Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(An Autonomous Institution Affiliated to University of Mumbai)

Munshi Nagar Andheri (W) Mumbai 400058

End Semester Exam

May 2019

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

Class: T.Y. B. Tech | **Semester: VI**

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

Course Code: PC-BTC605

Instructions:

- **Attempt any five questions out of seven**
- **Draw neat sketches/diagrams wherever required**
- **Assume suitable data if necessary and state it clearly at start of**
- **Figure on right indicate maximum marks, course outcomes attained bloom's level and performance indicators for the given question**
- **Please start new question on the new page and all subsections should be included together**

READ INSTRUCTIONS BEFORE ANSWERING

QN	Description	Points	CO	BL	PI
Q1	**Answer the following questions:**	**(20)**	**1,2**		
(a)	**Define and explain** in short: (i) Ecology (ii) Ecological Pyramids (iii)Respiration Ratio (iv) Food Webs	**(10)**		**1,2**	**2.1.1** **2.3.2**
(b)	A farmer in Chandrapur harvests wheat from 4 plots of 1000 m^2 each at the end of the growing season. **Determine NPP and GPP** of a **grassland** if the dry masses for each plot: Plot 1 = 9000 kg, Plot 2 =12000 kg, Plot 3 = 10200 kg, Plot 4 = 12000 kg. A growing season was **only 6 months out of one year**.	**(05)**		**3,4**	**3.1.3** **3.2.2**
(c)	Describe **any one** of the following with respect to Kolhapur (i) Nitrogen Cycle (ii) Transfer of energy in ecosystem	**(05)**		**2**	**2.1.1**
Q2	**Answer of following questions:**	**(20)**	**1,4**		
(a)	A News item in down to earth on 15th August 2015. **Chandrapur** Super Thermal Power Station (CSTPS) 3340 MW have been spewing poison into the air for more than a decade now. Every day the air quality of Chandrapur is getting more and more polluted, **Chandrapur** is now the fourth most polluted city in India. The number of deaths per day due to air pollution in India has risen from 2,139 per day in 1990 to 3,238 in 2015. According to a Greenpeace India report people residing in Chandrapur are suffering from respiratory and stomach-related ailments. It has been seen by MPCB (Maharashtra Pollution Control Board) that the old unit of CSTPS exceeding the prescribed standard emissions limit several times. Analyse the reasons of air pollution in	**(10)**		**4,5**	**4.2.2**

	Chandrapur apart from CSTPS and classify them, state effects of air pollution on living and non living things. Describe in brief mitigation measures or solution to the problem of air pollution as an environmental engineer.				
(b)	Explain **any two** with short notes for Chandrapur (i) Water pollution (ii) Soil Pollution (iii) Thermal pollution **OR** Evaluate **L_{eq} Lavg** and **Noise climate** for the following noise levels observed **every minute for 15 minutes. Plot graph too** Noise levels in dbA= 60; 70; 55; 60; 65; 70; 75; 72; 81; 90; 92; 50; 40; 45; 56.	**(10)**		**1-3**	**3.1.2** **4.1.1**
Q3	**Answer the following questions:**	**(20)**	**2,3**		
(a)	There is a confluence of Irai and Zarpat rivers in Chandrapur. Chandrapur is a developing town and requires a water supply scheme. Explain the need of water supply scheme with components that could be considered in the water supply scheme (**draw the figure for water supply scheme**)	**(05)**		**3,4**	**3.1.2**
(b)	**Chandrapur** has many **small scale industries** around it. The king "Balal Sah" orders to find **physical, chemical and biological parameters of water of rivers to you.** As an environmental engineer **which parameters** should be considered? **List and explain** in detail parameters to be considered while deciding the quality of water at confluence.	**(05)**		**4,5**	**4.3.1**
(c)	Based on the parameters evaluated for confluence, draw a flowsheet of **water treatment facility** required for **Chandrapur** explaining the **reductions of important parameters** and **functions of various units** of the facility. It was observed that **odor and color** is present in water, **list down additional units** required to remove the impurities.	**(10)**		**4,5**	**5.1.1**
Q4	**Answer any two of the following questions:**	**(20)**	**2-4**		
(a)	List down the factors to be considered while selecting a site for an intake structure in **Irai and Zarpat**. There is a canal laid down for the city of Chandrapur. **Canal** intake is to be designed for **Chandrapur** with population 3,29,000 where canal runs for 10 hrs in a day with a depth of 2m. Design a canal intake and calculate head loss in intake conduit if treatment works are 0.8 km away. Draw a neat sketch. Assume average consumption as 120 lpcd. Assume velocity through the screen and bell mouth to be less than 16cm/sec and 32cm/sec respectively ($V = 0.85\ CR^{0.63}\ S^{0.54}$ Take C= 130)	**(10)**		**4,5, 6**	**5.2.1**
(b)	Design **rapid mixing unit/units** for Chandrapur for the year 2040 if the earlier census record are as follows. The average water demand to be considered is **120lpcd.** Year | Population 1980 | 1,50,000 1990 | 1,80,000 2000 | 2,40,000 2010 | 3,29,000	**(10)**		**5**	**5.2.2**
(c)	Design a paddle flocculator/flocculators for Chandrapur for 2040 with following details: Detention time= 15 min; Average G= $80s^{-1}$; Speed of paddles = 3 rpm K=0.25; $\mu = 1.0087X10^{-3}$ Ns/m^2; ρ=998 kg/m^3 at 20°C; Ratio of L: B= 3.	**(10)**		**5**	**5.2.2**

Q5	**Answer the following questions:**	**(20)**	**1-3**		
(a)	**Define:** WLR, G, Coagulation and flocculation, Short Circuiting in sedimentation tanks, MPN	**(05)**		**2**	**2.1.1**
(b)	**Design coagulant aided settling basin/basins** for Chandrapur for 2040 considering earlier data in Q4 (b). Provide the checks.	(05)		**5**	**5.3.1**
(c)	**Design rapid sand filtration unit with underdrainage system and wash water troughs** for Chandrapur for 2040 considering earlier data in Q4 (b). (no need to design wash water collection system)	(10)		**5**	**5.3.1**
Q6	**Answer the following questions:**	**(20)**	**1-4**		
(a)	Explain **requirement of disinfection**. Explain **breakpoint chlorination** and **dechlorination. Chlorine usage** in treatment of Chandrapur daily is 130 kg/day. The residual chlorine after **10 min contact** is 0.2 mg/L. Calculate dosage of chlorine in mg/L and chlorine demand in mg/L. Consider chlorine requirement for **2040 and earlier data of Q4 (b).**	**(10)**		**2,4**	**4.1.1, 3.1.1**
(b)	Explain process of **ion exchange**. Lime and soda were used for softening in **Chandrapur** for treatment of following impurities $CaCl_2$= 200 mg/L; $MgSO_4$ = 210 mg/L; NaCl= 140 mg/L; Mg $(HCO_3)_2$= 300 mg/L. Compute the quantities of chemicals required to Irai river for Chandrapur in year 2040. Assume **soda ash and lime purity 90%. (Consider data in Q 4(b))**	**(10)**		**3,4**	**4.3.1**
Q7	**Answer <u>any four</u> the following questions:**	(20)	1-4	**1,3**	**3.1.1**
(a)	Reverse Osmosis	(05)			
(b)	Incineration	(05)			
(c)	Landfills	(05)			
(d)	Elements of solid waste management	(05)			
(e)	Coagulant and coagulant aids	(05)			

Formula sheet

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

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

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

$$P_n = (P_o + n\bar{x})$$

$$r = \sqrt[t]{r_1 * r_2 * r_3 * ..... * r_n}$$

SA=volume/SOR

Al=27
Ca=20
C=12
O=16
S=32
Cl=35.5
H=1
Na=23
Fe= 55.5
Mg=24
Si=14

G =300-700s^{-1}
0.5 min to 1 min

WLR=Q/B
WLR= Q/2πR
DT= V/Q
SOR= 12-20 $m^3/d/m^2$
SOR= 24-30$m^3/d/m^2$

$P=\frac{1}{2}C_d\rho.A_p.v_r^3$

$C_d = 1.8\ for\ flat\ paddles$

$\rho = 998kg/m^3$

$v_r = (1-0.25)v_p$

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

$$G = \sqrt{\frac{P}{\mu * V}}$$

μ=1.0087*10^{-3}Ns/m^2

$$v_s = \frac{1}{18}\frac{g}{\upsilon}(S_s - 1) * d^2$$

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)

$$G * t = \frac{V}{Q} * \sqrt{\frac{P}{\mu V}} = \frac{\sqrt{PV/\mu}}{Q}$$

ALL THE BEST

Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)
Munshi Nagar, Andheri (W) Mumbai – 400058

End Semester Examination

May 2019

Program: T.Y. B.Tech (Civil) **Duration:** 03 hours

Course Code: PC-BTC 606 **Maximum Points:** 100 marks

Course Name: Theory of Reinforced and Prestressed Concrete

Semester: VI

Notes: 1) Attempt **any five** questions out of seven questions.
2) Use of **IS: 456-2000** code is permitted in exam.
3) Figures to the right indicate full marks.
4) Assume suitable data wherever required and state it clearly.

Q.No.	Questions	Points	CO	BL	PI
Q1.					
a)	With neat sketches, explain Steel Beam Theory.	05	CO1	L3, L4	1.3.1
b)	A simply supported beam 300 mm x 600 mm (effective) is reinforced with 5 bars of 25mm diameter. It carries a uniformly distributed load of 80 kN/m (including its self-weight) over an effective span of 6 m. Out of 5 main bars, two bars can be bent up safely near the supports. Design the shear reinforcement for the beam. Use M20 grade of concrete and Fe415 steel. Sketch the shear reinforcement details.	15	CO1	L1, L2, L3	1.3.1, 2.1.1, 2.1.2, 2.1.3, 2.2.2
Q2.					
a)	Design a simply supported roof slab for a room 7.5 m x 3.5 m clear in size. The slab is carrying an imposed load of 5 kN/m^2, floor finishing load of 0.8 kN/m^2. Use M20 grade of concrete and Fe415 steel. Unit weight of RCC = 25 kN/m^3. Sketch the reinforcement details.	15	CO1	L1, L2, L3	1.3.1, 2.1.1, 2.1.2, 2.1.3, 2.2.2
b)	A prestressed concrete beam of I-section has top flange of 1400 mm x 250 mm, bottom flange 700 mm x 180 mm, web is 150 mm wide, overall depth is 2400 mm. Determine the efficiency of the section.	05	CO2	L1, L2, L3	1.3.1, 2.1.1, 2.1.2, 2.2.2
Q3.					
a)	Design an RCC column 4 m high and effectively held in position and restrained against rotation at both ends. It is carrying, a load of 1500 kN. Use M25 concrete and Fe415 steel. Sketch the reinforcement details.	10	CO1	L1, L2, L3	1.3.1, 2.1.2, 2.1.3, 2.2.2

b)	The flange of an isolated T-beam is 120 mm thick and 1200 mm wide. The effective depth of the T-beam is 700 mm and the breadth of web is 300 mm. The beam is reinforced with 5 bars of 25 mm diameter. Determine the stresses developed in the concrete and the steel if the beam is subjected to a bending moment of 200 kN-m over a simply supported span of 6 m. Take modular ratio = 13.33.	10	CO1	L1, L2, L3	1.3.1, 2.1.2, 2.1.3 2.2.2
Q4.					
a)	A concrete beam of cross sectional dimensions 550 mm x 800 mm (overall) is prestressed with a tendon of parabolic profile. The eccentricity of the tendon is 150 mm at the centre of the span and zero at the supports. The prestressing force applied is 1700 kN. The beam is subjected to a uniformly distributed load of 55 kN/m including its self-weight over a span of 7.5 m. Compute the extreme fibre **stress at service stage** at the mid-span by applying the following approaches: a) **Stress Concept** and b) **Load Balancing concept**. Draw the resultant stress distribution across the section at mid-span.	15	CO2	L1, L2, L3	1.3.1, 2.1.2, 2.1.3 2.2.2
b)	Differentiate between short column and long column. What are the provisions made by IS: 456-2000 for design of long columns?	05	CO1	L3, L4	1.3.1, 2.1.1
Q5.					
a)	Design an RCC slab of size 5 m x 6 m (clear span dimensions), simply supported on 230 mm thick walls on all four edges with corners held down. The slab is carrying a total load of 4 kN/m^2 which includes live load and floor finishing load and excludes the self-weight of the slab. Use M20 concrete and Fe 415 steel. Sketch the plan of bottom reinforcement.	20	CO1	L1, L2, L3	1.3.1, 2.1.1, 2.1.2, 2.1.3, 2.2.2
Q6.					
a)	With a neat sketch, explain the Hoyer's system of pre-tensioning. What are the advantages of this system and where is this system used?	07	CO2	L3, L4	1.3.1
b)	What is meant by 'Kern' of a prestressed section? Write the	13	CO1	L1,	1.3.1,

	expressions to find the top and bottom kern of a section. Design the section of a doubly reinforced beam to resist a bending moment of 185000 N-m. The section of the beam is restricted to 350 mm x 700 mm. Assume 50 mm effective cover, M20 grade of concrete and mild steel reinforcement is used. Take modular ratio = 13.33		& CO2	L2, L3,	2.1.1, 2.1.2, 2.1.3, 2.2.2
Q7.					
a)	A prestressed concrete beam, 200mm wide and 300 mm deep is prestressed with wires of area = 320mm^2, located at an eccentricity of 50mm and carrying an initial stress of 1000 N/mm^2. The span of the beam is 10 m. Calculate the percentage loss of stress in wires if: i)The beam is Pre-tensioned & ii) The beam is Post-tensioned. Use the following data: E_s= 210 kN/mm^2, E_c = 35 kN/mm^2 Relaxation of steel stress = 6% of the initial stress Residual shrinkage strain = 300 x 10^{-6} (Pretensioning) = 200 x 10^{-6} (Post-tensioning) Creep coefficient = 1.6 Slip at anchorage = 1.2 mm Frictional coefficient for wave effect (k) = 0.0015 per metre	15	CO2	L1, L2	1.3.1, 2.1.1, 2.1.2, 2.1.3, 2.2.2
b)	What are the advantages of RCC over other construction materials? (State any two points). What are the assumptions made in working stress method of design? (State any three points)	05	CO1	L3, L4	1.3.1

**********GOOD LUCK**********

Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)
Munshi Nagar, Andheri (W) Mumbai – 400058

End Semester

Program: **UG Civil** **Duration: 3 Hours**

Course Code: MC-BT03 (Mandatory audit) **Maximum Points: 100**

Course Name: Environmental Studies **Semester: VI**

Notes:

- Question one is compulsory
- Attempt any **four of the remaining six**
- 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**

Q.No.	Answer the Questions	Points	CO	BL	PI
Q1 (A)	**Fill in the blanks** I. _____ and _____ are the coagulants used in water treatment. II. _____ and _____ are gases given by auto exhausts III. Two devices used to control gaseous air pollutants are_____ and_____ IV. _____ and _____ are two types of plumes given out by stack in specific atmospheric conditions V. Ecological pyramid is made up of _____ VI. The provision of settling tank in wastewater is done to remove _____	(10)	2, 3	1,3	1.3.1 2.3.2
Q1 (B)	Explain in short ecology, ecosystem and concept of productivity	(10)	2	3	1.3.1
Q2 (A)	Explain sustainability and 17 SDGs. What measures could be taken up by common citizens towards SDGs	(10)	1,2	1, 6	2.1.3 3.1.6
Q2(B)	Explain green building. Which are the various organization which give green building ratings. Explain the criteria considered for the same	(10)	1,3	6	2.2.3 3.1.6 4.1.1

Q3 (A)	Define air pollution. Classify the air pollutants and enumerate impact of these on humans, animals and materials	(10)	1-3	5,6	4.1.1
Q3 (B)	Define Noise pollution. Explain sources, impacts and control methodology for the same	(10)	1-3	5,6	4.2.1
Q4 (A)	What causes air pollution episodes? Explain any two of them	(10)	1-3	5,6	4.1.1
Q4 (B)	Define Water pollution. Enumerate water pollutants with problems associated	(10)	1-3	4,5	3.4.2
Q5 (A)	Draw flowsheet for surface water treatment with functions of each unit	(10)	1-3	6	4.1.1
Q5 (B)	Draw flowsheet of wastewater treatment with functions of each unit	(10)	1-3	6	4.2.1
Q6 (A)	Explain with short notes (**any four**) (i) Food webs and food cycles (ii) Sulphur cycle (iii) Thermal pollution (iv) Soil remediation (v) Energy transfer in ecosystem	(20)	1-3	6	4.1.1
Q7 (A)	Give salient features related to Water Act 1974	(10)	4	5	5.1.3
Q7(B)	Give salient features related to Air Act 1981 OR Give salient features related to EPA, 1986	(10)	4	5	5.1.3
	ALL THE BEST				

Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)
Munshi Nagar, Andheri (W) Mumbai – 400058

End Semester Examination – May,2019

Program: B. Tech. Civil **Duration: 3 Hr.**

Course Code: PC – BTC – 604 **Maximum Points: 100**

Course Name: Transportation Engineering - II

Semester: VI

Notes: Assume suitable data if required

Q.No.	Questions	Points	CO	BL	PI
Q.1.	Write short notes on (solve any four)	20			
	i. advantages and disadvantages of road Transportation ii Classification of Road as per Nagpur Plan iii. Third 20 years Road Development Plan iv. Basic Requirement of an Ideas Alignment v. Revised PRA system for classification of soils		01	01	1.5.1
Q.2.					
a	Discuss following geometric features for different class of roads as per IRC guide line. (i) Carriageway (ii) Shoulders (iii) Right of way (iv) Camber	10	01	01	1.5.1
b	The area of the certain district in India is 23, 400 km^2, the number of towns as per 2001 census is 17. For a road density of 82 km per 100 km^2 area, calculate the length of various categories of Road as per third 20 year's road development plan	10		04	3.5.5
Q.3.					
a	Enlist sight distance. Derive the expression for stopping sight distance.	06	01	02	1.7.1
b	What is extra widening, derive the expression for extra widening, draw a neat sketch showing extra widening.	07		02	1.7.1
c	Calculate the stopping sight distance on a highway at a descending gradient of 2 % for a design speed of 80 km/hr. Assume other data as per IRC recommendation. Total reaction time = 2.5 sec.	07		04	3.7.1
Q.4.					
a	Discuss the Laboratory Procedure of calculating soaked CBR value of subgrade soils. How will you apply the correction to the load penetration curve	10	02	02	5.4.1
b	Differentiate flexible pavement and rigid pavements	05		01	1.5.1
c	Discuss Equivalent single wheel load (ESWL)	05		01	1.5.1
Q.5.					
a	Calculate the GI value of subgrade soil shown in Table I	06	02	03	3.5.5
b	Write short notes on Vegicle Damage Factor	06		01	1.5.1
c	Describe the different types of traffic island.	08	04	01	1.5.1

Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai – 400058

End Semester Examination – May,2019

Q.6.					
a	Discuss briefly the characteristics of an ideal site for a bridge.	06	03	01	1.5.1
b	Explain afflux and scour depth.	06		02	1.5.1
c	Discuss the different methods for determining the flood discharge?	08		02	1.5.1
Q.7.					
a	Wheel load stress as per westergard's approach	05	02	02	1.5.1
b	Construction of WBM roads	05			1.5.1
c	Burmister's method for Flexible Pavement Design	05			1.5.1
d	Explain different types of traffic sign	05	04		1.5.1

Table - 1

Properties of subgrade soils	Soil - A	Soil - B	Soil - C
Passing 2.0 mm sieve	74 %	94 %	68 %
Passing 0.425 mm	---	---	---
passing 75 micron	30 %	50 %	45 %
Liquid limit	60 %	50 %	55 %
plastic limit	31 %	43 %	35 %

Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai – 400058

End Semester Examination May 2019

Civil Engineering

Max. Points: 100 **Duration:** Three Hours

Class: T.Y. (Civil), Semester: VI **Program:** U.G. (B. Tech. Civil)

Name of the Course: Hydraulic Engineering-II **Course Code :** PC-BTC603

Instructions:

i. Attempt ***Any Five*** questions
ii. All questions carry equal marks
iii. Answer to each question to be started on the fresh page
iv. Assume suitable data if necessary and mention it clearly.
v. Draw neat diagrams and indicate it clearly.

Q. No.	Questions	Points	CO	BL	PI
1	(a) Explain the concept of fluctuation of velocity and shear stress in turbulent flow. Also explain Reynold's theory and Prandtl's mixing length theory.	10	CO1	BL2	1.2.1
1	(b) A 300 mm diameter water supply pipe had a friction factor of 0.02 when freshly laid. After 10 years of service the friction factor was found to be 0.025. What friction factor can be expected after another 15 years? The pipe can be assumed to be in rough–turbulent flow regime.	10	CO1	BL4	1.3.1
2	(a) Assuming that the shear stress distribution in a laminar boundary layer is such that $\tau = \tau_0 (1-y/\partial)$. Calculate the displacement and momentum thickness of this boundary layer in terms of ∂.	10	CO1	BL4	1.3.1
2	(b) The velocity distribution in the boundary layer of a flat plate is prescribed by the relation $u/U_0 = \text{Sin}\,[(\pi/2).(y/\partial)]$. Develop an expression for boundary layer thickness in terms of Reynold's number using momentum integral equation.	10	CO1	BL4	1.3.1
3	(a) Explain with neat sketch the development of lift force on a cylinder due to circulation and derive an expression for the magnitude of lift force called as Magnus effect.	10	CO4	BL2	1.2.1
3	(b) A flat plate 1m x 1m, moves at 6.5 m/sec normal to its plane. Compute the resistance of the plate when the surrounding fluid is (i) air with mass density 1.3 kg/m^3 and (ii) water with mass density 1000 kg/m^3, Assume C_D =1.15 for both the cases.	05	CO4	BL4	1.3.1
3	(c) A kite is in the form of a rectangular airfoil with the chord length of 60 cm and a width of 45 cm and weights 0.80 N. It is maintained at an angle of 10^o to horizontal and the string makes an angle of 30^o to the vertical. If the wind speed is 15 km/Hr. and C_D is 0.25. Estimate the tension in the string and the lift coefficient. Take ρ_{air} = 1.2 kg/m^3.	05	CO4	BL4	1.3.1

4	(a) Differentiate between flow through pipe and flow through open channel. Also define and explain for channel flow: Prismatic and Non-prismatic channels, Steady and unsteady flow and Uniform and non-uniform flow.	10	CO2	BL2	2.2.4
4	(b) A trapezoidal channel with bottom width of 3.5 m and side slopes 1H: 1V on the left and 1.5H: 1V on the right, with n =0.016, and bed slope of 2.6 in 10,000 carries a discharge of 8 m^3/sec. Determine the normal depth and the average shear stress on the channel bed.	10	CO2	BL5	3.4.1
5	(a) Explain the significance of Specific energy, momentum equation and Specific force in an open channel flow. Discuss the criteria for minimum specific energy and maximum specific force.	10	CO3	BL2	2.2.4
5	(b) In a rectangular channel 3.5 m wide laid at a longitudinal slope of 0.0036, uniform flow occurs at a depth of 2 m. Find how high can the hump be raised without causing afflux? If the upstream depth of flow is to be raised to 2.5 m, what should be the height of the hump? Take Manning's n = 0.015.	10	CO3	BL5	3.4.1
6	(a) A rectangular flume 2 m wide carries discharge at the rate of 2 m^3/sec. The bed slope of the flume is 0.004. At a certain section the depth of flow is 1m. Calculate the distance of the section downstream where the depth of flow is 0.90 m. Solve by single step method. Assume rugosity coefficient as 0.014. Is the slope of the channel mild or steep? How is this type of surface profile classified?	10	CO3	BL5	3.4.1
6	(b) A hydraulic jump is formed in a 5 m wide outlet at a short distance downstream of control gate. If the flow depths are 10 m and 2 m the u/s and d/s respectively of the sluice gate and discharge Q = 150 m^3/sec, determine (i) Flow depth downstream of the jump, and (ii) Head loss in the jump.	10	CO3	BL4	4.3.4
7	(a) Find the expression for the drag force on a smooth sphere of diameter 'D', moving with a uniform velocity of 'V' in a fluid of density 'ρ' and dynamic viscosity 'μ'. Use Rayleigh's method.	10	CO5	BL4	5.1.1
7	(b) Obtain an expression for the thrust (F) developed by a propeller which depends upon the angular velocity (ω), approach velocity (V), dynamic viscosity (μ), density (ρ), propeller diameter (D) and the compressibility of the medium measured by the local velocity of sound (C). Use Buckingham's-π method.	10	CO5	BL4	5.1.1

****

Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai – 400058

Final Semester - May 2019 Examinations

Program: Civil Engineering

Course Code: PC-BTC602

Course Name: DDSS

Duration: 3 Hours

Maximum Points: 100

Semester: VI

Instruction: Candidates should read carefully the instructions printed on the question paper and on the cover of the Answer Book, which is provided for their use.

NB:

1) Question No. **One** is compulsory.
2) Out of remaining questions, attempt any **four** questions.
3) In all **five** questions to be attempted.
4) All questions carry equal marks.
5) Answer to each new question to be started on a fresh page.
6) Figures in brackets on the right hand side indicate full marks.
7) Assume Suitable data if necessary
8) IS800:2007 Code & Steel table is allowed

Q.No.	Questions	Points	CO	BL	PI
1	1. Explain the complete procedure for wind load calculations 2. List & explain the parameters affecting the lateral stability of flexural member 3. Specify classification of structural connection. Explain with sketches and graph 4. List all the parameters affecting the compressive strength	20	1	1,2	
2	A)Design a single angle to carry a tension of 75 kN. Use M16 bolts for end connections having class 4.6. Yield & ultimate strengths are 250 & 410 MPA.	(10)	1	3,4	
	B)Design bolted stiffened seat angle connection between the beam ISMB350 and column ISHB300 for a factored reaction from beam equal to 260 kN. Use M20 bolts of 4.6 grade and steel 410 with fy = 250 MPa	10	1	3,4	

Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai – 400058

Final Semester - May 2019 Examinations

3	A)Find the compressive strength of ISHB200 having a top & bottom cover plate of 300x20. The unsupported length is 7 m. one end is fixed & other hinged about y axis & both end fixed about z axis B)Design the welded seat angle connection between the beam ISMB250 and column ISHB200 for a factored reaction from beam equal to 100 kN.	(12), (8)	1 1	2,3,4 2,3,4	
4	Design Battened column with channels back to back to working load of 1100 kN. Unsupported length is 10 m with both end pinned. Take welded connection. (20)	(20)	1	2,3,4	
5	A)Design a suitable I beam for a simply supported span of 9 m. and carrying a point load of 250kN at mid span. Take FY = 250 MPA. Assuming it is restrained laterally but having stiff bearing B)A beam ISMB400 transfers a factored load of 250 KN to a column ISHB400. Using Fe410 grade steel design the stiffened seat connection with welding	(12) (8)	2 2	2,3,4 2,3,4	
6	Design a welded Gusseted base for a column ISHB350 having working load of 1300kN, yield strength 250 MPA & use M25 grade of concrete	(20)	1	2,3,4	
7	A)Design a laterally unsupported beam of span 5 m & subjected to uniformly distributed load of 60kN/m. Both ends hinged. B)Design the welded cleat angle connection between the beam ISMB200 and column ISHB200 for a factored reaction from beam equal to 70 kN.	(10), (10)	2 2	2,3 2,3	

Bharatiya Vidya Bhavan's

Sardar Patel College of Engineering

(A Government Aided Autonomous Institute)

Munshi Nagar, Andheri (West), Mumbai – 400058

END SEM-EXAMINATION

May 2019

Program: Civil Engineering

T. Y. B. Tech.

Duration: 3 hrs.

Course code: PCBTC601

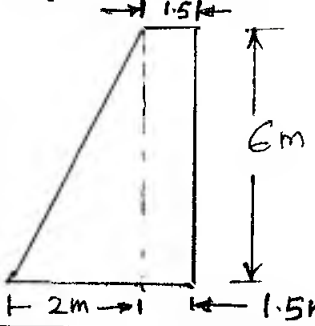
Maximum Marks: 100

Name of the Course: Geotechnical Engineering-II

Semester: VI

Instructions:

1. **Question No 1 is compulsory**
2. **Out of Question 2 to Question 7 attempt any 4 questions.**
3. Neat diagrams must be drawn wherever necessary.
4. Assume Suitable data if necessary and state it clearly

Que. No.		Points	CO	BL	PI
Q1(a)	A retaining wall 7.5 m high retains a cohesionless backfill. The top 3m of the fill has a unit weight of 18 KN/m³ and ϕ= 30° and the rest has unit weight of 24 KN/m³ and ϕ= 20° Determine pressure distribution on the wall also draw pressure distribution Diagram.	7	CO2	BL3	1.3.1
(b)	Discuss the functions and properties of geotextiles in reinforced earth structures	5	CO1	BL1	1.2.1
(c)	Discuss the factors affecting bearing capacity of a soil	4	CO2	BL1	1.2.1
(d)	Discuss how efficiency of pile group by Feld's rule is calculated for 4, 5 and 6 piles in group.	4	CO1	BL4	1.2.1
Q2(a)	A masonry retaining wall is 1.5 m wide at the top 3.5 m wide at the base and 6m high.	9	CO2	BL3	1.3.1
	It is trapezoidal in section and has vertical face on the earth side. The backfill is leveled with top. The unit weight of the fill is 16 KN/m³ for top 3m and 18 KN/m3 for the rest of the depth. The unit weight of masonry is 23KN/m³. Determine total lateral pressure on the wall per meter run and maximum and minimum pressure intensities of normal pressure at the base. ϕ= 30° for both grades of soil. 				
(b)	Discuss the classification of underground conduits.	6	CO1	BL1	1.2.1
(c)	Explain braced cuts.	5	CO1	BL1	1.2.1

Q3(a)	Using Terzaghi's Theory determine the ultimate bearing Capacity of a strip footing 1.5 m wide resting on a saturated clay (cu= 30kN/m^2 , ϕu=0 & saturated weight is 20kN/m^3) at a depth of 2m below ground level . The water table is also at a depth of 2m from ground level. If water table rises by 1m, calculate the percentage reduction in the ultimate bearing capacity. ϕ= 0°; c=0; N_q=1.0 and N_γ=0, Nc=5.7	8	CO2	BL3	1.3.1
(b)	Discuss the classification of retaining wall	6	CO1	BL1	1.2.1
(c)	Discuss about Engineering news Formula	6	CO1	BL2	1.2.1
Q4(a)	Discuss the Plate load test as per IS 1888:1982	10	CO1	BL2	1.2.1
(b)	Brief the importance of Pile load test	4	CO1	BL2	1.2.1
(c)	Draw pressure distribution diagram for cantilever sheet pile in granular soil	6	CO1	BL3	1.3.1
Q5(a)	A group of 9 piles, 10 m long is used as a foundation for bridge pier. The piles used are of 30cm dia with center to center spacing of 0.9m. The subsoil consists of clay with unconfined compressive strength of 1.5kg/cm^2. Determine the efficiency neglecting the bearing acting. Adhesion factor =0.9	8	CO2	BL3	1.3.1
(b)	Discuss in detail about whether foundation soil is likely to fail in local shear or general shear failure	6	CO1	BL4	1.4.1
(c)	Draw the pressure distribution diagram for submerged backfill, partly submerged backfill and backfill with uniform surcharge for active state by Rankine's theory.	6	CO2	BL2	1.3.1
Q6(a)	Explain mechanism of reinforced earth along with the purpose of reinforcement.	8	CO2	BL1	1.1.2
(b)	A smooth retaining wall 6m high retains dry granular backfill weighing 16kN/m^2 to its level surface. Active thrust on the wall is 96kN/m of the wall. What will be the total active thrust if the water table come up to backfill surface. G=2.65.	6	CO2	BL3	1.3.1
(c)	Discuss Coulomb's wedge theory	6	CO1	BL2	1.2.1
Q7(a)	A Cohesionless soil with a void ratio of 0.6, G=2.65 exists at a site where the water table is located at a depth of 2m below the ground surface. Assuming a value of coefficient of earth pressure at rest Ka= 0.5. Calculate the following quantities at a depth of 5m below the ground surface total stress σ_v and σ_H and effective stress σ_v' and σ_H'	6	CO2	BL3	1.3.1
(b)	Discuss the effect of water table on bearing capacity	8	CO2	BL2	1.2.1
(c)	Explain about the settlement calculations of friction piles.	6	CO1	BL5	1.2.1