

Total No. of Questions : 12]

SEAT No. :

P4561

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[Total No. of Pages : 3

M.E. (Civil) (Water Resources and Environmental Engineering)

CLOSED CONDUIT FLOW

(2008 Course) (Semester - II) (Elective - IV) (501612)

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 is allowed.*
- 5) All questions are compulsory.*
- 6) Answers to the two sections must be written separately.*

SECTION - I

- Q1)** a) What are pump characteristics? Explain with neat sketches applications of pump characteristics. **[8]**
- b) A pump delivers water at $Q = 300$ l/s and a head $D_h = 40$ m through a DN 400 discharge pipe measuring $L = 5000$ m into an overhead tank; $a = 1000$ m/s. The inertia moments of pump and motor are negligible. Is there a risk of liquid column separation, i.e. macro-cavitation, following pump trip? If so, what is the anticipated pressure increase? **[10]**

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]**

P.T.O.

- 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 rectangular power channel 20 m wide and 3 m deep supplies 120 cumecs discharge to a power plant with four turbines. Two turbines are suddenly closed. Determine magnitude and speed of surge developed. [8]
- b) A penstock 2000 m long and m in diameter has a surge tank 20 m diameter for a discharge of 30 cumecs. Friction factor is 0.018. Normal reservoir level is 500 m. Determine maximum and minimum water levels in the tank. [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 500 m long carrying water at a velocity of 5 m/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 Pipe 2000-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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