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**Daffodil International University**
BSc. In Civil Engineering
Midterm Examination, Fall - 2024

Course Code: CE 341 | Course Title: Water Supply Engineering
Section: BN1, BN2 | Level-Term: L3-T1 | Teacher's Initial: MHz
Full Marks: 25 | Date: 02-Oct-2024 | Time: 1.5 Hours

*Note: There are 5 questions. Answer all. [Right side figures indicate full marks]*

1. Estimate the future population for the year 2045 of a city with the following data. Calculate the future demand if per capita water demand is taken as 120 lpcd. [5]

| Year | 1990 | 2000 | 2010 | 2020 |
|---|---|---|---|---|
| Population | 120,000 | 145,000 | 180,000 | 225,000 |

*[Course Learning Outcome: CO1 Cognitive Level: C5 Time: 18 min]*

2. A 0.2 m diameter tubewell produces 40,000 $m^3/d$ from an unconfined aquifer. The static depth of water in the well is 42 m. An observation well at a distance of 120 m shows water level at 44.5 m. Calculate the coefficient of permeability. [5]

*[Course Learning Outcome: CO3 Cognitive Level: C4 Time: 18 min]*

3. A strainer with a diameter of 50 mm and length of 6 m is installed in an aquifer. The strainer have slot # 20 having an open area of 35%. If the entrance velocity of water from the aquifer to strainer is around 0.01 m/sec, what is the yield of the well? [5]

*[Course Learning Outcome: CO3 Cognitive Level: C4 Time: 18 min]*

4. The results of sieve analysis test carried out on a 250 gm sample of underground aquifer proposed to be tapped for installation of a tubewell, are given in the table below: [6]

| Size of the sieve in mm | Wt. of material retained In gm | % of material retained | Cumulative % retained | % finer |
|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) |
| 2.360 (#8) | 0 | | | |
| 1.180 (#16) | 2 | | | |
| 0.600 (#30) | 15 | | | |
| 0.300 (#50) | 170 | | | |
| 0.150 (#100) | 30 | | | |
| 0.075 (#200) | 20 | | | |
| pan | 13 | | | |
| Total = | 250 | | | |

Determine the slot size ($D_{50}$) of the tubewell.

*[Course Learning Outcome: CO2 Cognitive Level: C3 Time: 21 min]*

5. Determine the number and size of the intake gates for a flow of 200 MLD. [4]

*[Course Learning Outcome: CO2 Cognitive Level: C3 Time: 15 min]*

*Required Formulae: (symbols have their usual meaning)*

$$Q = \frac{\pi K(y_2^2 - y_1^2)}{\log_e(\frac{x_2}{x_1})} \quad ; \quad Q = \frac{2\pi K m(y_2 - y_1)}{\log_e(\frac{x_2}{x_1})} \quad ; \quad Q = \pi D L p v_e \quad ; \quad P_f = P_p(1+r)^n$$