

# ANSWER SHEET

Name: \_\_\_\_\_

Matric Number: \_\_\_\_\_

Section / Group: \_\_\_\_\_

Date of Experiment: \_\_\_\_\_

## EXPERIMENTAL DATA

Air temperature = \_\_\_\_\_ K

Atmospheric pressure = \_\_\_\_\_ N/m<sup>2</sup>

Coefficient of viscosity,  $\mu$  = \_\_\_\_\_ kg/ms

Length of plate,  $L$  = 0.265 m

Thickness of Pitot Tube, = 0.40 mm

Pressure reading during experiment

$\Delta h_o$  = \_\_\_\_\_ mm

$P_o$  = \_\_\_\_\_ N/m<sup>2</sup>

**Table 1** Pressure Distribution in Boundary Layer on Smooth Flat Plate

Micrometer Reading (mm)	$y$ (mm)	Pressure Head
		$\Delta h$ (mm)
20.0	10.0	
19.0	9.0	
18.0	8.0	
17.0	7.0	
16.0	6.0	
15.5	5.5	
15.0	5.0	
14.5	4.5	
14.0	4.0	
13.5	3.5	
13.0	3.0	
12.5	2.5	
12.0	2.0	
11.5	1.5	
11.0	1.0	
10.5	0.5	
10.0	0.0	

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**Table 2** Pressure Distribution in Boundary Layer on Rough Flat Plate

Micrometer Reading (mm)	$y$ (mm)	Pressure Head
		$\Delta h$ (mm)
20.0	10.0	
19.0	9.0	
18.0	8.0	
17.0	7.0	
16.0	6.0	
15.5	5.5	
15.0	5.0	
14.5	4.5	
14.0	4.0	
13.5	3.5	
13.0	3.0	
12.5	2.5	
12.0	2.0	
11.5	1.5	
11.0	1.0	
10.5	0.5	
10.0	0.0	

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## EXPERIMENTAL RESULT

**Table 3** Velocity Distribution in Boundary Layer on Smooth Flat Plate

Micrometer Reading (mm)	$y$ (mm)	Pressure, $P$	$\frac{u}{U} = \sqrt{\frac{P}{P_0}}$	$\frac{u}{U} \left(1 - \frac{u}{U}\right)$
		$\rho g \Delta h$ (N/m <sup>2</sup> )		
20.0	10.0			
19.0	9.0			
18.0	8.0			
17.0	7.0			
16.0	6.0			
15.5	5.5			
15.0	5.0			
14.5	4.5			
14.0	4.0			
13.5	3.5			
13.0	3.0			
12.5	2.5			
12.0	2.0			
11.5	1.5			
11.0	1.0			
10.5	0.5			
10.0	0.0			

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**Table 4** Velocity Distribution in Boundary Layer on Rough Flat Plate

Micrometer Reading (mm)	$y$ (mm)	Pressure, $P$ $\rho g \Delta h$ (N/m <sup>2</sup> )	$\frac{u}{U} = \sqrt{\frac{P}{P_o}}$	$\frac{u}{U} \left(1 - \frac{u}{U}\right)$
20.0	10.0			
19.0	9.0			
18.0	8.0			
17.0	7.0			
16.0	6.0			
15.5	5.5			
15.0	5.0			
14.5	4.5			
14.0	4.0			
13.5	3.5			
13.0	3.0			
12.5	2.5			
12.0	2.0			
11.5	1.5			
11.0	1.0			
10.5	0.5			
10.0	0.0			

### SAMPLE CALCULATION

Show a sample of calculation and attach those with the report.

### DISCUSSION

1. Determine values for  $Re_x$ ,  $\delta^*$  and  $\theta$ .
2. Calculate the pressures  $P_o$  and  $P$  in N/m<sup>2</sup>,  $\frac{u}{U}$  and  $\frac{u}{U} \left(1 - \frac{u}{U}\right)$ .
3. Plot the velocity distribution of  $y$  against  $\frac{u}{U}$  for smooth surface and rough surface case in a same graph.
4. Compare the boundary layer thickness for both cases and comment your results.

### CONCLUSION

State the conclusions of the experiment based on the understanding from results, graphs and discussions.