Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai – 400058

End Semester Direct Second Year – Re-Examinations August 2022

S.Y. Sem IV

Program: B. Tech. Civil Engineering **Duration: 3hrs.**

Course Code: PE-BTC404 **Maximum Points: 100**

Course Name: Surveying & Geomatics **Semester: IV**

21/8/22

Notes:

1. There are **TOTAL SEVEN MAIN** questions, each of **20 points**.
2. **QUESTION 1 is COMPULSORY.**
3. **From the remaining SIX Questions Solve ANY FOUR.**
4. **Assume suitable data, wherever necessary and State it clearly.**
5. Write **answer to each question on a new page.**
6. Answers to be accompanied with **appropriate sketches/facts & figures/table or chart/graph/diagram/flowchart** wherever necessary or required.

Q.No.	Questions	Points	CO	BL	PI
1.	**Answer the following: (2 marks each)**				
	1. Distinguish between horizontal curve and vertical curves. 2. Define Triangulation and Trilateration 3. Distinguish between aerial remote sensing and space remote sensing 4. Define super-elevation and sight distance 5. Define Photo/Image Interpretation 6. Focal length and photo scale in aerial photographs 7. Total station and EDM 8. State the basic principle of Global positioning system 9. Give the difference between theodolite and tacheometer 10. Define: Horizontal and vertical control in setting out works	**20**	**1,2,3**	**1,4**	**1.1.1**
2.A	Design the transition curve for a railway line with rail gauge of 1.5m: vehicle design speed (1), transition curve length (2), spiral angle (1), shift of the transition curve (1). Following data is available: Super-elevation – 15cm, radius of circular curve – 300m, rate of change of radial acceleration – $0.3 m/s^3$	**5**			
2.B	1. State various methods of setting out horizontal curve (2). Explain the method in detail with proper sketch (5). 2. With proper sketch, explain the concept of 'Sight distance' (3). 3. Explain, with the help of a neat sketch, the 'Tangent Correction method' of setting out Vertical curve. (5)	**15**			
3.A	Define 'Figure of Triangulation' (3). State different figures adopted for triangulation with proper sketches (6). Explain the criteria for carrying out triangulation survey (6).	**15**			
3.B	Differentiate between Vertical, Tilted and Oblique photographs with proper sketches (5).	**5**			

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4	1. State various elements of aerial photo interpretation (2). Explain any two elements with proper examples (6). 2. Aerial photographs were taken with a camera having a focal length of 160mm. the average elevation of the ground in the photograph was 180m. Find the scale of the map if the flying height was 3000m(2) and the flying height required to have a photo scale of 1 in 6000 (2). 3. Explain in short the working of EDM, with a neat sketch (8)	**8** **4** **8**				
5.	1. Draw a neat sketch and show the range line, sounding points and shore line (2). Give the requirements for planning the sounding points (3). 2. With neat and labelled sketches, the location of sounding stations by means of Intersecting ranges (5) 3. Give the difference between Registering and Non-registering (Self-registering) tide gauges (2). Explain the working of the registering (recording) tide gauge (3) 4. Give the types of self-registering gauges (2) and explain any one in detail (3).	**5** **5** **5** **5**				
6.A	1. Given the data as shown here: *Inst. stn* | *Staf f stn* | *Line* | *Bearing* | *Vertical angle* | *Stadia readings* O | A | OA | 84°36' | 3°30' | 1.35, 2.10, 2.85 O | B | OB | 142°24' | 2°45' | 1.955, 2.875, 3.765 Find the distance between stations A & B and the gradient between stations A & B. (*Staff held normal at both the stations)*	**10**				
6.B	Explain with neat sketches the difference between primary, secondary and tertiary triangulation methods.	**10**				
7.A	Write a note on: 1. Importance of setting out works (5). 2. Methods of locating a new structure w.r.t the permanent structure (5).	**10**				
7.B	1. Derive the stadia equation for a line of sight inclined to the staff intercept (5). 2. State and explain the errors in stadia measurement in a teacheometric survey (5).	**10**				

----- The End -----

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Re-Examinations August 2022 (DSE)

(2021-22)

Program: S.Y. B. TECH Sem IV
Course Code: PC-BTC-405
Course Name: HYDRAULIC ENGINEERING

Duration: 03 Hrs.
Maximum Points: 100
Semester: IV

23/8/22

Notes:

- Attempt ***any five*** questions.
- Answer to all sub questions should be grouped together.
- **Figure** to right indicates full marks.
- Assume suitable data wherever necessary and state it **clearly**.

Q. No.	Questions	Points	CO	BL	PI
1	(a) Explain the significance of dimensional analysis in experimental studies with special emphasis in hydraulic engineering.	10	4	2	1.3.1
	(b) Explain Buckingham's-π method of dimensional analysis.	10	4	4	2.1.2
2	(a) Explain with neat sketches HGL and TEL for pipes in parallel and pipes in series.	10	1	2	1.3.1
	(b) What do you mean by Siphon? Explain its working with neat sketches.	10	1	4	2.1.2
3	(a)What is Impulse momentum principle? Explain its applications in hydraulic engineering with suitable examples.	10	1	4	1.3.1
	(b) Show that the efficiency of a free jet striking normally on a series of flat plates mounted on the periphery of a wheel can never exceeds 50%.	10	1	5	2.3.1
4	(a). Explain working of hydraulic turbine with a neat sketch and define hydraulic efficiency, mechanical efficiency and overall efficiency of a hydraulic turbine	10	2	2	2.1.2
	(b) A Pelton wheel has a mean bucket speed of 10 meter/sec with a jet of water flowing at a rate of 0.85 cum/sec. under a head of 40 meter. The bucket deflects the jet through an angle of 165^0. Assuming coefficient of velocity as 0.98, Calculate power and overall efficiency of turbine	10	2	4	2.3.1
5	(a) Explain: (i) Priming of a centrifugal pump; and (ii) Pumps in series and parallel	10	2	2	2.1.2
	(b) Explain: performance characteristics curves of hydraulic turbines; also discuss the term specific speed of turbine.	10	2	4	3.1.6
6	(a) Derive the condition for most economical triangular channel section to carry maximum discharge.	10	2	2	2.1.2
	(b) For a trapezoidal channel with bottom width 30 meter and side slopes 2H: 1V, Manning's constant (N) is 0.018 and bottom slope is	10	2	4	3.4.2

	0.000235. If it delivers 60 m^3/s of water, determine the normal depth of flow.				
7	(a)Differentiate between Gradually varied flow and rapidly varied flow. Explain with an example.	10	3	4	2.3.1
	(b) What is Specific Energy curve? How it is important in the open channel flow studies? Explain.	10	3	4	2.3.1

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SARDAR PATEL COLLEGE OF ENGINEERING
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Munshi Nagar Andheri (W) Mumbai 400058

Reexam DSY

August 2022

Max. Marks: 100 **Duration: 3 Hrs**

Class: S.Y. B. Tech Civil Sem IV **Semester: IV**

Name of the Course: Environmental Engineering I **Program: B. Tech Civil**

Course Code: PC- BTC407

24/8/22

Instructions:

Question one is compulsory
Attempt any four of remaining six questions
Draw neat sketches/diagrams wherever required
Assume suitable data if necessary and state them clearly
Figure on right indicate **maximum points** for the given question, **course outcomes attained, Bloom's Level** and **Performance Indicators**

Q1	Answer the questions	(20)	CO	BL	PI
(a)	(i) Explain the need of filtration in water treatment. (ii) Explain process of disinfection and its requirement. (iii) Give advantages of tube settlers (iv) Explain the importance of coagulant aided sedimentation (v) Explain color and odor removal	(10)	1,2	2	1.2.1
(b)	Draw components of water supply scheme and Explain factors affecting need of water supply scheme	(10)	1,2	2	3.2.1
Q2	**Answer the following questions**	(20)			
(a)	Draw the flowsheet of conventional surface water treatment plant in detail. Explain in detail the function of each unit. The reductions of turbidity, salts and pathogens after each unit should be mentioned.	(10)	1,2,3	3,4	3.3.1
(b)	Explain per capita demand . Explain factors affecting percapita demand. Explain Fire demand in detail	(10)	1,2	3,4	5.3.1
Q3	**Answer the following questions**				
(a)	Explain population forecasting and why it is required for designing the water supply scheme.A town has a population of **8,00,000 in 2010**. The water supply scheme is to be developed for the area for the year **2040**. The past census records are provided in **table 1**. Calculate the population for which water supply system is to be designed using any two appropriate methods for newly developing city.	(10)	1-3	4-5	3.4.2

	Table 1.								
	Year	1970	1980	1990	2000	2010			
	Population	3,55,000	4,10,000	5,55,000	6,20,000	8,00,000			
(c)	Explain intakes and type of intakes with their functions.						**(10)**	**1-4**	**3-4**	**4.3.1**
Q4	**Answer the following questions**						**(10)**	**1-3**	**3-5**	**3.2.1**
(a)	Write short notes on Coagulation and flocculation; Ideal settling tanks									
(c)	Explain softening process. Lime and soda were used for softening for treatment of following impurities Ca Cl_2= 120 mg/L; $Mg(HCO_3)_2$=180 mg/L; NaCl= 140 mg/L; Mg Cl_2= 150 mg/L. Compute the quantities of chemicals required for Rajkot in year 2040. Assume **soda ash and lime purity 90%. (Consider data in Q 3(a))**						**(10)**	**1-3**	**3-4**	**3.2.2**
Q5	**Answer the following questions**						**(20)**			
(a)	**Define SOR and WLR. Design circular** settling tank for the population for **the year 2020 as given in Q3 (a) and water supply rate is 150lpcd.**						**(10)**	**2-3**	**2-3**	**2.2.1**
(b)	Design **a paddle flocculator** for Rajkot for **2040** with following details with average water demand as 150 lpcd: **Detention time= 15 min; Average G= 70s^{-1}; Speed of paddles = 3.5 rpm** **K=0.25; μ =1.0087X10^{-3} Ns/m^2; ρ=998 kg/m^3 at 20°C; Ratio of L: B= 3.**						**(10)**	**2-3**	**3-4**	**3.2.1**
Q6	**Answer the following questions**						**(10)**	**3-4**	**3-5**	**4.3.2**
(a)	**Design rapid sand filter for (size, underdrainage system and wash water troughs)** for the population of 5,00,000 for water demand of 150 lpcd.									
(b)	Explain the characteristic of a good disinfectant. What factors impact the use of disinfectants. Find chlorine consumed in kg/day and chlorine dosage in mg/L for the city with population of 10,00,000 if the residual chlorine **is 0.3 mg/L** and a **chlorine demand is 0.8 mg/L and average water demand of 120 lpcd.**						**(10)**	**3-4**	**2-4**	**3.4.1**
	Answer the following questions						**(20)**			
(a)	**Explain with short notes** (a) Electrodialysis (b) Reverse osmosis (c) Distillation						**(10)**	**1-4**	**1-2**	**4.2.3**
(b)	**Explain** the problems related to water and water pollution in Mumbai city and give unique solution of the problems						**(10)**	**2-3**	**2-3**	**2.2.3**

Formula Sheet

$$P_n = P_o\left[1+\frac{r}{100}\right]^n$$

$$P_n = P_o + nx + \frac{n(n+1)}{2}y$$

$$\log_e\left[\frac{P_s - P}{P}\right] - \left[\frac{P_s - P_o}{P_o}\right] = -kP_s * t$$

Al=27
Ca=40
C=12
O=16
S=32
Cl=35.5
H=1
Na=23
Fe= 55.5

WLR=Q/B
WLR= Q/2πR
DT= V/Q
SOR= 12-20 $m^3/d/m^2$

V= 0.849 C $R^{0.63}$ $S^{0.54}$
Leq = L_{50} +{ (L_{10} - L_{90})^2 / 60}
NC = L_{10} - L_{90}
SOR= 24-30$m^3/d/m^2$

$P_n = (P_o + n\bar{x})$ $r = \sqrt[t]{r_1 * r_2 * r_3 * ..... * r_n}$	Mg=24 Si=14	
SA=volume/SOR	G =300-700s^{-1} 0.5 min to 1 min	$P=\frac{1}{2} C_d \rho . A_p . v_r^3$ $C_d = 1.8\ for\ flat\ paddles$ $\rho = 998 kg/m^3$ $v_r = (1 - 0.25) v_p$
Ratio of length to diameter of lateral ≤ 60 Spacing of laterals= spacing of orifices= 150 to 300 mm Dia of perforations 5 to 12 mm (spacing 80 mm for 5 and 200 mm for 12mm) Total area of perforations≤ 0.5 Total c/s area of laterals Total area of perforation = 0.002 to 0.003 Entire filter area Area of manifold= 1.5 to 2 times laterals Rate of filtration = 300 to 500l/hr/m^2 Rate of filtration = 3000-6000l/hr/m^2 Max. demand= 1.8 Q	$v_s = \frac{1}{18} \frac{g}{v} (S_s - 1) * d^2$ Value of υ=1.002X10^{-6} m^2/sec $v_d = \sqrt{\left(\frac{8\beta}{f'}\right)(S_s - 1) dg}$ $f' = 0.025 - 0.03$ g=9.8m/s^2	Q/A; Q/ perimeter; Q/b; V/Q V= D^2 (0.011D+0.785H)
$G = \sqrt{\frac{P}{\mu * V}}$ μ=1.0087*10^{-3}Ns/m^2		$G * t = \frac{V}{Q} * \sqrt{\frac{P}{\mu V}} = \frac{\sqrt{PV/\mu}}{Q}$

ALL THE BEST