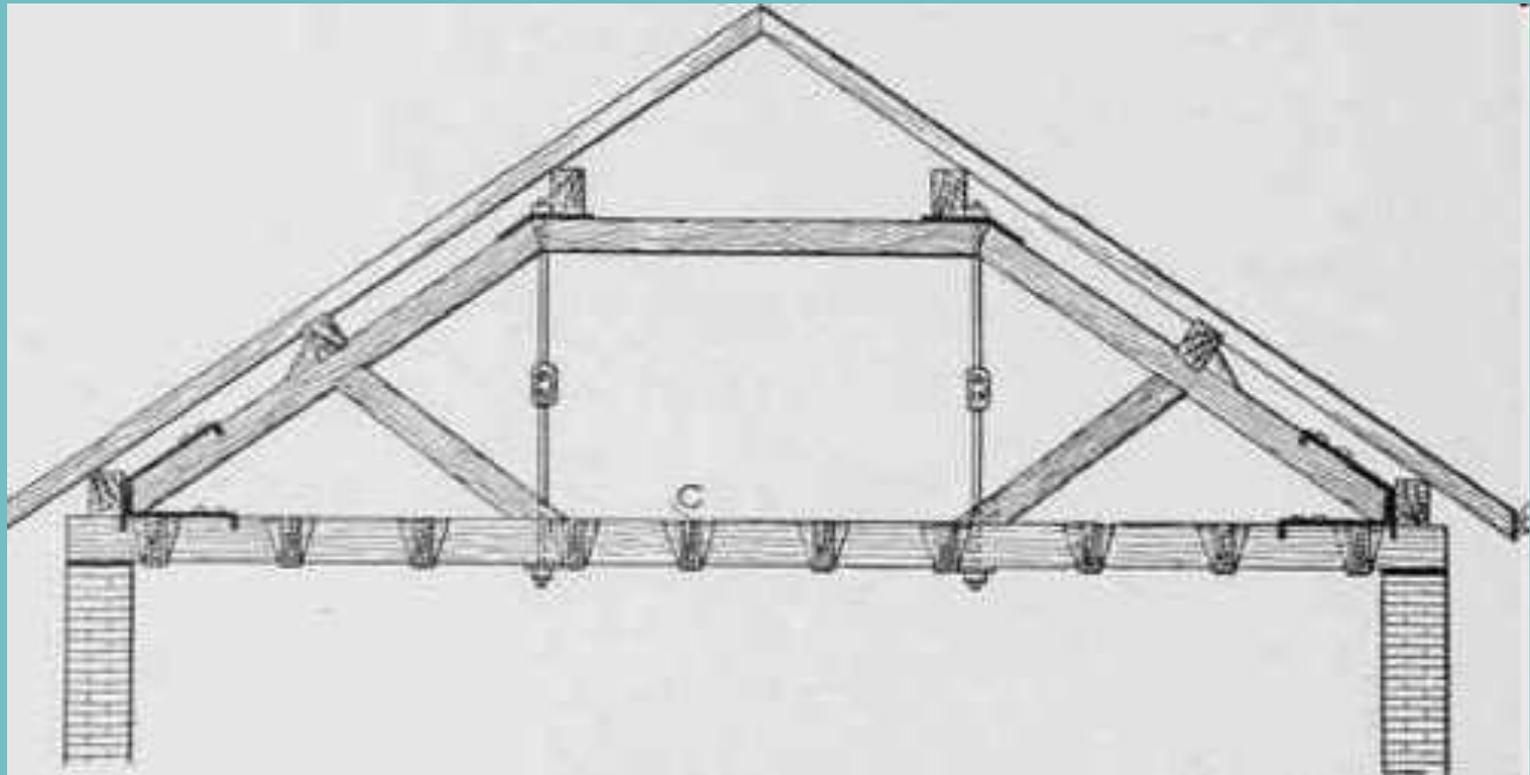
# membered or framed or trussed roof King



# Queen post truss

- A queen post truss differs from king post truss is having two vertical posts rather than one.
- Queen posts are suitable upto 12mt.
- Combination queen post and king post trusses, which are suitable upto 18mt.





# Steel trusses

- When span exceeds more than 10mt, timber trusses become heavy and more uneconomical.
- steel trusses are used these days for all spans – small or large reason:
  - } More economical
  - } Easy to construct
  - } Fire proof
  - } More rigid
  - } Permanent
  - } Most resistant to other environmental agencies

## Steel trusses.....

- These are fabricated from rolled steel structural members like channels, angels, T-sections, plates
- Angle section can resist effectively both tension as well as compression. Jointing easy

# Steel roof truss.....

