Reg. No. : | | | | | | | | | | |

Question Paper Code: 41014

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 2015.

Fourth Semester

Civil Engineering

01UCE405 - APPLIED HYDRAULIC ENGINEERING

(Regulation 2013)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. Write down the Reynolds number for laminar flow and turbulent flow.
2. Define flow regime.
3. Define hydraulic depth of an open channel flow.
4. What is called best section preferred in pipe flow?
5. Define alternate depths in an open channel.
6. Write down any two practical applications of hydraulic jump.
7. Define Cavitation.
8. What are multistage pumps?
9. Give example for Impulse turbine and Reaction turbine.
10. What is called negative slip in reciprocating pump?

PART - B (5 x 16 = 80 Marks)

11. (a) (i) Derive the expression for finding momentum. (10)

(ii) Explain boundary with neat sketch. (6)

Or

(b) (i) A siphon of diameter 200 *mm* connects two reservoirs having a difference in elevation of 15 *m*. The total length of the siphon is 600 *m* and the summit is 4 *m* above the water level in the upper reservoir. If the separation takes place at 2.8 *m* of water absolute, find the maximum length of the siphon from the upper reservoir to the summit. (10)

(ii) Explain minor losses in pipes. (6)

12. (a) The discharge of water through a rectangular channel of width 8 *m*, is 15 m^3/s. When the depth of flow of water is 1.2 *m* calculate

(i) Specific energy. (6)

(ii) Critical depth and critical velocity. (6)

(iii) Minimum specific energy. (4)

Or

(b) (i) A trapezoidal canal has side slopes 3 *H* to 4 *V* and slope of its bed 1 in 2000. Determine the optimum dimensions of the canal, if it has to carry water at $0.5 m^3/s$. (10)

(ii) Derive the conditions for best rectangular section. (6)

13. (a) Determine the length of back water curve caused by an afflux of 2.0 *m* in a rectangular channel of width 40 *m* and depth 2.5 *m*. The bed slope is 1/1000. (16)

Or

(b) The depth of flow of water at a certain section of a rectangular channel of 2*m* wide is 0.3*m*. The discharge through the channel is 1.5 m^3/s. Determine whether the hydraulic jump will occur or not. If so, find its height, loss of energy per kg of water and power lost. (16)

14. (a) (i) Write the various classifications of turbines. (8)

(ii) Define draft tube. Explain the various types of draft tubes with sketches. (8)

Or

(b) An inward flow reaction turbine has an external and internal diameter 1 *m* and 0.6 *m* respectively. The hydraulic efficiency of the turbine is 90 *%* , when the head on the turbine is 36 *m*. The velocity of flow at the outlet is 2.5 *m/s* and discharge at outlet is radial. If the vane angle at outlet is 15^0 and width of the wheel is 100 *mm* at inlet and outlet, determine

(i) The guide blade angle

(ii) speed of the turbine

(iii) vane angle at outlet

(iv) power developed (16)

15. (a) (i) Draw a neat sketch of centrifugal pump and explain the working principle of the centrifugal pump. (12)

(ii) Explain briefly about priming in pump. (4)

Or

(b) (i) A single acting reciprocating pump running at 50 *rpm,* delivers 0.*01* m^3*/sec* of water . The diameter of the piston is 200 *mm* and stroke length 400 *mm.*
Determine

(1) theoretical discharge.

(2) coefficient of discharge.

(3) slip of the pump. (12)

(ii) Explain Indicator diagram with a neat sketch. (4)

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