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FACULTY OF ENGINEERING & TECHNOLOGY

S.E (Civil) Examination - June – 2015

Fluid Mechanics-II

(Revised)

[Time: Three *Hours*] **[Max. Marks: 80]**

"Please check whether you have got the right question paper."

N.B *i)* Q.No.1 and Q.No.6 are compulsory.
ii) Solve any two questions from the remaining questions in each section.
iii) Assume suitable data, if necessary.

SECTION-A

Q.1 Solve any five from following 10

i) Draw a neat diagram for uniform and non-uniform flow through open channel.
ii) Define back water curve.
iii) What do you mean by equivalent pipe?
iv) Define hydroynamically smooth and rough boundaries.
v) What do you mean by fundamental dimension?
vi) Define kinematic similarity.
vii) Enlist the types of forces acting in moving fluid.
viii) Define velocity defect.
ix) Define steady flow and unsteady slow in open channels.
x) Find the perimeter for channel rectangular is shape with depth 6.oM and width 8.0M.

Q.2 a) Give the scale ratios of distorted models. 07

b) Show that the hydraulic mean depth of a trapezoidal channel having the best positions is half of the minimum depth. 08

Q.3 a) Find the most economical cross section of a rectangular channel to carry 400 lit/sec of water when channel slope is 1 in 1000. Take C= 50. 08

b) Draw specific energy curve and them derive an expression for critical depth and critical velocity. 07

Q.4 a) Find the maximum power transmitted by a jet of water discharging freely out of nozzle fitted to a pipe, 250M long and 150MM diameter with f = 0.01. The available head at the nozzle is 75M. 08

b) Show that the loss head due to sudden expansion in pipe line is a function of velocity head. 07

Q.5 Write short notes on (any three) 15

a) Standing wave flume and venturiflume
b) Chezy's formula for loss of head due to friction in pipes.
c) Prandtl mixing length theory for turbulent shear stress
d) Methods of selecting repeating variables
e) Obtain an expression for critical velocity

SECTION -B

Q.6 Solve any five. 10

i) What do you mean amid ship?
ii) Draw inlet and outlet velocity triangle for pelton wheel turbine.
iii) Define jet ratio in case of pelton wheel turbine.
iv) Give the range of specific speed values of the kahan, francis turbines and pelton wheels.
v) A turbine develops 9000KW when funning at a speed of 140r. p. m and under a head of 30M. Determine the specific speed of the turbine.
vi) It $u_2 28.om/s$ and$u_1 - 14.0m/s$, determine manometric head.

vii) What are the effects of cavitation?
viii) Draw ideal indicator diagram.
ix) Give the compassion between centrifugal pumps and reciprocating pumps.
x) What is the principle of a hydraulic press?

Q.7 a) Prove that the work done per second per unit weight of water in a reaction turbine is given as : 07
$\frac{1}{g}(Vw_1, u_1 + Vw_2 u_2)$

b) A pelton wheel is having a mean bucket diameter of 0.8M and is running at 1000r.p.m. the net head on the pelton wheel is 400M of the side clearance angle is 15^0 and discharge through nozzle is 150 liters/ sec, find 08
i) power available at the nozzle &
ii) Hydraulic efficiency of the turbine.

Q.8 a) Obtain an expression for jet propulsion of ship when the inlet orifices face the direction of motion of the ship. 08

b) Explain with neat sketch working of a centrifugal pump. 07

Q.9 a) Obtain an expression for work done and power required to drive a double acting pump. 07

b) A centrifugal pump discharging 400 lit/sec, against –a head of 25M, runs at 1200 rpm. If the vane angle at outlet is 30^0, and the diameter and width of impeller at outlet are 400M and 15MM respectively, calculate the manometric efficiency. 08

Q.10 Write short notes on 15
a) Hydraulic crane
b) Hydraulic accumulator
c) Cavitation and priming