

FACULTY OF ENGINEERING & TECHNOLOGY

S.E.(Civil) Examination - DEC - 2014

Fluid Mechanics-II (Revised)

[Time: THREE Hours]

[Max. Marks: 80]

“Please check whether you have got the right question paper.”

- N.B**
- 1) Q No. 1 and Q No. 6 are compulsory
 - 2) Solve any two questions from remaining questions from each section
 - 3) Assume suitable data, if necessary

SECTION A

- Q.1 Solve any five 10
- i) Define Euler’s number
 - ii) State Buckingham’s π theorem
 - iii) Give the factors on which pressure rise due to water hammer depends
 - iv) Enlist the basic equations used for flow through branched pipes
 - v) give the conditions due to which laminar flow changes to turbulent flow
 - vi) What is velocity defect?
 - vii) Give the momentum equation for flow through open channels.
 - viii) Define hydraulic jump
 - ix) What do you mean by energy dissipation?
 - x) Define dimensional homogeneity
- Q.2 A Obtain an expression for velocity distribution in turbulent flow for rough pipes 07
 B A 20cm diameter pipe reduces in diameter abruptly to 10cm diameter. If the pipe carries water at 40 (8 liters/second, calculate the pressure loss across the contraction. Take the co-efficient of contraction as 0.6. 08
- Q.3 A Explain the most economical section of channel. In which situations, the rectangular channel section can become most economical? Derive the relations involved. 07
 B The discharge of water through a rectangular channel of width 10.0m is $22\text{m}^3/\text{sec}$, when depth of flow of water is 1.5m. calculate 08
- i) Specific energy of the flowing water.
 - ii) Critical depth and critical velocity.
- Q.4 A In 1 in 50 model of a spillway, the velocity and discharge are 4m/sec and 3000lit/sec. find the corresponding velocity and discharge in the prototype. 07
 B Define following: i) Prototype ii) Model analysis iii) Hydraulic similitude iv) Kinematic similarity 08
- Q.5 Write short notes on: 05
- i) Hydraulic jump and energy dissipation 05
 - ii) Flow through siphon 05
 - iii) Expression for the length of back water curve. 05

SECTION B

- Q.6 Solve any five 10
- i) Give the formula for work done by double – acting reciprocating pump.
 - ii) What do you mean by negative slip of a reciprocating pump?
 - iii) Name any five hydraulic devices

- iv) Define hydraulic ram.
 - v) Draw main characteristic curves of a pump.
 - vi) What are the functions of draft tube?
 - vii) What is the basis of selection of a turbine at a particular place?
 - viii) Define the term governing of a turbine
 - ix) Define radial flow reaction turbines.
 - x) What do you mean jet propulsion
- Q.7 A Derive the relation for the force exerted by a jet of fluid on a moving flat plate when the plate is inclined to the jet? 07
- B A nozzle of 6cm diameter delivers a stream of water at 30m/s perpendicular to a plate that moves away from the jet at 8m/s, find: 08
- i) The force on the plate
 - ii) The work done
 - iii) The efficiency of jet.
- Q.8 A An inward radial flow reaction turbine has external and internal diameter as 0.9 m and 0.45m respectively. The turbine is running at 200r.p.m and width of turbine at inlet is 0.2m. The velocity of flow through the runner is constant and is equal to 1.8m.sec. The guide blades make an angle of 10^0 to the tangent of the wheel and discharge at outlet velocity turbine in radial. Draw inlet and outlet velocity triangles and determine: i) relative velocity at inlet. ii) runner blade angles iii) width of the runner at outlet 09
- B Explain different types of draft tubes. 06
- Q.9 A Obtain an expression for the work done by impeller of a centrifugal pump on water per second per unit weight of water 07
- B A single acting reciprocating pump has a plunger of diameter 300mm and stroke of 40cm. if the speed of the pump is 70r.p.m and delivers 25 liters/sec of water against a section head of 5.0m and a delivery head of 18.0m, find theoretical discharge, cd, slip, % of slip of the pump. 08
- Q.10 Write short notes on: 05
- i) Hydraulic Ram 05
 - ii) Hydraulic press 05
 - iii) Hydraulic crane 05