

Code: CE4T4

**II B.Tech - II Semester – Regular/Supplementary Examinations –  
April 2017**

**HYDRAULICS & HYDRAULIC MACHINERY  
(CIVIL ENGINEERING)**

Duration: 3 hours

Max. Marks: 70

**PART – A**

Answer *all* the questions. All questions carry equal marks

11 x 2 = 22

1.

- a) Derive the conditions for most economical section of a rectangular channel
- b) Explain the terms :
  - i) rapidly varying flow
  - ii) gradually varying flow
- c) What do you mean by fundamental and derived units ?  
Give examples.
- d) Explain the terms : i) Distorted    ii) Undistorted model
- e) Explain The Term Impact Of Jet
- f) What is angular momentum principle?
- g) Discuss about classification of hydraulic turbines .
- h) What is meant by governing of turbines?
- i) Discuss about specific speed performance of turbine.
- j) Define the following :
  - i) suction head
  - ii) delivery head
  - iii) static head
- k) What is meant by multi stage centrifugal pump?

## PART – B

Answer any **THREE** questions. All questions carry equal marks.

$$3 \times 16 = 48 \text{ M}$$

2. a) Prove that for a channel of circular section, the depth of flow,  $d=0.81D$  for maximum velocity, and  $d=0.95D$  for maximum discharge, where  $D$ =diameter of a circular channel,  $d$ = depth of flow. 8 M
- b) Derive the condition for maximum discharge for a given value of specific energy. 8 M
3. a) Discuss the method of selecting repeating variables with example. 8 M
- b) Determine the dimensions of the quantities given below :
- |                     |                          |
|---------------------|--------------------------|
| i) angular velocity | ii) angular acceleration |
| iii) discharge      | iv) kinematic viscosity  |
| v) force            | vi) specific weight.     |
- 8 M
4. a) A jet of water of diameter 50 mm moving with a velocity of 25 m /s impinges on a fixed curved plate tangentially at one end at an angle of  $30^0$  to the horizontal. Calculate the resultant force of the jet on the plate if the jet is deflected through an angle of  $50^0$ . Take  $g=10 \text{ m/s}^2$ . 8 M

b) Find the force on the curved plate when the plate is moving in the direction of jet? 8 M

5. a) What do you understand by characteristic curves of a turbine? Name the important types of characteristic curves. 8 M

b) A turbine is to operate under a head of 25 m at 200 r. p .m . The discharge is 9 cumec. If the efficiency is 90 % , determine : 8 M

i) Specific speed of the turbine

ii) Power generated and ,

iii) Type of machine.

6. a) How will you find an expression for the minimum speed for starting a centrifugal pump? 8 M

b) A three stage centrifugal pump has impeller 40 cm in diameter and 2.5 cm wide at outlet. The vanes are set back at the outlet at  $30^\circ$  and reduce the circumferential area by 15%. The manometric efficiency is 85% and over all efficiency is 75%. Determine the head generated by the pump when running at 12000 r.p.m and discharge is 0.06  $\text{m}^3/\text{s}$ . Find the shaft power also. 8 M