## 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
i. What do you mean by scale of turbulence?
ii. Calculate the pressure drop required to maintain $0.05 \mathrm{~m}^{3} / \mathrm{s}$ of petrol (sp.gr.0.7) flow through a steel pipe 0.2 m diameter and 1000 m long. Take $\mathrm{f}=0.0025$ 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 $\mathrm{b}=5 \mathrm{~m}$ and depth of flow 1.5 m
Q. 2 a) State the Buckingham theorem and mention the advantages of dimensional analysis
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 08
prove that it is $66.7 \%$
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

Q. 4 a) A rectangular channel 3.5 m wide and bed slope of 0.0005 discharges $5 \mathrm{~m}^{3} / \mathrm{s}$. Find the depth of water using
manning formula and taking $\mathrm{N}=0.02$
b) Define the hydraulic jump and obtain an expression for depth of hydraulic jump
Q. 5 a) Explain with neat sketch uniform flow and gradually varied flow.
b) Describe the Rayleigh's method for dimensional analysis
c) Define: i) Subcritical depth
ii) Supercritical depth

## Section-B

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 10 cm , 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
it's tips. Prove that maximum efficiency is $50 \%$, when $\mu=\mathrm{v}$
b) A Kaplan turbine is to be designed to develop 8.5 MW brake power. The head available is 6.5 m . Take speed ratio $=2$, fiow 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.
Q. 8 a) Prove that the minimum speed required for the centrifugal to start is given by: $N=\frac{120}{\pi} \frac{V_{w 2} D_{2}}{\left(D_{2}^{2}-D_{1}^{2}\right)}$. $\eta_{\text {mano }}$
b) An impeller of inside diameter 15 cm and outside diameter 400 mm having width at inlet 4 cm and width at outlet 08 2 cm is running at 1400 rpm . 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
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?
b) The diameter and stroke of a single acting reciprocating pump are 200 mm and 400 mm . It delivers $0.42 \mathrm{~m}^{3} / \mathrm{min}, 08$ when running at 80 r.p.m Find the slip and percentage slip of the pump. Also find Cd
Q. 10 Write short notes on

1. Working of hydraulic RAM
2. Working of pelton wheel turbine
3. Working of hydraulic lift
