

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 2.8m² 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 3m³/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 2.06×10^{11} N/m² & bulk modulus of elasticity of water 2.01×10^9 N/m².
- c) What is meant by unsteady flow, give examples. **[2]**

P.T.O.

- 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 occurring 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 $\frac{1}{3600}$ & 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 $20\text{m}^3/\text{s}$ with a bed slope of $1\text{ in } 2500$ & 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 coefficient 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 $3.8\text{ m}^3/\text{s}/\text{m}$ 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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