Seat No.: _____   Enrolment No._____
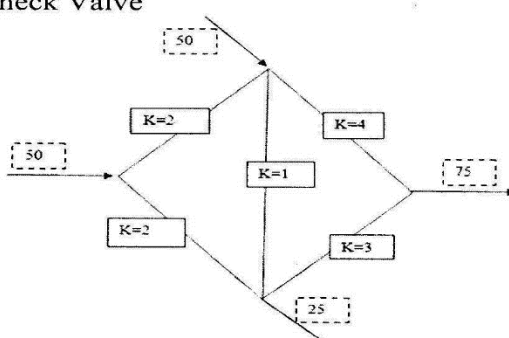
GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–VII (NEW) EXAMINATION – WINTER 2018
Subject Code: 2174016   **Date: 29/11/2018**
Subject Name: Planning and Design of Urban Water Infrastructure
Time: 10:30 AM TO 01:00 PM   **Total Marks: 70**
Instructions:
1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

			MARKS
Q.1	(a)	Differentiate between 'dry' and 'wet' intake towers.	03
	(b)	What are the factor's considered while selecting location of the Intake structure?	04
	(c)	Design a bell mouth canal intake for a city of 75,000 persons, drawing water from a canal which runs only for 10 hours a day with a depth of 1.5m. Also calculate the head loss in the intake conduit if the treatment works are 0.25 km away. Draw a neat sketch of the canal intake. Given average consumption per person=150 l/d. Assume the velocity through the screens and bell mouth to be less than 16 cm/s and 32 cm/s, respectively. [Note: Assume the flow velocity in conduit as 1.5 m/s, use Hazen William's formula for calculating losses, C=130 for CI pipe]	07
Q.2	(a)	Briefly explain the following types of valves (i) Sluice Valve (ii) Air Relief Valve (iii) Safety Valve (iv) Check Valve	07
	(b)		07

Determine the distribution of flow in the pipe network shown in the figure above. The head loss may be assumed as KQ^n. The flow is turbulent and pipes are rough. Take n=2.
The values of K for each pipe and flows at different nodes are indicated in the figure. Use Hardy-Cross method for two iterations.

OR

| | (b) | A water supply main trifurcates at a junction point J into three branches each feeding a separate reservoir. The details of the pipes and reservoirs are as follows: | 07 |

Pipe	Diameter	Length	Darcy friction factor(f)	Terminal Reservoir	Reservoir elevation(m)
JA	20 cm	2 km	0.02	A	80.00
JB	20 cm	2.5 km	0.02	B	70.00
JC	20 cm	3 km	0.02	C	60.00

If the inflow from the main at the junction is 0.250 cumecs, determine the delivery into each reservoir.

Q.3	(a)	Differentiate between 'Initial regime' and 'Final regime'?	03
	(b)	Why are the pressure pipes most commonly used for conveying water from distant sources to the towns of supply? What are the drawbacks of open channels and masonry aqueducts in this respect?	04
	(c)	Explain the classification of Canals based on the Alignment.	07

OR

Q.3	(a)	Define the following terms: (i) Surge tank (ii) Intensity of Irrigation (iii) Kor Depth	03
	(b)	Discuss the advantages and disadvantages of various types of pipes used in water supply transmission mains?	04
	(c)	The population of 5 decades from 1971 to 2011 are given below in the table. Predict the population after one, two and three decades beyond the last known decade by following methods. Arithmetic increase Method , Geometric Increase Method, Incremental Increase Method :	07

Year	1971	1981	1991	2001	2011
Population: (thousands)	25	28	34	42	47

Q.4	(a)	Narmada main canal is a contour canal. Give proper justification.	03
	(b)	What is a 'river intake'? What are the factors which govern the location of an intake structure on a meandering of a river?	04
	(c)	Design an irrigation channel by Kennedy's method, to carry 50 cubic meters per second of discharge, with base width to depth ratio as 2.5. The critical velocity ratio is 1.1. Assume Kutter's rugosity coefficient as 0.025 and side slopes of the channel as 0.5 horizontal to 1.0 vertical. Assume the longitudinal slope in the range of 1 in 3000 to 1 in 2500.	07

OR

Q.4	(a)	Differentiate between 'Alluvial' and 'Non-alluvial' canals.	03
	(b)	Explain Flanged joint and Expansion joint in pipes.	04
	(c)	Design a concrete lined channel to carry a discharge of 500 cumecs at a slope of 1 in 4000. The side slopes of the channel may be taken as 1:1. The Manning's roughness coefficient for the lining is 0.014. Assume permissible velocity in the section as 2.5 m/s.	07

| Q.5 | (a) | Explain HGL and TEL/TGL briefly. | 04 |
| | (b) | What is meant by 'water hammer', and how is it produced in pipes | 10 |

conveying water under pressure? What precautions should be taken and arrangements made to reduce its effects? What provisions are normally made in the design of pipe lines on this account?

OR

Q.5 **(a)** Why the Narmada main canal head is situated far away from the dam site?   03

(b) Explain the merits of Canal Lining.   04

(c) For the data given in the table and taking Kor depth and Kor period for Wheat as 13.5 cm and 4 weeks respectively and for rice as 19 cm and 2.5 cm weeks respectively, compute the average discharge requirements for both and find the peak demand.   07

Crop	Area under crop (Hectare)	Total Depth (cm)	Base Period (Days)	Average Duty (Hectare/Cumec)
Wheat	5000	37.5	140	3225.6
Rice	2500	120	120	864

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