Total No. of Questions : 6]

SEAT No. :

P4970

[Total No. of Pages :3

TE/In Sem. - 105
T.E. (Civil)
FLUID MECHANICS - II
(2012 Pattern) (Semester - I) (301005)

Time : 1 Hour] *[Max. Marks : 30*

Instructions to the candidates:

1) ***Answer Q.No.1 or 2, 3 or 4, 5 or 6.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) With necessary sketch explain the variation in pressure distribution with Reynold number for flow around cylinder. State also the application of this distribution. **[4]**

b) A body has a length of 3.5m & projected area 2.8m^2 normal to direction of its motion. The body moves through water medium having dynamic viscosity of 0.01 poise. Find the drag on the body if it has a coefficient of drag of 0.20 for a Reynold number of 5×10^6. **[3]**

c) Explain induced drag & profile drag & what factors influence it? **[3]**

OR

Q2) a) Explain why water hammer occur in pipe flow? What are its effect & methods of reduce water hammer effect. **[4]**

b) In a steel pipe 1200m long & 1.0m in diameter, carries water at a rate of 3m^3/s. If the wall thickness is 12mm, find the rise of pressure due to water hammer, if the valve at the end of pipe is closed in **[4]**

i) 2 sec

ii) 10 sec

Take modulus of elasticity of steel 2.06 $\times10^{11}$ N/m^2 & bulk modulus of elasticity of water 2.01 $\times10^9$ N/m^2.

c) What is meant by unsteady flow, give examples. **[2]**

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Q3) a) Explain energy equation as applied to flow through open channel with necessary sketch. **[3]**

b) What is kinetic energy & momentum correction factor & derive the expression for both. **[4]**

c) Work out the

i) Area of flow

ii) Wetted perimeter & hydraulic radius for

1) Triangular channel with sideslope 1V: 2H, depth of flow $1.5m\left[\frac{1}{2}\right]$.

2) Trapezoidal channel of base width 10m, slide slope 2V to 3.5horizontal, depth of flow 1.5m. **[3]**

OR

Q4) a) What is **[4]**

i) specific energy &

ii) specific force?

Prove that critical flow occuring at minimum specific force is given by $\frac{Q^2}{g}=\frac{A^3}{T}$.

b) A rectangular channel is 2.5m wide & 1.2m deep. The channel is laid to slope of lin 3600 & has Manning N = 0.015. Calculate. **[4]**

i) Maximum height of hump to produce critical depth &

ii) Reduction in width to produce critical depth.

c) What is channel transition & its necessity? List out different types of channel transition. **[2]**

Q5) a) What is the condition for an most efficient channel section? Show that for economical trapezoidal channel section, the best side slope $= \frac{1}{\sqrt{3}}$. **[3]**

b) A concrete lined channel is to carry a discharge of $20 m^3/s$ with a bed slope of lin 2500 & side slope of 1:1. Determine the channel dimensions. Take n = 0.013 what is the average shear stress along boundary. **[5]**

c) Derive the relation between Manning & chezy coefficent of roughness. **[2]**

OR

Q6) a) Derive the relation between conjugate depth of an hydraulic jump. **[5]**

b) The discharge in a horizontal channel is 3.8 $m^3/s/m$ width & average velocity of flow 8.5 m/s. Will hydraulic jump occur, if so what is height of jump & energy lost in jump. **[5]**

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