

SUBJECT CODE NO:- P-274
FACULTY OF ENGINEERING AND TECHNOLOGY
S.E.(Civil) Examination May/June 2017
Fluid Mechanics- II
(Revised)

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

N.B

- i) Question No.1 and 6 are compulsory.
- ii) Solve any two questions from remaining questions from each section.
- iii) Assume suitable data if necessary.

Section A

- Q.1 Solve any five from following 10
- i) Define geometric similarity
 - ii) What are the advantages of distorted models?
 - iii) Find velocity of flowing water through pipe from following data : $C=60$, $m = 0.075\text{m}$ & $I = 0.034$, by using chezy's formula
 - iv) Enlist the various minor losses
 - v) Draw diagrams of different slope profiles
 - vi) Define specific force.
 - vii) Give the uses of syphon.
 - viii) Define flow in open channel.
 - ix) Give the different types of flow in open channel.
 - x) What is the required condition for a symphonic action?
- Q.2 a) Find the bed slope of Trapezoidal channel of bed width 4.0 m, depth of water 3.0 m and slide slope of 2 horizontal to 3 vertical, when the discharge through the channel is $15.0\text{m}^3/\text{sec}$. Taking the value of $N=0.03$ in Mannings formula $C = \frac{1}{N} m Y^6$ 08
- N
- b) Find an expression for loss of energy head for a hydraulic jump. 07
- Q.3 a) Derive an expression for shear stress on the basis of Prandtl's mixing length theory. 08
- b) A pipe-line carrying water has surface protrusion of average height 0.12mm. If the shear stress developed is 5.5 N/m^2 , determine whether the pipe surface act as a smooth, rough or in transition. The kinematic viscosity of water may be taken as 0.01 stokes. 07
- Q.4 a) At a sudden enlargement of a water main from 26 cm to 52 cm diameter, the hydraulic gradient rises by 15mm. Estimate the rate of flow. 07
- b) Obtain an expression for chezy's formula for loss of head due to friction in pipes 08
- Q.5 Write short notes on :
- a) Rapidly varied flow and gradually varied flow. 05
 - b) Pipes in series and pipes in parallel. 05
 - c) Dimension legs numbers. 05

Section B

- Q.6 Solve any five 10
- i) What do you mean by runway speed?
 - ii) Define Impact of jet.
 - iii) Draw neat diagram of Inlet and Outlet velocity triangles.
 - iv) Define turbines and pumps.
 - v) Enlist the general component of hydroelectric power plant.
 - vi) Give the different efficiencies of a turbine.
 - vii) Define unit power and unit rate of flow of a turbine.
 - viii) Draw neat diagram of vortex casing.
 - ix) What do you mean by priming of a centrifugal pump?
 - x) Define reciprocating pump.
- Q.7 a) Find an expression for the efficiency of a series of moving curved vanes when a jet of water strikes the vanes at one of its tips. Prove that maximum efficiency is 50%, when $u = v$ 07
- b) The water in a jet propelled boat is drawn through inlet openings facing the direction of motion of the boat. The boat is moving in sea-water with a speed of 60 km/hr. The absolute velocity of the jet of the water discharged at the back is 30 m/s and the area of the jet of water is 0.06m^2 . Find the propelling force and efficiency of propulsion. 08
- Q.8 a) Draw neat sketches of Pelton wheel turbine and Francis turbine. 06
- b) A Kaplan turbine runner is to be designed to develop 9000 KW. The net available head is 6.0m. If the speed ratio = 2.0 flow ratio = 0.7, overall efficiency = 80% and the diameter of the boss is 1/3 the diameter of the runner. Find the diameter of the runner, its speed and the specific speed of the turbine. 09
- Q.9 (a) Define manometric head and obtain different equations for manometric head. 05
- (b) Draw neat diagram of air vessel and give its functions. 05
- (c) The diameter of an impeller of a centrifugal pump at inlet and outlet are 400mm and 800mm respectively. Determine the minimum starting speed of the pump if it works against a head of 25m. 05
- Q.10 Write Short Notes on : (Any three) 15
- i) Indicator diagram
 - ii) Hydraulic intensifier
 - iii) Governing of turbines
 - iv) Hydraulic accumulator