[4860] - 620

M.E. (Civil) (WREE)
c - CLOSED CONDUIT FLOW
(2012 Course) (Semester - II) (501612) (Elective - IV)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:
1) *Figures to the right indicate full marks.*
2) *Draw neat sketches wherever necessary.*
3) *Assume suitable data if necessary.*
4) *Use of calculators allowed.*
5) *All questions are compulsory.*
6) *Answers to the two sections must be written separately.*

SECTION - I

Q1) a) Derive expressions for water hammer in elastic pipe. How does it vary for rigid pipe. **[8]**

b) A centrifugal pump works at 100 rpm, vane angle at outlet is 60°. Velocity of flow 3m/s is constant. Impeller diameter at exit is twice that at inlet. Monometric head and monometric efficiency are 30m and 70 percent respectively. Find: **[10]**

    i) diameter of impeller at exit, and

    ii) Vane angle at inlet.

OR

Q2) a) What do you understand by static head Manometric head and total head of a centrifugal pump? Explain Manometric, Mechanical and overall efficiencies of centrifugal pumps. **[9]**

b) Derive the expression for specific speed of centrifugal pump. **[9]**

Q3) a) Explain Water hammer theory (elastic and rigid) for pipeline flow for hydroelectric project. **[8]**

b) Illustrate with the help of sketch variation in hydraulic gradient in a penstock with change of load. **[8]**

OR

Q4) a) What do you understand by a surge tank? Illustrate with sketches its different types. **[8]**

b) Do we need surge tanks in tailrace tunnel? Illustrate various types with suitable sketches. **[8]**

Q5) a) A penstock 2000m long and m in diameter has a surge tank 20m diameter for a discharge of 30 cumecs. Friction factor is 0.018. Normal reservoir level is 500m. Determine maximum and minimum water levels in the tank. **[8]**

b) Determine the pressure rise through water flowing elastic pipe 5 km long of 2m diameter, velocity of water 3m/s is suddenly stopped by a valve at turbine end. Assume ρ = 102kg/m^3, E = 2.1 × 10^6 kg/cm^2 and K = 21000 kg/cm^2. Pipe thickness is 10mm. Also find the length of the pipe subjected to peak pressure. **[8]**

OR

Q6) a) What are the functions of surge tanks? Determine the pressure rise due to sudden closure of the valve at the end of steel penstock pipe 500m long carrying water at a velocity of 5m/s. Assume sigma = 102. **[8]**

b) Explain in detail differential surge tanks with expanded chambers. **[8]**

SECTION - II

Q7) a) What are various components of water distribution system? Explain with sketches. **[8]**

b) Explain in detail method of pipe network analysis. **[10]**

OR

Q8) a) Explain use of PIPE2000(KYPIPE) for design of pipeline. **[9]**

b) Explain in detail contribution of computer science in planning and management of water supply. **[9]**

Q9) a) Explain use of SURGE program. **[8]**

b) State basic equations of transient flow analysis in closed conduits and explain terms involved. **[8]**

OR

*Q10)*a) Explain use of HEC RAS(HEC2) program in managing water resources. **[8]**

b) Explain use of Pipe2000-SWMM program. **[8]**

*Q11)*a) Explain classification of open channel flows. **[8]**

b) What are gradually varied flows explain with sketches various GVF profiles. **[8]**

OR

*Q12)*a) What are rapidly varied flows (RVF) explain with sketches RVF. **[8]**

b) Explain use of floodplain hydraulics in design of various civil engineering structures. **[8]**

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