Paper Code: ENV31G	Roll No.									

M.TECH.
THIRD SEMESTER EXAMINATION, 2015-2016
DESIGN OF WATER SUPPLY SYSTEMS

Time:-3 Hours Max Marks: 100

Note: Attempt all five questions. Assume any data, not given, suitably.

Q.1. Attempt any **two** parts of the following: [10x2]

a. Describe the effects of variation in demand on the design capacities of different components of a water supply scheme? Draw layout of water supply scheme. Explain coincident draft.

b. Design a bell mouth canal intake for a city having population of 60,000 drawing water from a canal which runs only for 10 hours/ day with a depth of 1.5 m. Also calculate the head loss in the intake conduit if the treatment plant is 250 m away. Assume average annual water demand as 150 LPCD. Assume the velocity through the screen and bell mouth to be less than 16 cm/s and 32 cm/s respectively.

c. In a water supply scheme to be designed for serving a population of 5 lac, the storage reservoir is situated at 8 km away from the city and the loss of head from source to city is 16 m. Calculate the size of the supply main by using Weisbach formula as well as by using Hazen's formula assuming a maximum daily demand of 200 LPCD and half of the daily supply to be pumped in 10 hours. Assume coefficient of friction for the pipe materials as 0.012 m in Weisbach formula and C_H = 130 in Hazen's Formula.

Q.2. Attempt any **two** parts of the following: [10x2]

a. (i) Define 'river intake' with the help of a sketch. What are the factors which govern the selection of a location for an intake structure?
(ii) Draw neat sketches of valve towers constructed in gravity and earthen dams.

b. Design a rapid sand filter for 2,75,000 population with all details.

c. A pump is to deliver water from underground tank against a static head of 40 m. The suction pipe is 50 m long and is of 25 cm diameter with Darcy-Weisbach friction factor 'f' = 0.01. The delivery pipe is of 20 cm diameter, 1600 m long and has 'f' = 0.022. The pump characteristics can be expressed as: $Hp = 100 - 6000Q^3$, where Hp = pump head in meters, Q = discharge in m^3/s. Calculate the head and discharge of the pump.

Q.3. Attempt any **two** parts of the following: [10x2]

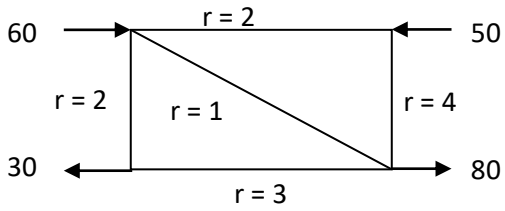
a. Explain use of topographic survey in water supply scheme. Write the importance of site plan, contour plan, flow diagrams and detailed drawings in water supply scheme.

b. Derive Hazen William's formula and compare it with modified Hazen William's formula.

c. What is equivalent pipe method? Discuss the equivalent pipe method for pipes in series and parallel.

Q.4. Attempt any **two** parts of the following: [10x2]

a. Evaluate the distribution of flow in the pipe network shown in figure as the pipes are rough, the flow may be assumed to be turbulent and head loss h_L may be taken as r Q^x. The value of r for each pipe is shown in figure. Assume 'x'=2.



b. How Distribution Network affects the water quality? Discuss the main features of EPANET. Compare with other models.

c. List various coagulant feeding devices used in water treatment plant and explain functioning of any one device in detail.

Q.5. Write short notes on any **four** parts of the following: [5x4]

a. Detailed design and drawing of water treatment systems.
b. Describe in details about working drawing.
c. Pre-feasibility and feasibility reports of new water supply project.
d. Dewatering and disposal of sludge from water treatment plants.
e. Flow measurement devices.
f. Economical diameter of rising main.