



SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)



DEPARTMENT OF AEROSPACE ENGINEERING

Subject Code & Name: 19AST203 Aircraft Structural Mechanics

UNIT: SHEAR FLOW IN OPEN SECTIONS

TOPIC: 8. Shear flow in open sections with wall effective and ineffective in bending

$e = \frac{50000}{29.11}$
 $e = 29.11 \text{ cm}$

2) Section shown in fig is subjected to vertical shear of 60 kN applied through shear centre. Obtain the shearflow for the section. Area of all the stringers are same and equal to 70 cm²

Soln:

Boom	A	y	Ay	Ay ²
a	70	15	1050	15750
b	70	15	1050	15750
c	70	0	0	0
d	70	0	0	0
e	70	15	1050	15750
f	70	15	1050	15750
Σ	420	60	4200	63000

$$\bar{y} = \frac{\sum Ay}{\sum A}$$

$$\bar{y} = \frac{4200}{420}$$

$$\bar{y} = 10 \text{ cm}$$

$$I_{xx} = \sum I_{cx} + \sum Ay^2 - \sum A\bar{y}^2$$

$$I_{xx} = 63000 - 420(10)^2$$

$$I_{xx} = 21000 \text{ cm}^4$$

$$q = \frac{-\bar{S}_y}{I_{xx}} \sum A_i y_i - \frac{\bar{S}_x}{I_{yy}} \sum A_i x_i$$

given section is symmetric about y axis

$I_{xy} = 0$ and also no horizontal load

$$q = -\frac{S_y}{I_{xx}} \sum A_i y_i = -\frac{V}{I} \sum A_i y_i$$

$$\therefore \bar{S}_y = S_y$$

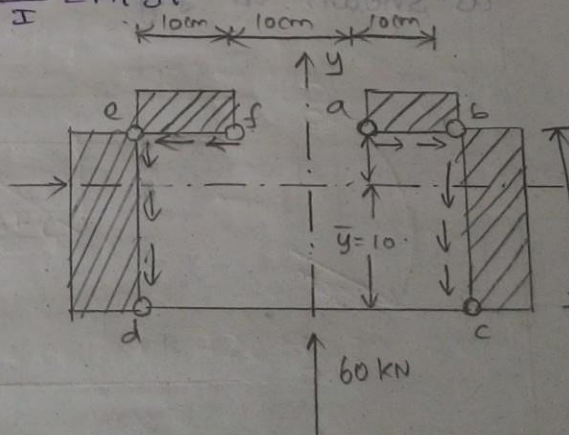
$$q = -\frac{V}{I} \sum A_i y_i$$

$$q = -\frac{60 \times 10^3}{21000} \sum A_i y_i$$

$$q = -2.857 \sum A_i y_i$$

$$q_{ab} = -2.857 \times 70 \times 5$$

$$-999.95 \text{ N/cm}$$



$$q_{bc} = -2.857 \times 70 \times 5 + q_{ab}$$

$$q_{bc} = -999.95 - 999.95$$

$$q_{bc} = -2000 \text{ N/cm}$$

$$q_{cd} = -2.857 \times 70 \times (-10) + q_{bc}$$

$$q_{cd} = 0$$

$$q_{de} = -2.857 \times 70 \times (10) + q_{cd}$$

$$q_{de} = 2000 \text{ N/cm}$$

$$q_{ef} = -2.857 \times 70 \times 5 + q_{de}$$

$$q_{ef} = 1000 \text{ N/cm}$$