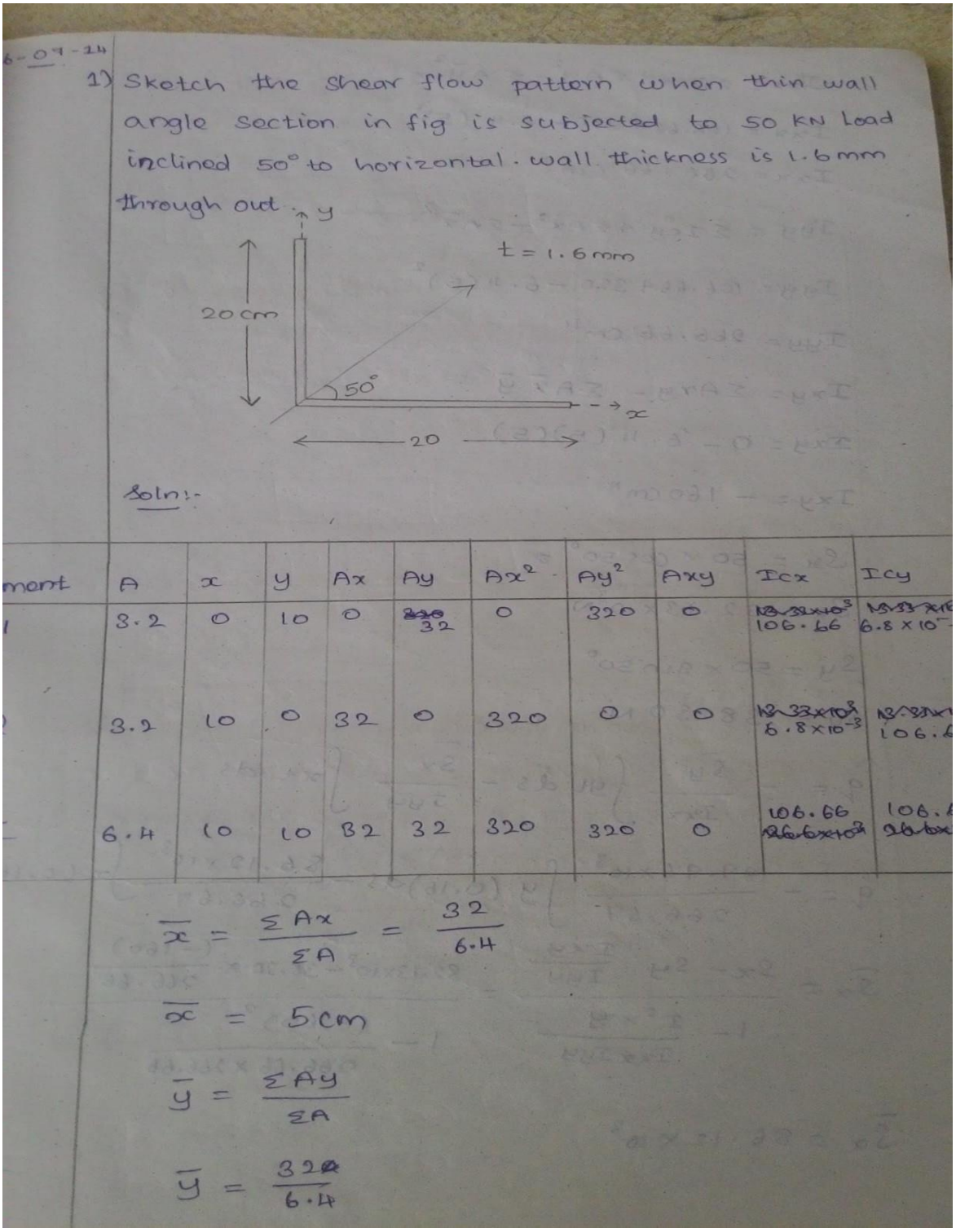
SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

DEPARTMENT OF AEROSPACE ENGINEERING

Subject Code & Name**: 19AST203 Aircraft Structural Mechanics**

TOPIC: **Shear flow in open sections with one axis of symmetry**



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

$$I_{xx} = 106.66 + 320 - 6.4\,(5)^2$$

$$I_{xx} = 266.66\ cm^4$$

$$I_{yy} = \Sigma I_{cy} + \Sigma A x^2 - \Sigma A \bar{x}^2$$

$$I_{yy} = 106.66 + 320 - 6.4(5)^2$$

$$I_{yy} = 266.66\ cm^4$$

$$I_{xy} = \Sigma A xy - \Sigma A \bar{x}\bar{y}$$

$$I_{xy} = 0 - 6.4\,(5)(5)$$

$$I_{xy} = -160\ cm^4$$

$$S_x = 50 \times \cos 50^\circ$$

$$S_x = 32.13 \times 10^3\ N$$

$$S_y = 50 \times \sin 50^\circ$$

$$S_y = 38.30\ N$$

$$q = -\frac{\bar{S}_y}{I_{xx}} \int yt\,ds - \frac{\bar{S}_x}{I_{yy}} \int xt\,ds$$

$$q = -\frac{89.96 \times 10^3}{266.67} \int y\,(0.16)\,ds - \frac{86.12 \times 10^3}{266.67} \int x\,(0$$

$$\bar{S}_x = \frac{S_x - S_y \frac{I_{xy}}{I_{yy}}}{1 - \frac{I^2_{xy}}{I_{xx} I_{yy}}} = \frac{32.13 \times 10^3 - 38.30 \times \frac{(-160)}{266.66}}{1 - \frac{(-160)^2}{266.66 \times 266.66}}$$

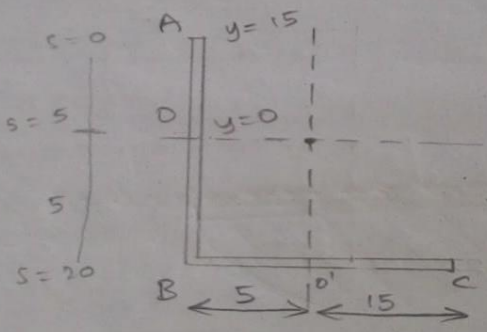
$$\bar{S}_x = 86.12 \times 10^3$$

$$\bar{S}_y = \frac{S_y - S_x \frac{I_{xy}}{I_{yy}}}{1 - \frac{I^2_{xy}}{I_{xx} I_{yy}}}$$

$$\bar{S}_y = \frac{38.30 - 32.13 \times 10^3 \times \frac{(-160)}{266.66}}{1 - \frac{(-160)^2}{266.66 \times 266.66}}$$

$$\bar{S}_y = 89.96 \times 10^3$$

$$q = -53.97 \int y\,ds - 51.66 \int x\,ds$$



q_{AB}

$x = -5\,cm$

$y = 15.5$

$$q = -53.97 \int (15.5)\,ds - 51.66(-5) \int ds$$

$$q = -5397(15s - s^2/2) + 258.35$$

$s = 0$	$s = 15$	$s = 20$
$q_A = 0$	$q_0 = 2.19\,kN/cm$	$q_B = -0.24\,k$

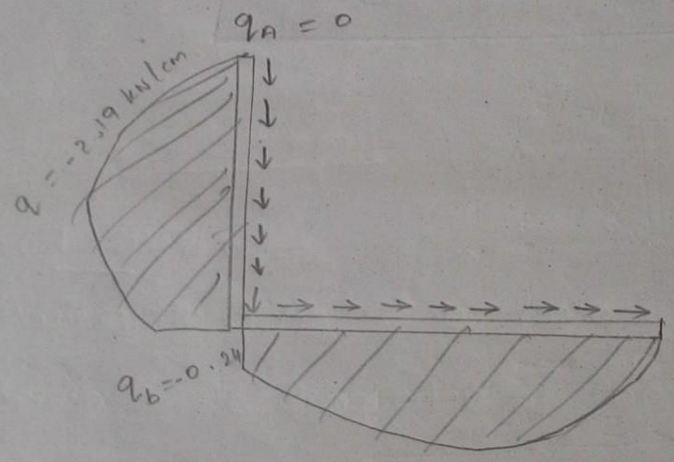
q_{bc}

$$q = -53.97 \int y\,ds - 51.66 \int x\,ds + q_b$$

$y = -5\,cm \qquad x = s - 5$

$$q = -53.97(-5)s - 51.66\left(\frac{s^2}{2} - 5s\right) + q_b$$

$s = 0$	$s = 5$	$s = 20$
$q_b = -0.24\ KN/cm$	~~$q_0 = 1349.25$~~ $q_0 = -2\ KN/cm$	$q_c = 0.2 = 0.$



07-14 One axis Symmetry.
(Wall ineffective in bending)

1) Plot the shear flow for a given cross secti also findout distance of shear centre. giver $A = B = C = 2cm^2$ (boom area).