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SF - 8321

B. E. (Sem. VI) (Civil) Examination

May / June – 2011

Applied Fluid Mechanics

(New Course)

Time : **3** Hours] [Total Marks : **100**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ B. E. (SEM. 6) (CIVIL)

Name of the Subject :

☛ APPLIED FLUID MECHANICS (NEW)

☛ Subject Code No. : 8 3 2 1 ☛ Section No. (1, 2,.....) : Nil

Seat No. :

Student's Signature

(2) All questions are compulsory.

(3) Assume suitable data if required and mention clearly the same.

1 (a) Explain how development of drag and lift forces takes place for bodies submerged in moving fluid. Explain separation points and make formation. **6**

(b) Explain the scale effect in models. **7**

(c) Use Prandtle's mixing length theory and obtain the velocity distribution for turbulent flow in pipes. **7**

$V = V_{max} + 2.5V_* \log_e y/R$, where V is the point velocity, R is the radius of the pipe.

2 (a) Develop an expression for velocity distribution for laminar flow between parallel plates one plate moving and the other plate stationary. Also sketch the shear stress distribution for the coute flow of this case. **8**

(b) Explain the causes and effect of the lift forces generated around an aerofoil. **7**

OR

(b) Explain the Euler model law and the Mach Model law and give examples where they are applicable. **7**

3 Write notes on any three of the following : **15**

(i) Merits and limitations of distorted models

(ii) Magnus Effect

(iii) Friction Drag pressure Drag and dynamic pressure of flowing fluid.

(iv) Dimensional analysis for drag forces on a submerged body.

4 (a) Derive the condition for most economical rectangular section. **8**

(b) Find the discharge through a rectangular channel of width 2m having a bed slope of 1 in 2000. The depth of flow is 1.5 m and the value of N in Manning's formula is 0.012. **8**

5 (a) Define specific energy. Derive the impression for critical depth (hc) and Critical Velocity (Vc) as given below: **10**

$$hc = \left(\frac{q^2}{g}\right)^{1/3}$$

where q = discharge per unit width

$$V_c = \sqrt{g \times hc}$$

(b) The discharge of water through a rectangular channel of width 8m, is 15 m^3/S when depth of flow of water is 1.2 m. Calculate : **8**

(i) Specific energy of flowing water

(ii) Critical depth

(iii) Critical velocity

(iv) Minimum specific energy.

OR

5 (a) Write in detail about classification of hydraulic turbine. **6**

(b) Define the following terms : **4**

(i) Hydraulic efficiency

(ii) Overall efficiency

(c) A turbine develops 10000 kW when running at 10 r.p.m. The head on the turbine is 30 m. If the head on the turbine is reduced to 18 m, determine the speed and power developed by the turbine.

6 Write short note on the following : (any **four**) **16**

(i) Cavitation

(ii) Gradually varied flow

(iii) Hydraulic jump

(iv) Characteristic curves of centrifugal pump

(v) Kaplan turbine.
