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MATRIC NO: 17/ENG06/106

DEPARTMENT: MECHANICAL ENGINEERING

COURSE TITLE: FLUID MECHANICS

COURSE CODE: MEE322

1. N = 0.9poise

D = 0.12m

Length = 12m

1(a)

Raynold number when flow is 785N of oil in 25 seconds

Re = eDU/η

Therefore

Flow Q = 785 N of oil in 25 seconds = 785 Kgm/s(^2)

785Kgm/s(^2)

F=Mg

M= F/g

= 80kg

M= 785/9.81

= 80kg

M= 80/25

= 3.20Kg/s

M = eUA

Where A = [πD(^2)]/4 e=900kg/m

= [π (0.12)(^2)]/4

= 0.01131m (^2)

U = m/eA

= 3.20/(0.1131 x 900)

U = 0.3144m/s

Re = [900 x 0.12 x 0.314]/0.09

= 376.8 the flow is laminar

DP(P1-P2) = [32 ηUL]/D(^2)

= 32 x 0.09 x 0.3144 x 12/(0.12 x 0.12)

= 754.56N/m^2

P=egh

hf = 753.6/9.8 x 900

hf = 0.0853m

D= 0.06m e= 1000Kg/m(^3)

L = 850m Q= 8.5 lit/sec

= 8.5 x 10^-3 m^3/s

V = 0.5 shakes Q=Ua

= 0.00005 m^2/s A=π(0.06)^2/4

V = η /e

η = v x e

= 0.00005 x 1000 = 2.827 x 10^-3 m^2

= 0.05 Ns/m

U = [8.5 x 10(^-3)] / [2.83 x 10(^-3)]

= 3.01 m/s

2 (a)

DP = 32 ηuL/D(^2)

= [32 x 0.05 x 3.01 x 850 ]/ [0.06(^2)]

DP = 1,130KNm(^-2)

Recall

P = egh

h = [1,130 x 10(^3)] / [1,000 x 9.81]

= 110m

2 (b)

To = η[du/dy]

To = -(dp/dx) \* γ/2

γ = D/2

= 0.06/2

= 0.03m

(dp/dx) = - (-[1130 \* 10^3] /850) \* 0.03/2

= 19.9411N/m^-2

2 (c)

Re = eDu/ η

= [1000 x 0.06 x 3.0]/0.05

3600

{“THE FLOW IS INTERMIDIARY. As Rainold number is between 2000 and 4000”}