Roll.No | | | | | | | | |

B. E / B. Tech. (Full Time) DEGREE END SEMESTER EXAMINATIONS NOV/DEC 2012

CIVIL ENGINEERING (ENGLISH AND TAMIL MEDIUM)

FOURTH SEMESTER – (REGULATION 2004)

5

CE 9253 APPLIED HYDRAULIC ENGINEERING

TIME: 3 hr Max Mark: 100

Answer ALL questions

PART – A (10 x 2 = 20 MARKS)

1. Differentiate normal depth, critical depth and alternate depths in open channel flows.
2. Draw the velocity distribution diagram for a rectangular channel with the velocity profile showing the location of the average velocity.
3. List the assumptions involved in deriving the dynamic equation of the gradually varied flow in open channels.
4. Sketch the different zones of water surface profiles in a critical and mild sloped channels
5. A control sluice spanning the entry of a 4m wide rectangular channel having a mild slope admits 16m^3/s at a velocity of 3m/s. Find whether a hydraulic jump is expected in the channel downstream from the sluice
6. What is meant by negative surge?
7. Differentiate impulse and reaction turbines
8. What is meant by Priming of a pump?
9. A double acting reciprocating pump having piston area 0.1m^2 has a stroke of 0.3 m long. The pump is discharging 2.4 m^3 of water per minute at 45 rpm through a height of 10m. Find the slip of the pump.
10. What is meant by ideal indicator diagram?

PART – B (5 x 16 = 80 Marks)

11. a. i With the help of a diagram discuss the surface profile variations in a mild and steep sloped channels considering the given depth lies in all the zones of the respective channels. (16)

12. a. i Derive the best conditions for a trapezoidal channel to be called as a most economical section. (16)

OR

12. b.i A flow of 5m^3/s is passing at a depth of 1.5 m through a rectangular channel of 2.5m width. The kinetic energy correction factor is found to be 1.20. What is the specific energy of the flow? What is the value of the depth alternate to the existing depth if kinetic energy correction factor is equal to 1.0 for the alternate flow? (8)

12. b ii Explain the procedure for the integration of the varied flow equation by step method (8)

Roll.No | | | | | | | | |

13 a.i Show that the head loss in a hydraulic jump formed in a rectangular channel may be expressed as $E = \frac{(V_1 - V_2)^3}{2g(V_1+V_2)}$ (16)

OR

13. b.i Derive an expression for sequent depth in terms of Froude number and loss of energy due to hydraulic jump. (16)

14. a. i Write short notes on the characteristic curves of centrifugal pump (4)

a. ii With the help of a neat sketch explain the working principle of a centrifugal pump (12)

OR

14. b. i Write short notes on the various efficiencies in turbines (4)

b ii A Pelton wheel has to develop 18,000 bhp under a net head of 800m while running at a speed of 600 rpm. If the coefficient of the jet C_v =0.97, speed ratio =0.46 and the ratio of the jet diameter is 1/16 of the wheel diameter, calculate the number of jets required for the pelton wheel. Calculate also the diameter of jets, the pitch diameter and the quantity of water supplied to the wheel. Assume overall efficiency as 85% (12)

15. a. i Determine the maximum speed at which a double acting reciprocating pump can be operated under the following conditions (a) no air vessel on the suction side (b) a very large air vessel on the suction side close to the pump. The suction lift is 4m, length of suction pipe is 6.5m, diameter of piston 150mm and length of stroke is 0.45m. Assume simple harmonic motion. Take Darcy's f=0.024 (16)

OR

15. b.i Explain the working of a single acting reciprocating pump and derive an expression for the work done. (10)

b.ii Explain the types of reciprocating pump and why it is called as a positive displacement pump? (6)