BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: MTECH **SEMESTER : I**
BRANCH: ESE **SESSION : MO/19**

SUBJECT: CE529 WATER SUPPLY ENGINEERING

TIME:3:00 HOURS **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q.1(a) Discuss the physico-chemical parameters of water as per Indian standard for drinking water. [5]

Q.1(b) Correlate the relationship between hardness and alkalinity with emphasizing their importance in water supply scheme. [5]

Q.2(a) Examine the effects of variations in demand on the design capacities of different components of a water supply scheme. [5]

Q.2(b) Predict the population for the year 2021 from the following census figures of a town by incremental increase method. [5]

Year	1941	1951	1961	1971	1981	1991	2001	2011
Population: (thousands)	60	65	63	72	79	89	97	120

Q.3(a) A 2 m diameter well is being pumped at a constant rate of 0.85m^3/min producing drawdowns of 0.8 & 0.5 m in two test bores 30 & 60 m away respectively from the well. Depth of water before pumping was 15 m. Determine the radius of zone of influence. **[5]**

Q.3(b) From a clear water reservoir 3m deep and maximum water level at 30.00. Water is to be pumped to an elevated reservoir at 75.00 at the constant rate of 9 lakhs litres/hr. The distance is 1500m. Determine the economical diameter of the rising main and the water horse power of the pump. Neglect minor losses and take f = 0.01. [5]

Q.4(a) Determine the percent removal of suspended solids in an ideal horizontal flow sedimentation tank operating at 1.2 $m^3/min/m^2$. Fraction of the particles having a settling velocity less than the terminal velocity is 0.5. $\int_0^{xt} v_s\, dx$ is 0.185. [5]

Q.4(b) The water works of a town of population 25,000 has to meet its water demand at the rate of 135 lpcd. If the disinfection has to be done by the bleaching powder having 45% available chlorine, determining the quantity of bleaching powder required per year. The required dose of chlorine at the water works is 0.3 ppm for disinfection. [5]

Q.5(a) Optimize the distribution of flow in the pipe network shown in Fig. 1. The head loss, H_L, may be assumed as KQ^n. The flow is turbulent and pipes are rough. The value of K for each pipe is indicated in the figure. Use Hardy- Cross method. (upto one iteration only). [5]

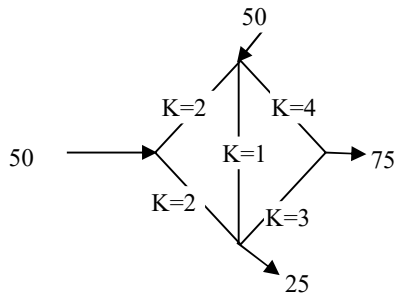

FIG. 1.

Q.5(b) Discuss the importance of service reservoirs and their types. [5]

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