S.Y. Civil HE 6/3

Total No. of Questions – [6]   Total No. of Printed Pages: 1

G.R. No.	

MARCH 2020 INSEM (T1)
S. Y. B.TECH. (Civil Engineering) (SEMESTER – IV)

COURSE NAME: Hydraulic Engineering
COURSE CODE: CVUA22185

(PATTERN 2018)   [Max. Marks: 20]

Time: [1 Hour]

(*) Instructions to candidates:

1. Attempt Q.1 OR Q.2, Q.3 OR Q.4, Q.5 OR Q.6
2. Figures to the right indicate full marks.
3. Use of scientific calculator is allowed.
4. Assume suitable data wherever required.

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Q. 1)   A 10 mm ball with R.D. 1.2 is suspended from a string in air   8   1
floating at a velocity of 10 m/s. Determine the angle which the
string will make with the vertical. $v = 1.53 \times 10^{-5}$ m²/s

$$C_D = \frac{24}{R_e}\left[1 + \frac{3}{16}R_e\right] \quad \text{if } 0.2 < R_e < 20$$

$$C_D = \frac{24}{R_e} + \frac{3}{\sqrt{R_e}} + 0.34 \quad \text{if } 0.5 < R_e < 10^4$$

OR

Q. 2)   Derive an equation for time of emptying a tank of any shape   4   2
A rectangular tank of surface area 375 m² is to be emptied over a   4
triangular notch in one of its sides. Find how long will it take to
reduce the head over the apex of the notch from 1 to 0.6
$Q = 1.417 H^{5/2}$

Q. 3)   The depth of flow in trapezoidal channel is to be 2 m with a flow   8   3
rate of 25 m³/s. If the section is to be most efficient find the base
width and the slope necessary to carry this discharge. Take side
slope to be 1.5 H : 1 V and n = 0.015. What would be Chezy's C
for this case?

OR

Q. 4)   Derive condition for maximum velocity in hydraulically efficient   8   3
circular channel for Chezy's formula and Manning's formula.

Q. 5)   A rectangular channel has a width of 2 m and carries a discharge   4   3
of 2 m³/s with a depth of 0.25 m. Calculate (i) The specific energy
(ii) The depth alternate to existing depth

OR

Q. 6)   Show that for a triangular cross section of an open channel   4   3

$$y_c = \left(\frac{2Q^2}{gZ^2}\right)^{1/5}$$