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ANNA UNIVERSITY CHENNAI :: CHENNAI-600025
B.E (Full Time) DEGREE END SEMESTER EXAMINATIONS, APR/MAY 2014
CIVIL ENGINEERING BRANCH (ENGLISH & TAMIL)
FOURTH SEMESTER – (REGULATION 2004/2008)
CE 283 / CE 9253 APPLIED HYDRAULIC ENGINEERING

Time : 3 hr

Max Mark : 100

Part-A (10 x 2 = 20 Mark)

Answer All Questions

1. What are the types of flow in open channels?
2. The open channel flows have two depths for a given energy- Justify.
3. Write the condition for hydraulically most efficient trapezoidal channel section?
4. Write the GVF profile types in which the flow will be in the subcritical state.
5. How will you calculate the length of a hydraulic jump in a rectangular channel?
6. When a hydraulic jump is said to be a strong jump?
7. What is the function of draft tube?
8. What is cavitation in centrifugal pumps?
9. What is the percentage of work saved by fitting air vessels in a double acting reciprocating pump?
10. Under what circumstances the rotary pumps are used?

Part-B (5 x 16 = 80 Mark)

(Question number 11 is compulsory)

11. The discharge of water through a rectangular channel of width 8 m, is $15 \text{ m}^3/\text{s}$ when depth of flow is 1.2 m. Calculate i) Specific energy of the flowing water ii) Critical depth and critical velocity iii) Value of minimum specific energy. (16)

12. (a) A dam is built across a stream of rectangular cross section which carries water at the rate of $5 \text{ m}^3/\text{s}$. As a result the depth of water upstream of dam is increased to 2.5m. The stream is 3 m wide and has a bed slope of 1 in 4900. The channel is lined with concrete (Manning's $n= 0.015$). How far upstream is the depth within 10 cm of the normal depth? (16)

(OR)

12. (b) Illustrate the classification of all the water surface profiles in open channel flow. Discuss the characteristic of mild slope profiles with the help of dynamic equation of GVF. (16)

(P.T.O)

13. (a) A trapezoidal channel having bottom width 8 m and side slope 1:1, carries a discharge of $80 \text{ m}^3/\text{s}$. Find the depth conjugate to initial depth of 0.75 m before the jump. Also, determine the loss of energy in the jump. (16)

(OR)

13. (b) (i) Hydraulic jump is a desired phenomena – Justify. (4)

13.(b) (ii) What are the types of hydraulic jumps and how they are classified (12)

14. (a) Explain with neat sketches the working of a single stage centrifugal pump with different types of casing. (16)

(OR)

14. (b) A Pelton wheel has a mean bucket speed of 12 m/s and is supplied with water at a rate of 750 litres per second under a head of 35 m. If the bucket deflects the jet through an angle of 160° , find the power developed by the turbine and its hydraulic efficiency. Take the coefficient of velocity as 0.98. Neglect friction in the bucket. Also determine the overall efficiency of the turbine if its mechanical efficiency is 80%. (16)

15. (a) A single acting reciprocating pump has a plunger of diameter 250 mm and stroke of 350 mm. If the speed of the pump is 60 r.p.m and it delivers 16.5 litres per second of water against a suction head of 5 m and a delivery head of 20 m, find the theoretical discharge, coefficient of discharge, the slip, the percentage slip of the pump and the power required to drive the pump. (16)

(OR)

15. (b) What is an air vessel? Describe the function of the air vessels in single acting and double acting reciprocating pumps with neat sketches. (16)