

**SUBJECT CODE:- 80**  
**FACULTY OF ENGINEERING AND TECHNOLOGY**  
**S.E.(Civil) Examination Nov/Dec 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) Attempt any two questions from the remaining questions in each section.
  - iii) Assume suitable data, if any.

**Section-A**

- Q1. Solve any five from the following 10
- i. What do you mean by scale of turbulence?
  - ii. Calculate the pressure drop required to maintain  $0.05 \text{ m}^3/\text{s}$  of petrol (sp.gr.0.7) flow through a steel pipe 0.2 m diameter and 1000m long. Take  $f= 0.0025$  in the darcy relation
  - iii. Define hydraulic similitude
  - iv. Enlist the different forces acting in moving fluid
  - v. What do you mean by smooth and rough boundaries?
  - vi. Draw neat diagram of a venturi flume
  - vii. Draw a neat diagram of backwater curve
  - viii. What do you mean by economic channel?
  - ix. Enlist the different dimensionless numbers
  - x. Calculate wetted perimeter, if  $b= 5\text{m}$  and depth of flow 1.5 m
- Q.2 a) State the Buckingham theorem and mention the advantages of dimensional analysis 06
- b) What do you understand by similarity? mention various similarities which are to be maintained for model testing 05
- c) Draw neat sketch of : i) Pipes in series & ii) Pipes in parallel 04
- Q.3 a) What do you understand by transmission efficiency of pipe? Obtain a condition for maximum efficiency and prove that it is 66.7% 08
- b) For water distribution to a small town, a 25 cm pipe line is required. As pipes above 20 cm diameter are not available, it is proposed to put two parallel lines of the same diameter. Find the diameter required for the parallel lines 07
- Q.4 a) A rectangular channel 3.5m wide and bed slope of 0.0005 discharges  $5\text{m}^3/\text{s}$ . Find the depth of water using manning formula and taking  $N=0.02$  07
- b) Define the hydraulic jump and obtain an expression for depth of hydraulic jump 08
- Q.5 a) Explain with neat sketch uniform flow and gradually varied flow. 05
- b) Describe the Rayleigh’s method for dimensional analysis 05
- c) Define: i) Subcritical depth    ii) Supercritical depth 05

**Section-B**

- Q.6 Solve any five 10
- i. What is use of surge tank
  - ii. Define indicator diagram
  - iii. Draw neat diagram of Moody draft tube
  - iv. What is reciprocating pump?
  - v. What do you mean by cavitation?
  - vi. Define specific speed of turbine
  - vii. Enlist different types of impellers
  - viii. The force exerted by a jet of water having a velocity  $V$  on a series of vertical plates moving with a velocity  $U$  is given by equation
  - ix. If diameter of a wheel pelton turbine is 1.5 m and jet diameter is 10cm, find out the number of buckets.
  - x. What is necessity of priming?
- Q.7 a) Find an expression for the efficiency of a series of moving flat plates varies when a jet of water strikes at one of its tips. Prove that maximum efficiency is 50%, when  $\mu=v$  07
- b) A Kaplan turbine is to be designed to develop 8.5 MW brake power. The head available is 6.5m. Take speed ratio=2, flow ratio =0.7,  $D_b=0.4 D_o$ , assume  $\eta_0=0.7$ , Find the diameter of the runner and RPM of the turbine. 08
- Q.8 a) Prove that the minimum speed required for the centrifugal to start is given by:  $N = \frac{120}{\pi} \frac{V_{w2} D_2}{(D_2^2 - D_1^2)} \cdot \eta_{mano}$  07
- b) An impeller of inside diameter 15 cm and outside diameter 400mm having width at inlet 4cm and width at outlet 2 cm is running at 1400rpm. The inlet and outlet blade angles are  $25^\circ$  and  $15^\circ$  respectively. The whirl velocity at inlet is zero. Find: i) Flow rate ii) Absolute velocity at outlet 08
- Q.9 a) Describe the principle and working of a reciprocating pump with a neat sketch .why is a reciprocating pump not coupled directly to the motor? 07
- b) The diameter and stroke of a single acting reciprocating pump are 200 mm and 400 mm .It delivers  $0.42\text{m}^3/\text{min}$ , when running at 80 r.p.m Find the slip and percentage slip of the pump. Also find Cd 08
- Q.10 Write short notes on 15
1. Working of hydraulic RAM
  2. Working of pelton wheel turbine
  3. Working of hydraulic lift