SNS COLLEGE OF ENGINEERING

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AN AUTONOMOUS INSTITUTION

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai.

UNIT – I PROPERTIES OF MATTER

TOPIC – VIII : I Shaped Girders

I Section of Girders

Definition

A girder with broadened lower and upper portion with narrow middle layer is known as I shape or I section girder.

Fig.6. I Section Girder

Explanation

When a beam is supported at the edges and loaded at the middle, the centre of the beam is lowered. This depression at the mid-point of the beam,

(i)   Directly proportional to the load (W) applied.

(ii)   Directly proportional to the cube of the distance between the knife edges (l^2).

(iii)   Inversely proportional as the Young's modulus (Y) of the material.

(iv)   Inversely proportional to the breadth (b) and cube of thickness (d) of the beam.

Thus, when girders are erected, they are subjected to this type of this type of non-uniform bending due to their own weight and the centre sags. To reduce the bending to the minimum, thickness (d) of the beam has to be large and mass (m) of the beam has to be small.

These make contrary to each other. The problem can be got over by having the cross-section of the girder in the form I which satisfies both the conditions of larger depth and small mass. The top and bottom surfaces of the girder experience

maximum stress and more material should be at these positions. Thus, the I form for the girder is the most suitable one.

Applications

(i) Due to its strength and stability, they are used to construct the bridges.

(ii) They are used to make the railway tracks.

(iii) They are used to make the beams for bridges, buildings and heavy vehicles.