Total No. of Questions : 12]

SEAT No. :

P3468

[Total No. of Pages : 3

[5560]-105
T.E. Civil
FLUID MECHANICS - II
(Semester - I) (2012 Course) (301005)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4 Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
4) ***Assume suitable data, if necessary.***
5) ***Figures to the right indicate full marks.***

Q1) a) Define **[2]**

i) Pressure Drag

ii) Skin Friction Drag

b) A kite weighing 8.20 N has an effective area of 0.90m^2. It is maintained in air at an angle of 11° to the horizontal. The string attached to the kite makes an angle of 46° to the horizontal and at this position the value of co-efficient of drag and lift are 0.61 and 0.79 respectively. Find the speed of the wind and the tension in the string. Take the density of air 1.245 kg/m^3. **[6]**

OR

Q2) a) Explain in brief

i) Unsteady flow **[2]**

ii) Water Hammer **[2]**

b) Find the rise of pressure in pipe line carrying water when the valve at the end of pipe is closed suddenly at 2.0 seconds. Take the dimensions of pipe as, diameter 30 cm, length 1500m, velocity of flow 1.8 m/s. **[4]**

Q3) a) Explain in brief classification of flows in open channel. **[4]**

b) Define Isovel. Draw velocity distribution in different channel sections. **[2]**

OR

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Q4) Derive the expression for discharge over a sharp crested Rectangular notch. **[6]**

$$Q_{act} = \frac{2}{3} C_d \cdot \sqrt{2g}\ L.H^{3/2}$$

Q5) A rectangular channel 600 mm wide carries a discharge of 200 lps at a depth of 400mm. calculate the maximum height of the hump so that critical depth occurs at the hump. **[6]**

OR

Q6) Derive the conditions for the most economical trapezoidal channel. **[6]**

Q7) a) A jet of water 5cm in diameter having velocity of 20m/s, strikes normally on a flat plate. Determine the thrust on the plate:

i) If the plate is stationary.

ii) If the plate is moving with a velocity of 5m/s in the direction of jet.

iii) Also find the workdone / sec on the plate and the efficiency of the jet when the plate is moving. **[6]**

b) What are different types of casing for centrifugal pump? Explain any one with neat sketch. **[6]**

c) Explain in brief. **[6]**

i) Selection of pumps.

ii) Reciprocating pumps.

OR

Q8) a) Explain in detail classification of centrifugal pump. **[6]**

b) Derive the expression for the workdone by the jet on flat plate inclined and moving in the direction of jet. **[6]**

c) Define "specific speed" of centrifugal pump. Derive its expression in detail. **[6]**

Q9) a) What is the significance of unit quantities? Derive the expression for unit speed, unit power and unit discharge. **[8]**

b) A turbine develops 6500kw under head of 30m at 180 r.p.m. what is its specific speed? Indicate the type of turbine suitable for the purpose. If the turbine is tested in the laboratory where the head of water available is only 10.0m, what power will it develop and at what speed? **[8]**

OR

Q10)a) Write a short note on **[4+4]**

i) Selection of turbine

ii) Cavitation in turbine.

b) A pelton wheel has a mean bucket speed of 30 m/s, when a jet of water flowing at rate of 1500 lps strikes the bucket under head of 220 m. The bucket deflects the jet through 150º. Find the power given to the runner and hydraulic efficiency. Take $C_v = 0.98$. **[8]**

Q11)a) What are the assumptions made in Gradually varied flow analysis? Derive the dynamic equation for wide rectangular channel using manning's formula. **[8]**

b) Draw the various types of water surface profiles in Gradually varied flow. **[8]**

OR

Q12)a) State various methods for finding length of flow profile. Explain graphical integration method in detail. **[6]**

b) A rectangular channel has a bed width of 8m carries a discharge of $18m^3/s$ with a normal depth of 1.2m at a bed slope of 1 in 4000. At a particular section the depth of flow is 1.4m. Determine how for upstream or downstream the depth of flow will be 2.0m. Take Manning's N=0.02. Use step method and take two steps. **[10]**

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